NATIONAL MEAT AND POULTRY

CODE

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PART 1 & 2
INTERPRETATION AND PURPOSE

Reference: Part 1 & 2 - Sections *2 & 3 of the National Meat & Poultry Regulations*

INTERPRETATION

The National Meat & Poultry Regulations constitute the legal basis under which the national meat inspection system is carried out in establishments registered under these regulations.

< The National Meat & Poultry Code is the interpretative guideline or the manual of procedures that is more detailed and specific, as to what is required, what has to be done and outlines how compliance is achieved in order to meet the objectives.

PURPOSE

< The purpose of the National Meat and Poultry Regulations and Code is to ensure that no meat product derived from an animal slaughtered in an establishment and no meat products that are processed in an establishment can be sold in Canada unless it is produced and inspected in accordance with the Regulations and Code.

PART 3 - APPLICATION AND LICENCES

Reference: Part 3 - Sections 4, 5 & 6 of the National Meat & Poultry Regulations

Introduction

The principles applied to the development of national norms or standards for food animals slaughtered and meat products processed at establishments are outlined as described below:

(a) The role of government, either Federal or Provincial, should be to monitor food operations and products to verify food products are slaughtered, processed, transported, stored and offered for sale under acceptable sanitary conditions, and that the food products are safe for human consumption.

(b) The role of industry includes complete responsibility for production, processing, transportation and sale of food products under acceptable sanitary conditions and ensuring safety for human consumption.

(c) Prescribed standards should be related to health, safety and public expectations for aesthetic quality requirements acceptable in Canada and not related to additional demands placed on operations by importing countries.

(d) The standards should be clearly defined for the benefit of both the industry and the consuming public, and it is the responsibility of the appropriate Regulatory Authority to justify and support prescribed standards in a meaningful way.

(e) At the outset of any program which relates to application of standards, it is reasonable that the standards should be applied, in total, to all new plants. With respect to existing plants, it is possible to apply negotiated time frames for standards other than those directly related to consumer health and safety.

(f) It is essential that the humane slaughter provisions of legislation be applied to all establishments engaged in the slaughter of food animals. There may be certain adjustments required on methods of application, but the intent and principles must remain intact.

(g) The main emphasis should be placed on the purpose and intent of the legislation and standards. There should be sufficient flexibility in application of standards to enable incorporation of newer methods and techniques and to accommodate proposals for change where the purpose and intent can be maintained.

(h) There should be a process established whereby industries in particular, and the consuming public in general, are permitted a continuing review of the standards prescribed and efforts made to accommodate any valid proposals for change.

(i) While the national norms or standards are the major component in ensuring safe, wholesome, meat products, they should be developed with a view toward achieving a total objective of safe meat products at all stages from production to consumption.

(j) It is recognized that there are Federal, Provincial and Municipal requirements with respect to meat slaughter plants which are not specifically related to the development of these standards. It is assumed that, in addition to these standards, the general laws of the land apply.

This chapter covers the requirements in regard to facilities at all establishments. In those establishments where operations are specialized, some of the information provided is superfluous.

Manual Updates

In order to provide updates of this manual on a regular basis, serially numbered amendments will be issued. The information in these amendments will be incorporated in the manual by replacing revised pages with new pages provided with the amendments. The new pages will include dates of revisions.

3.0 Application

3.1 Establishment Application

Parts 1 (interpretation), 2 (purpose), 3 (application and licences) and Parts 4 to 16 of the Code shall apply to every establishment in Canada. In other words the National Meat and Poultry Regulations and Code shall apply to an establishment in Canada in which;

(i) animals are slaughtered for use in a meat product intended for sale or other distribution to consumers as food; or

(ii) an establishment which engages in both the slaughter of animals for food and the processing of meat products, the storage, packaging, transportation or otherwise handling for sale or other distribution to consumers as food;

(iii) operators and workers in an establishment described in paragraphs (i) and (ii); and

(iv) all meat products produced in an establishment described in paragraphs (i) and (ii).

3.2 Licensing Protocol

3.2.1 Approval and Licensing of an Establishment

The purpose of this section is to outline a framework which provides for the approval and licensing of meat establishments, while recognizing the diverse legal and administrative requirements in the provinces and federal government.

An application for the licensing of an establishment for one or more of the following activities shall be made to the appropriate *Regulatory Authority* of the province in which the establishment is located or is to be located, in a form approved by the *Regulatory Authority*.

Operators of meat plants shall make an application to the appropriate *Regulatory Authority* for the license of an establishment, for:

1. A newly constructed premise, in Canada, intending to operate as an establishment for the purpose of slaughter of food animals and/or with combined meat processing operations.

2. An establishment that intends to remodel or make changes to an existing facility for the slaughter of food animals and/ or with combined meat processing operations.

3.2.2 License to Operate

Approval to operate an establishment shall be confirmed by a variety of formal designations including the issuance of a license, certificate, permit or registration. The type of formal approval will be determined by the appropriate *Regulatory Authority* having jurisdiction, but herein referred to as a license.

The *Regulatory Authority* will generally issue a license after:

(a) Submission and approval of a properly completed application form.

(b) Submission and approval of blueprints or plans.

(c) A final inspection verifying that the establishment has been constructed in accordance with the approved plans and specifications.

(d) Where appropriate, payment of any required license fees.

Generally, licenses are not transferrable from one operator to another, or from one establishment to another, etc. Application forms will be completed whenever an operator changes ownership of an establishment.

There shall not be more than one operator for an establishment at anytime. However, an operator may use any business name listed on the operator's licence for the purpose of labelling.

Operations under inspection shall not be permitted to commence until the operator has received acceptance by the appropriate *Regulatory Authority*. Acceptance of an establishment shall verify that the operator has completed and complied with all necessary written programs and requirements of the National Meat and Poultry Regulations and Code. In addition, establishments shall be properly equipped with appropriate stamps, labels and recipe registrations, etc.

3.2.3 Renewal of the Licence to Operate an Establishment

The licence to operate an establishment shall be renewed yearly by a representative of the appropriate *Regulatory Authority*. A licence shall not be renewed when an operator:

(a) has not complied with standards or provisions of the National Meat and Poultry Regulations and Code;
(b) owes any outstanding fees.

3.2.4 Modification to the Status of an Establishment/Operator

In the case of a change in ownership or operator, the applicant is strongly advised to seek information regarding the state of compliance of the establishment before assuming ownership or operations. Relevant information in this regard may be obtained from the appropriate *Regulatory Authority*. Before releasing the above information to a third party, the *Regulatory Authority*, should have written confirmation from the owner/operator that he or she does not object to the release of the information.

3.3 General Construction Requirements

It is expected that every precaution will be taken such as, for example, soil testing to assure the best possible foundation and thereby minimize the settling and sagging of the building intended for the registration of an establishment.

The materials used in the construction of an establishment shall be those which are not only

sufficiently strong and durable, but which will promote satisfactory maintenance inside and out. Masonry and steel construction have proven to be the most acceptable to date for this purpose. *Refer to Part 4, Establishment: Design and Facilities for additional information and requirements regarding section 3.3 of this part.*

3.3.1 Municipal, Provincial and Other Federal Regulatory Requirements

Prior to site selection, plan development, and establishment construction, it is essential that all legislative or regulatory requirements of Municipal Corporations, Provincial and Federal governments are known. In many instances the initial action will be assuring that land use and zoning requirements, as well as building codes are recognized. It is important that land use conflicts or potential conflicts be recognized and addressed at the outset.

An operator must give written assurance that the location, construction, facilities and nature of operation are in accordance with all applicable ordinances. This may necessitate submission of a building permit, as well as written assurance from the appropriate authorities, indicating compliance with environmental requirements.

3.3.2 Location and Site

3.3.3 Location

Establishments that slaughter and process meat products should be located at a site which is free from conditions that may interfere with the sanitary operation of the establishment (e.g. set reasonably apart from barnyards, stables, dead meat operations, waste disposal facilities, offensive trades or any source of pollution or any place that harbors insects, rodents or other vermin likely to cause meat or meat products in the plant to be contaminated).

3.3.4 Selection of a Site for an Establishment

The principal considerations are:

(a) Availability of an adequate supply of potable water. A copy of a recent water potability test result should be submitted along with blueprints for a new establishment.

(b) Satisfactory means of garbage disposal.

(c) Connection into a municipal sewerage system. Other means of disposal may be considered.

(d) Satisfactory access to the site.

(e) The site must be of adequate size for immediate needs and should provide for possible future expansion of operations.

(f) The site must be such as to promote good drainage and provide a suitable base for construction of an establishment.

3.4 Application for Approval

Application for approval for slaughter and processing plants shall be made to the appropriate *Regulatory Authority* having jurisdiction. The Authority will review the proposal, with Municipal Corporations if necessary, and will ensure, that all other Municipal and Provincial requirements have been secured or addressed by the applicant.

It is proposed that a listing of Regulatory Authorities will be developed, attached to this document as an appendix, and be updated at least once per year. The objective of this appendix would be to assist industry and the public in identification of responsible *Regulatory Authorities*.

3.4.1 Application Detail-Blueprints (Plans and Specifications)

All plans and specifications must be carefully reviewed, and agreed upon by all parties, before commencement of any construction. Until advised of the acceptability of plans and specifications, it is most important that the applicant refrains from acquiring property or from undertaking construction or renovation.

Failure to observe this advice may result in unnecessary expense and inconvenience to the operator.

An operator shall notify the *Regulatory Authority* upon completion of construction or alteration of an existing operation. As a general practice, a final inspection will be conducted by the appropriate *Regulatory Authority* to verify that the premise has been constructed and equipped in accordance with the approved plans and the National Meat and Poultry Regulations and Code.

3.4.2 Preparation and Contents of Plans and Specifications

The drawings must be to scale and include the following information:

(a) the name and address of the applicant or operator;

(b) a plot plan showing the boundaries of the site; location of the structure or proposed structure in respect to other buildings or structures; streets, driveways and parking sites; railway lines; sewer lines; wells; gas and water mains and power lines; and the separation distances from other industrial, commercial, municipal and residential structures and drinking water sources. The scale and the north point shall be shown;

(c) a floor plan of each level of the establishment, showing the purpose for which each room or area is to be used, location of walls, partitions, windows, doors, posts, rail support systems and equipment on the floor or in an elevated position, e.g., draw-off fans, refrigeration units;

(d) a floor plan showing the location and size of floor drain inlets and drains, location and size of direct drains for pieces of equipment using large amounts of water, curbing, gutters, and slope of floors toward drains, hot and cold water outlets, water flow (entry into the plant from the main when water is coming from a municipal source or the location and type of well, the location, size and construction material of water storage tanks (if applicable), potable and non potable water sources and their lines throughout the plant), etc.;

(e) the sewage disposal system to be used (e.g., municipal or private);

(f) the ventilation system proposed for the plant;

(g) the exterior elevations of the building, showing doors, windows, platforms, etc.;

(h) a cross-section of the establishment showing ceiling heights and other pertinent information;

(i) a roof plan showing skylights, vents, drainage and other pertinent information;

(j) a schedule of room "finishes" on or attached to the plans, including a schedule of door sizes, construction and type of door frames, etc.;

(k) the details of construction (including a finishing schedule) for floors, walls, doors, ceiling and appropriate cross sections;

(l) an equipment layout with accompanying "flow charts" of operations. The design and construction of the equipment must also be shown and, where necessary, cross-sections provided to show method of construction and operation;

(m) production flow diagrams which indicate employee traffic patterns and product flow (raw product and finished product) throughout the entire establishment. If there are some risks of product cross-contamination due to incompatible operations (edible and inedible, raw and a ready-to-eat products etc.), this must be indicated in the flow diagrams and accompanied by the applicants proposed written operational controls to prevent product cross-contamination risks;

(n) where the plans refer to alterations to an existing establishment, sufficient description should be made of the surrounding rooms as well as those above and below. The principal area of change shall be shown so as to give a comprehensive explanation of the nature, extent and impact of the proposed changes. This may be accomplished by attaching copies of plans of the existing layout and construction. Whenever changes in slaughter operations are involved, the proposed maximum number per hour, for each animal species to be slaughtered, shall be provided;

(o) the procedures for humane slaughter;

(p) the procedures for blood collection or disposal;

(q) the source of water to be identified. Where a well is the source of potable water, its location is to be indicated on the site plan;

(r) the method of handling and disposal of inedible and condemned products to be identified;

(s) the maintenance temperature of reduced temperature rooms; and

(t) details of live holding and sick pen areas;

An applicant shall submit completed application forms, blueprints and specifications as described above to the appropriate *Regulatory Authority* for evaluation and acceptance.

PART 4

ESTABLISHMENT DESIGN & FACILITIES

PART 4
ESTABLISHMENT: DESIGN & FACILITIES

PART 4 - ESTABLISHMENT: DESIGN & FACILITIES

Establishment Design, Construction
Compatibility of Operations and Operational Controls

Reference: Part 4 - Sections 7, 8, 9, 10, 11, 12, 13, 14 of the National Meat & Poultry Regulations

OUTCOME REQUIRED

Premises where meat products are manufactured are located, designed, constructed and maintained in a manner that consistently:

< minimizes the risk of contamination of a product;

< permits the operation therein to be performed under sanitary conditions appropriate for safe meat production; and

< permits and facilitates appropriate maintenance, cleaning and sanitizing.

RATIONALE

< The design and construction of buildings for the manufacture of meat should incorporate features that prevent hazards that might adversely affect the safety of the meat.

< These features provide suitable environmental conditions, permit adequate cleaning and sanitation, minimize migration of extraneous material, prevent access by insects and other animals, and allow employees to fulfill their duties. Product flow and employee traffic must be appropriate to prevent cross contamination.

< Regular maintenance is required to maintain adequacy of premise.

4.0 General

4.1 Definition

As defined in the Regulations.

4.2 Location and General Construction Requirements (External)

4.2.1 Location of an Establishment

An establishment that operates as a slaughter abattoir for food animals and the processing of meat products, shall be situated on well-drained land. The grading surrounding the building shall be such, that, water drains away from the structure and the likelihood of water accumulation are minimized. Land that is well drained can prevent possible deterioration of the building due to moisture, contamination and/or possible physical, chemical and biological hazards that may affect operations within a premise.

Should an existing premise be located on land that does not adequately drain, and at times, water accumulates, an operator shall develop effective control programs in order to remove accumulative water and/or sources of contamination.

Prevention should be the main focus when developing a maintenance program that services the building premises, well as, the boundaries of the property site. It is important that the building and the outside property be regularly maintained to correct deficiencies before problems create serious hazards to the property and the premises. Property and building maintenance programs should identify deficiencies (a short term or long term corrective actions) and provide appropriate corrective actions, in order to maintain the building in sound condition and to discourage sources of contamination.

4.2.2 Access to Building /Debris, Waste, Refuse

The surrounding property of an establishment should be of either compressed stone, or compacted gravel and/or paved materials such as asphalt or concrete. Should an existing establishment contain outside areas that are unpaved, an operator shall develop written programs that describe methods and frequencies applied in order to control and reduce excessive dust.

Access to the building site should be regularly maintained to facilitate carrier transport and operational activities, such as loading and unloading procedures. Outside areas shall be maintained free of any obstruction and accumulation of debris and garbage.

The property of an establishment shall receive regular property maintenance programs and shall be maintained tidy and organized at all times. Exterior areas shall be free of garbage, waste materials and unnecessary accumulative items, such as, the storage of obsolete equipment. Should it be necessary to store various items for a period of time, the designated storage areas shall be accessible and shall not provide areas for possible harborage of pests or other sources of contamination.

Waste container units, used for the collection and/or storage of garbage materials shall be appropriately covered and/or removed at frequencies to minimize contamination or infestation of

rodents.

4.2.3 Sources of Contamination

Establishments that are situated on land that is dependent on, or share the same property as live animals, or principal residences, or, other possible sources of contamination, may require a physical barrier that clearly identifies, protects and surrounds the boundaries of an establishment. The physical barrier shall act as a deterrent from entry of pests, live animals, cats, dogs, wild animals, etc. Operational controls, which have proven to be effective, shall also be considered in lieu of physical barriers, providing an operator implements and maintains such operational controls.

Should surrounding neighboring businesses impose potential hazards on the property site and ultimately the establishment, it is the responsibility of operators' to initiate immediate and appropriate actions in order to correct the situation and to maintain compliance with the National Meat and Poultry Regulations and Code. Generally a minimum set back of 30 meters is recommended from potential sources of contamination. However, a greater or lesser distance could be found acceptable depending on specific site conditions and agreement of the appropriate *Regulatory Authority*.

An operator shall implement and maintain effective pest control programs in order to discourage entry locations and possible habitation of rodents, flies, vermin and any other sources of potential contamination. (*Refer to Part 6, Maintenance and Sanitation, for further details and requirements for a pest control program).*

4.2.4 Exterior Construction of an Establishment

An establishment shall have exterior walls, roof and foundations that are composed of sound building materials that have proven to be durable and can be easily maintained, in order to minimize pollutants, contamination, deterioration and infestation of rodents, vermin, insects from entering the building and/or causing structural damage over a period of time.

Building materials shall be suitable for the intended manufacturing operations, (i.e. slaughter of food animals and processing of meat products), in order to maintain sanitary conditions within the establishment and to prevent possible biological, physical and/or chemical hazards, as a result of materials used to construct the establishment. Such materials may consist of:

Exterior Construction of an Establishment

- pre-cast cement
- poured smooth concrete
- concrete block material
- insulated exterior metal sandwich panels
- weather resistant aluminum siding
- or any similar type materials that have proven to be sound, impervious, easily maintained and found acceptable for use by the appropriate *Regulatory Authority*.

4.2.5 Living Quarters

Residential living areas, shall not be connected to the plant and/or any livestock part or area of an establishment, in any way that permits direct access. Direct access to live animal holding areas and/or manufacturing operations or storage areas and rooms of an establishment is prohibited.

Should a property site contain both an establishment and a residential home, the establishment shall be physical separated from the residential building. In other words, there shall be no possible interior access from residential occupancy space to any part or area of an establishment by means of a door, window, stairs, elevator, loading, unloading areas, passageways or similar types access areas.

4.2.6 Monitoring Procedures: *What is Done and How is it Done*

An establishment and the boundaries of the site shall be monitored at pre-determined frequencies in order to maintain the exterior building and surrounding areas free of accumulation of water, garbage, debris and refuge and to minimize contamination and/or factors contributing to deterioration.

In order to achieve compliance with the National Meat and Poultry Regulations and Code an operator shall develop a program for the building, i.e., Building/Property Maintenance Program. The program shall verify that the building and the boundaries of the property site are being visually inspected at pre-determined frequencies for the following elements;

< water accumulation or pooling around the surrounding areas of the establishment. Should the site contain lagoons, monitoring tasks should include visual observation for potential overflow, as well as, possible sludge and excess of water. Observation of exterior drainage for obstruction or blockage.

< surrounding areas and/or neighboring businesses are free of garbage, accumulation of debris, improperly stored equipment and refuge and areas are maintained in a neat, tidy and clean manner;

< damaged asphalt areas and/or potholes are scheduled for repair; compacted stone/gravel is maintained in good condition; and/or a dust control program is employed at regular intervals to ensure dust is controlled and/or minimized to prevent entry to the building during unloading and loading activities;

< walls, and foundation footings/walls are free of damage, deterioration, cracks, holes, leaks, mold growth and exterior windows and doors are in good condition and equipped with appropriate screens;

< ventilation outlets are equipped with protective covers and are intact, secure and appropriately located;

< insect/rodent control devices and/or screening protection devices are appropriately installed and located around the exterior building;

Monitoring activities shall be documented and any deficiencies shall be followed-up with

appropriate corrective actions to ensure that the building and the property remain free of all possible sources of contamination, as well as, any areas showing evidence of structural damage.

An operator shall complete and maintain monitoring, deviation and verification records for a period of time found acceptable by the appropriate *Regulatory Authority*.

4.3 General Construction Requirements

4.3.1 Construction Materials (Internal Rooms)

The walls, ceilings, floors and doors used in the construction of rooms within an establishment shall be of a design that promotes sanitary maintenance. Construction materials used to construct rooms within an establishment shall be durable, cleanable and suitable for the room's activities.

Although, there are many types of materials that may be used in the construction of rooms throughout an establishment an operator should consider carefully the purpose of each room in respect to the rooms manufacturing operation or storage activity, in order to decide on the best possible choices of materials for activities that may involve:

< holding and detainment of livestock animals;
< welfare facilities for livestock employees;
< slaughtering and dressing procedures of food animals;
< storage of inedible and/or condemned meat and meat products;
< handling and packaging of offal meat by-products;
< refrigerated storage rooms for meat and/or meat products, including drip cooler rooms;
< refrigerated storage/detained rooms for anti-parasitic treatment procedures;
< transferring of meat and/or meat products in corridors and loading/unloading areas/rooms;
< handling, processing, assembling, packaging and labelling of meat and meat products;
< mixing, weighing of restricted ingredients; spices, additives, nitrites/nitrates;
< dry storage rooms for non-meat ingredient products and/or packaging materials;
< storage rooms for cleaning chemicals and agents; maintenance supplies;
< rooms used for employee welfare facilities; washrooms, change rooms and lunchroom.

4.3.2 Walls, Ceilings and Floors (General Requirements)

In order to promote an acceptable level of sanitary maintenance throughout an establishment, walls, ceilings, floors and doors shall be constructed of materials that can be easily cleaned and durable for the rooms activity or purpose. The following elements shall be reviewed when constructing or renovating an establishment to ensure that the materials purchased complies with the criteria:

< free of contaminants,

(composed of materials that are free of any noxious constituent; construction materials that do not harbor bacteria - biological hazards; of a design and composition that cannot easily deteriorate, thus minimizing physical and chemical hazards and/or by the material composition that do not create possible chemical and/or biological hazards to meat and meat products).

< cleanable,

(can be maintained in a clean and sanitary condition/manner).

< durable,

(can be easily maintained. Materials composed of components that do not deteriorate.

< suitable,

(suitable for the intended operational activities performed within the room. The materials can withstand refrigeration temperatures; method of cleaning and sanitizing and chemicals used; can withstand the rooms activities when various elements are introduced through manufacturing processes, such as, high salt concentrations, cooking temperatures, humidity, moisture, vapor, steam, etc.,).

4.3.3 Walls and Ceilings

Construction materials used for rooms throughout an establishment shall be free of contaminants, cleanable, durable and suitable for the room's activity.

4.3.4 Walls

< concrete block; block filled and made smooth with a coating suitable for the room's activity;
< smooth steel or troweled cement plaster, (free of cracks and/or large crevices);
< vinyl sheeting/covering; the application of applying wall paneling to cover walls should provide sealed joints;
< coated enamel materials;
< ceramic tiles;
< insulated metal sandwich panels; or prefabricated panels;
< and/or similar type materials found acceptable by the appropriate *Regulatory Authority*.

4.3.5 Refrigerated Rooms

In addition to the previous section on walls and ceilings (section 4.3.3), the construction of walls and ceilings in refrigerated rooms where meat and meat products are handled, processed, stored, shipped and received (if applicable) may be constructed of the following materials:

(a) Refrigerated processing and packaging rooms

< Concrete block, covered with cleanable wall paneling, or the concrete block materials have been block filled with a filler and coated with an approved coating or finish. Painted concrete block walls are not recommended for use in cooler or freezer rooms due to the room's lower temperature requirements.
(Materials and finishes shall provide a waterproof surface to facilitate sanitary maintenance). Concrete block walls in a refrigerated room may require adequate insulation in order to maintain the required temperature of the room and to prevent condensation from forming.

< prefabricated insulated metal sandwich panels with sealed joints.

< vinyl sheeting/covering; the application of applying wall paneling to cover walls should provide sealed joints; the vinyl or wall paneling shall be accompanied by underlying insulation material.

(b) Coolers (Drip Cooler, Chill Cooler, Holding Cooler) and Freezer Rooms

In case of cooler and freezer rooms the underlying materials of walls should contain adequate insulation in order to maintain proper refrigerated temperatures and to prevent condensation problems as a result of inadequate insulation.

The use of materials that require paint as a surface finish is discouraged in order to minimize contamination to products during storage as a result of peeling and flaky paint.

Note that all wall and floor junctions should be adequately sealed or coved in order to prevent moisture from affecting the underlying structure of walls.

In areas or rooms where hand lift trucks or motorized vehicles are used to convey pallets of products, wall areas should be protected against damage by providing suitable sanitary type bumpers or concrete curbs or bollard posts.

4.3.6 Underlying Structure of Walls

New establishment's and existing establishment's considering renovations or new additions to their premises shall ensure that underlying structure of walls are composed of materials such as, metal lathing and metal support or similar type materials that are impervious and durable.

In existing establishments with underlying structures composed of gyp roc and wooden support materials, long term durability may result with weakened walls and ceiling structures, as well as, a reservoir for microbial growth. Operators may be required to upgrade affected areas should the durability and cleaning of materials create a sanitary problem. Continual acceptance of walls (and ceilings) shall depend on the establishment's capability of maintaining walls and ceilings structurally sound and capable of withstanding repeated cleaning and sanitizing.

An operator shall demonstrate acceptable methods and procedures for cleaning and preventive maintenance, in order to ensure that the materials used in the building's existing underlying structure does not pose any biological, physical or chemical hazards to a room or to meat and meat products.

4.3.7 Ceilings

< non-corrosive, rust resistant metal gauge ceilings with open web joist construction, (providing joists are treated with standard rust inhibitor coating);
< insulated metal sandwich panels; or prefabricated panels;
< pre-cast cement;
< vinyl sheeting/covering;
< coated enamel materials;
< and/or similar type materials found acceptable by the appropriate *Regulatory Authority*.

Materials composed of solid wooden components and/or waterproof drywall materials for walls and ceilings, *may be found acceptable for non-production and non-meat product storage rooms,* i.e. dry storage rooms, welfare facilities and similar areas and rooms within the plant where moisture, steam and vapor would not be a factor and providing the method of cleaning does not involve the use of a high pressure system or a great deal of water.

Generally ceiling heights should be about 3 meters throughout an establishment excluding rooms where animals are slaughtered, held in drip cooler or carcass holding cooler.

4.3.8 Ceiling Heights for Rooms Involved in Slaughter Activities and Carcass Storage

Rail heights shall accommodate the following minimum distances from the carcass suspension contact point to the floor:

	Bleeding	Dressing	Coolers
Cattle	3.7 m	3.1 m	3.1 m
Calves	2.7 m	2.4 m	2.4 m
Sheep & Goats	2.4 m	2.0 m	2.0 m
Swine	2.6 m	3.1 m	2.4 m*
Horses	4.3 m	3.4 m	3.4 m

* When heads are not removed from dressed carcasses 2.7 m distance is required.

Rails and rail support systems shall be constructed of materials which are rust resistant and which can be easily cleaned and maintained. Only food grade lubricants may be applied to overhead rail systems.

4.3.9 Floors

As a general note, floors throughout an establishment where animals are slaughtered, carcasses are dressed or meat or meat products are refrigerated, stored, processed, packaged, labeled, shipped, received or
otherwise handled shall be composed of materials that are:

- free of any noxious constituent;
- constructed of hard, impervious materials, such as dense, acid-resistant, non-dusting and water proof cement, masonry floor tile, vitrified bricks or synthetic materials;
- or any similar type materials that are durable for the manufacturing operations performed within the establishment and can be easily cleaned and maintained in a sound and sanitary condition.
- properly graded to as many drain inlets as may be necessary for the effective removal of fluid wastes or an operator has provided the appropriate *Regulatory Authority* with a sanitation program that achieves the same results.

4.3.10 Floors in Freezer rooms

Freezer rooms operate at low temperatures and as such, their construction and design may require careful workmanship. The construction of freezer floors shall be:

1. provided with adequate protection to preclude damage due to frost penetration into the underlying soil;

2. provided with adequate insulation that assists in maintaining frozen meat and meat products at required room temperatures; and to prevent moisture from forming or possible condensation problems within the room;

3. Construct of smooth concrete with expansion joints where appropriate; and/or materials found acceptable by the appropriate *Regulatory Authority.*

4.3.11 Windows

Windows in areas where exposed meat and meat products are handled or stored, should be of a shatterproof type material or covered with appropriate material that prevents glass (physical hazard) from contaminating products, as a result of breakage.

Should an existing establishment contain glass windows in production and storage areas, a preventative maintenance program or a daily pre-operational inspection program shall include a visual inspection of windows for evidence of damage and/or breakage, as an operational control measure.

Damaged windows shall be appropriately covered with acceptable materials until such time as the glass is removed and replaced.

All windows within an establishment should be permanently sealed or provided with an acceptable screen that prevents flies and insects from entering facility areas.

In rooms or areas where screening devices are not practical, the use of fly chaser fans or other acceptable and equivalent devices should be placed over the outside doorways or in areas of livestock holding pens.

4.3.12 Doors

Doors and door frames should be constructed of cleanable materials with smooth surfaces. Where doors in an establishment lead directly outside, the doors shall be equipped with self closing devices and of a design that is close fitting.

In addition, exterior doors should be constructed of metal, or metal clad, or similar acceptable materials. Exterior doors shall be equipped with adequate door seals and door jambs, and constructed of materials that are durable, cleanable and easily maintained.

Existing premises that may contain exterior doors and/or shipping/receiving doors that are constructed of wooden materials shall develop effective sanitation procedures.

The sanitary program shall ensure that existing doors continue to be durable and cleanable and do

not pose any physical hazards to meat products or deteriorate as a result of their construction and design.

Refrigerated rooms may require doors that contain insulation materials in order to maintain temperature requirements within a room, as well as, to prevent condensation from occurring.

4.3.13 Lighting

Light fixtures throughout an establishment shall be of a design and construction that can be cleaned and easily maintained in order to prevent rust and corrosion from occurring.

Where unprotected meat and meat products are handled, processed, transferred or stored, light fixtures shall be protected from breakage, with the use of protective shields, sleeves or covers.

Unprotected light fixtures shall not be located in areas of an establishment where there is a likelihood of risk of contamination to meat and meat products, ingredients materials, equipment or packaging materials.

The type of lights installed in work and storage rooms shall not alter the colour of meat and meat products.

4.3.14 Lighting Illumination Intensities

The lighting illumination intensity measurement should be such that, the inspection activity conducted by the 'examiner' or the 'inspector', can be performed effectively. As a minimum the following light illumination intensities shall be available within the specific rooms of an establishment:

a) 1000 lux at post mortem inspection stations; poultry inspection stations at 2000 lux

b) 0540 lux at designated inspection areas;

c) 220 lux in work rooms;

d) 110 lux in all other rooms of the plant, (i.e. maintenance, utility room, storage rooms, etc).

4.3.15 Monitoring Procedures: *What is Done and How is it Done*

Rooms within an establishment shall be monitored at pre-determined frequencies to ensure that the room's construction and equipment continues to be designed, constructed and maintained in a manner that minimizes risk of contamination of meat products and permits and facilitates appropriate maintenance, cleaning and sanitizing. An operator shall ensure that each room within an establishment is visually inspected for:

< suitability of construction materials;

< walls, ceilings and doors, visually inspect for evidence of damage, deterioration, cleanliness,

condensation and sanitary condition;

< location of curbs, or bollard posts, or metal railings used to protect walls at impact areas to ensure they are free of damage or deterioration;

< floors, inspected for damaged areas or areas of water pooling. Junctions between walls and floors should be inspected for proper seals or coving to prevent moisture from affecting underlying structures;

< light fixtures inspected for proper illumination intensities; if light fixture changes colour of meat products and if fixtures are showing evidence of damage and require replacement.

Monitoring tasks, deviation and verification procedures shall be documented and should products be affected shall, include an assessment on product safety. Deficiencies shall be followed-up with appropriate corrective actions and records shall be maintained by the operator for a period of time found acceptable by the *Regulatory Authority.*

4.3.16 Heating and Ventilation (HVAC)

Ventilation systems within an establishment must be adequate in order to provide a sufficient exchange of air throughout the premises. The system shall be sufficient to maintain the plant environment free of odours, condensation, steam, vapor, etc., and to keep air fresh, as well as, to maintain refrigerated rooms free of condensation and/or temperature variations.

Equipment and/or rooms that require venting or equipped with exhausts, should be included within an establishment's ventilation system, (cookers, smoke houses, pasteurizers, inedible rendering equipment and equipped with filters, where applicable,) to prevent the introduction of air contaminated with insects, smoke, pollution, etc.

Air throughout an establishment should flow forward from the cleanest operation to a less cleaner area/operations, i.e., from processing room to slaughter operations.

All ventilation systems within the plant shall comply with the provinces building codes and standards.

Overhead heaters that are constructed of non corrosive, rust-resistant materials may be located in ambient temperature rooms. The use of overhead heaters in a non refrigerated rooms shall assist in preventing pipes from freezing and any moisture damage to exterior walls as a result of freezing temperatures during winter months.

The overhead heater is normally equipped with a filter, which should be cleaned and/or replaced at pre-determined frequencies, in order to prevent possible contamination to items/materials handled or stored within the room/area.

The HVAC system within the premises shall meet the provinces applicable building codes and standards.

4.3.17 Overhead Utility Lines

Utility lines such as gas, electrical, sewage, water lines, as well as heating ducts should be:

- < suspended away from work areas or areas of exposed food products to minimize the potential for contamination;
- < where appropriate, insulated with cleanable materials to prevent possible condensation from forming;
- < constructed and covered with suitable material to minimize the build-up of soil;
- < be easily cleanable;
- < lines carrying contaminated or hazardous materials, such as sewer or floor drain lines, should be located sufficiently distant from any product or product contact surfaces so as to ensure that there is no risk of contamination.

4.3.18 Drainage, Well and Septic Systems

An operator must ensure that plumbing and drainage systems conveying water and waste material comply with applicable local, municipal and provincial requirements, including any additional operating policies. Alternate systems, of disposing of plant effluent must first meet municipal and provincial requirements, prior to submitting to the appropriate Regulatory Authority for acceptance.

In order to facilitate sanitary maintenance throughout an establishment a sufficient amount of floor drainage shall be provided in work and cooler storage rooms, and in areas, or where specific equipment discharges large volumes of water while in operation.

The size of drain lines and drain inlets shall be in keeping with local and provincial ordinances and building codes, as well as, to facilitate specific operating lines within the establishment.

Where drain lines are installed they shall be trapped, equipped with rodent screens and designed to vent to the outside air, in order to remove odours effectively from work and storage rooms.

It is important that floors slope uniformly to drain inlets, and be of a slope gradient that avoids low spots that may collect liquids or create situations for pooling. *Refer to Section 4.3.9 for requirements.*

4.3.19 Potable Water Supply

The potable water supply to an establishment shall be separate and apart from all other supplies of non-potable systems and/or drainage lines, in order to ensure that the water is not contaminated with any biological, physical and/or chemical hazards that may pose a risk to the safety of meat and meat products handled and stored within the premises. *Refrigeration evaporators*, containing non-potable water from evaporator condensers units shall be directly drained and shall not join at any section the potable water supply and/or potable water system of the establishment's manufacturing operations.

4.3.20 Toilets/Urinals

Toilets and urinals, should have a separate piping system from all other drainage lines within the plant, to a point outside the building and join the exterior drainage after bypassing any grease interceptor units.

Should an existing establishment be designed with only one drainage system, the drain line shall be equipped with back flows prevention devices (i.e., air gaps, vacuum breakers), in order to prevent back flows through cross connections to drains within production and storage rooms. The drainage system shall be in compliance with applicable local plumbing and building codes.

4.3.21 Water Conditioning Devices

Where water conditioning devices, such as water filters or screens are installed on water lines, they should be designed and installed to facilitate disassembly for periodic servicing/replacement and cleaning.

4.3.22 Solid Waste Disposal and Sewage

Disposal of sewage and solid wastes should be done in a sanitary manner and shall not expose the establishment or meat products to any risk of contamination, in addition sewage disposal systems must meet all local or provincial requirements.

Should the operations of the building necessitate the installation and use of a mechanism /equipment that separates organic matter from the plant effluent, etc.., grease trap, catch basin, interceptor, the location of the equipment should be in an area of the plant where no operations are performed or materials are stored or handled. Ideally, locating the interceptor outside the building would reduce and/or eliminate potential for hazards from occurring.

Waste containers within the premises should be:

a) designated containers that are cleanable, durable and of leak proof material;
b) designed to prevent the attraction of pests or contribute to air borne contamination;
c) sufficient in number to accommodate the plant's operations;
d) accessible for use;
e) be emptied daily or when full;
f) cleaned and sanitized at frequency to minimize contamination.

Waste containers located outside the building:

g) equipped with covers and maintained closed when not in use;
h) maintained in a manner not to attract pests;
i) emptied, cleaned and sanitize at frequencies to minimize contamination

4.3.23 Monitoring Procedures: *What is Done and How is it Done*

An establishment shall be monitored at pre-determined frequencies in order to ensure that rooms maintain adequate ventilation, heating and plumbing systems and that the drainage and waste disposal facilities continue to be of sound construction and maintained in a manner that prevents meat products from being contaminated by the water supply.

In order to achieve compliance with the National Meat and Poultry Regulations and Code, an operator shall develop a building/premises maintenance program that describes what is done and how is it done, and at what frequencies, together with, deviation and verification procedures. The

monitoring tasks shall include;

< a visual inspection of the ventilation system to verify that the system is operating as intended; equipment that is designed with exhausts is observed for leaks, improper seals, etc;

< a visual inspection of all equipment with filters to ensure that filters cleaned or being replaced at frequencies to prevent contamination to meat products and the plant environment;

< a visual inspection of walls and ceilings for evidence of moisture and, molds;

< a visual inspection of drainage system; overhead pipes for leaks, corrosion or damage; inspect potable water supply to ensure that non-potable lines do not cross-connect with potable water supply;

< a visual inspection of floor drainage to ensure that drain lines are clear of obstruction and are operating as intended in order to remove water from rooms/areas and/or equipment;

Monitoring records shall be completed and maintained, including any deviations and corrective actions for a period of time found acceptable by an inspector.

4.4 General Construction Requirements

4.4.1 Establishment Design and Room Layout

In general an establishment's room layout shall be designed to provide a one way operational flow that prevents backtracking of incompatible products, such as raw and ready-to-eat, edible and inedible materials. A one way directional flow shall contribute to minimizing contamination to meat and meat products through contact with incompatible products, or equipment, or contamination through air, or handling procedures by plant employees.

Ideally, the plant's operational flows shall begin at the point of receiving and flow forward, respecting each 'stage' of the operation throughout slaughter/ dressing/ chilling/ processing activities and finish product storage and distribution activities, in order to minimize potential hazards.
When designing an establishment for slaughter of food animals and meat processing operations, consider carefully the intended operational activities, in order to create the best possible plant design that achieves compatibility for all intended manufacturing operations.

An establishment also engaged in processing of meat products is of the utmost importance when determining compatible operational flows. The plant design should provide rooms that separate raw from ready-to-eat meat products, as well as, edible from inedible meat products, etc. Separation could be achieved either physically or operationally, (effective operational controls).

Should an existing establishment not permit a continuous 'one way flow' as a result of insufficient rooms or existing room layouts, an operator must develop written compensating ' operational controls'. The objective of written controls shall minimize possible cross-contamination risks that may become potential hazards to meat products and that may lead to food borne illnesses to the consuming public. Operational controls must be strictly enforced and maintained at all times by an

operator in order to verify their effectiveness and compliance with the National Meat and Poultry Regulations and Code. *(Refer to Section 4.4.8, for additional requirements).*

4.4.2 Flow of Incoming Materials

The flow of incoming materials shall begin at a designated area or room for receiving of materials or in the case of live animals at the designated livestock holding areas. The materials shall flow forward to nearby storage rooms or in the case of live animals to pre-slaughter pens, to stunning area/room, etc.

It is not necessary to provide refrigeration in a shipping/receiving room, providing, perishable meat products are transferred as soon as possible to refrigerated storage rooms with the plant.

Effective operational controls should be established that satisfy objectives of preventing cross-contamination of incompatible products through handling, transferring and storage activities, especially for those premises that do not have a sufficient number of rooms to achieve physical separation of incompatible activities.

4.4.3 Livestock Yards/Pre-Slaughter Pens

A separate area will be provided on the property site for the holding and detainment of live animals. The designated area will not open directly to where food is processed, handled or stored or where packaging materials are handled or stored.

An operator must provide a sufficient number of livestock pens in order to accommodate the intended volumes of food animals for slaughter at an establishment.

Pre-slaughter holding pens shall be adequately separated from the stunning and bleeding areas, in order to prevent dust, dirt and odours from entering adjacent work rooms.

An operator must ensure that an establishment is designed, constructed and maintained so that animals transported to an establishment for slaughter are not subjected to avoidable pain or distress. An establishment shall contain a separate area that is equipped with pens for:

(a) housing and inspecting animals of each species separate from animals of all other species;
(b) animals that are considered a danger to other animals shall be segregated from each other;
(c) holding animals that are injured, sick or suspected of being sick, or identified as being detained or condemned in accordance with the National Meat and Poultry Regulations and Code.

An establishment shall contain:

(d) facilities for restraining animals for detailed ante mortem examination or inspection;
(e) conveying injured or disabled animals in a humane manner, directly to the bleeding rail, without dragging or undue manipulation. Where this is not practical, either suitable facilities be provided for the immediate "on-the-spot" stunning and bleeding or the conveyance of stunned animals by other than dragging directly to the killing floor, for bleeding;
(f) slaughtering animals that have been identified as condemned in accordance with the National

Meat and Poultry Regulations and Code.;

(g) floors, ramps, gangways and chutes that are constructed and maintained in a manner that provides secure footing for animals during movement and prevents injury during movement. Floors that have been scored or otherwise treated usually provide a good footing for animals.

The facilities should be constructed so that unloading can be carried out without having a gap between the vehicle and the unloading dock, in order to prevent unnecessary injury to animals during unloading.

Construction of Livestock Yards and Pens:

< smooth sawn lumber is the minium acceptable requirement for the construction of partition and gates.

Protruding nails, bolts etc., which may cause injury to animals, are not permitted. Partition and gates constructed of rust resistant metal would be another choice of acceptable materials for this area.

Refer to Part 9, Ante Mortem, Slaughter and Dressing and Post-Mortem Procedures, for additional requirements and information.

4.4.4 Stunning, Bleeding and Carcass Dressing Room

A separate room must be provided for the stunning and bleeding of animals, and subsequent dressing operations. Stunning and bleeding activities must comply with applicable humane slaughter requirements. *Refer to Part 9, Ante Mortem, Slaughter and Dressing and Post-Mortem Procedures, for additional requirements).*

The room used for stunning, bleeding and evisceration of food animals shall be constructed of durable and cleanable materials. The room shall be equipped with floor drainage, hose bib connections for cleaning and adequate lighting. In addition, an adequate amount of hand washing facilities and knife sterilizers, shall be provided to accommodate the various work activities performed by plant employees, an examiner or an inspector.

The knocking box, chutes and restraining devices must provide a one way flow for animals, as well as, designed to prevent injury to animals and to permit an employee performing stunning, animal to do so safely. The facilities and related equipment must be suitable for the handling of food animals of the species and size slaughtered in order to prevent unnecessary injury or contamination.

It is recommended that bleeding areas be curbed and steeply graded to blood and wash-up drains. The drain used for the collection of blood shall be of a sufficient size and slope to prevent blockage due to clotting.

Should the carcass dressing activity be performed in the same room as stunning and bleeding activities, the room shall be of sufficient size to provide adequate space for all phases of slaughter, dressing and inspection operations in proper sequence and relation. The equipment layout for carcass dressing must provide inspection stations and/or necessary equipment, which are suitable for the purposes of inspection (carcass and/or organs) by an ‘examiner’ or an ‘inspector’.

4.4.5 Hide Rooms

A separate room located within a compatible area of an establishment or a separate room located outside the premises shall be provided for the temporary storage of hides. The room shall be constructed of cleanable and during materials and shall be equipped with adequate ventilation to remove odours from the room.

Should the hide storage room be located in the inedible section of the facility, the room should be provided with a separate exterior door for removal purposes. The exterior door shall prevent inedible materials (hides) from being transferred through edible work rooms during picked-up and removal from an establishment.

4.4.6 Inedible Holding/Storage Rooms

All establishments shall provide a separate room, located in a compatible area of an establishment for the holding and detainment of inedible meat products, including condemned materials. The room shall be constructed of durable and cleanable materials. In addition, the room shall be equipped with adequate ventilation, provided with floor drainage and hose bib connections for cleaning purposes. The room should be provided with an exterior door to facilitate removal by outside rendering companies.

Should an inedible room not be equipped with an exterior door, inedible materials should be transferred by a designated employee, either when production activities have ceased, or transferred in such a manner that the likelihood of contamination to edible products or materials is minimized, in order to prevent potential for cross-contamination.

Establishments that do not have daily removal of inedible waste materials, shall equip inedible rooms with refrigeration units capable of maintaining a temperature of 4°C or lower. *Refer to Part 10, Inedible Meat Products for additional requirements and information.*

4.4.7 Processing Rooms

Processing rooms, are used for the handling, manufacturing and packaging of meat and meat products. Such operations may involve boning/cutting, formulating, curing, injecting, stuffing, cooking, drying, assembling, packaging, etc. The location of the processing rooms, shall be such that, the risk of contamination of products is not likely to occur or can be controlled by applying effective operational controls. For example, locating a processing room close to a room intended for slaughtering activities or a room used for the holding of inedible meat products would not be viewed as compatible locations.

Processing rooms shall be constructed of durable and cleanable materials. The rooms shall be equipped with refrigeration (where appropriate), capable of maintaining a temperature of 10°C or lower. Floor drainage shall be provided, as well as, hose bib connections to facilitate sanitary maintenance.

The rooms shall have adequate lighting intensity and all light covers where exposed meat and meat products are handled or stored shall be protected against breakage.

Operators engaged in the processing of both raw and ready to eat meat products should ideally, allocate a room for raw meat handling and a separate room for the handling, assembly or packaging of ready to eat meat products, in order to minimize situations for cross-contamination. However, many existing establishments are not large enough to accommodate a sufficient amount of rooms that separate incompatible activities. As such, operators may be tasked with manufacturing meat products under strict operational controls that achieve "operational segregation" and that minimizes physical, chemical and biological hazards to meat products.

Should the handling of raw meat products be performed in the same room as ready to eat meat products, the potential for cross-contamination must be minimized by implementing and maintaining effective operational procedures and controls, that shall include as a minimum,

a) operational sanitation,
b) equipment maintenance,
c) employee training programs,
d) process control based program.

(Refer to Parts 8, Personnel and Part 11, Processing and Meat Standards for additional requirements).

4.4.8 Operational Controls

Operational controls can be used throughout slaughter activities and manufacturing processes that help to minimize potential biological, physical and chemical hazards. The development of operational controls or mechanisms shall establish criteria for work activities and operating procedures.

When developing operational controls, an operator must evaluate all slaughter and meat processing steps being performed within the plant, in order to identify potential hazards that may affect the operations and the products during conveyance, manufacturing stages and storage. The hazards, once identified, must be controlled operationally, in order to effectively minimize factors or situations that may result with cross-contamination.

Should an existing premises not permit a progressional one way flow, alternate compensating "operational controls" may be employed to prevent possible cross-contamination risks and potential hazards from being introduced to meat products. Operational controls may include such measures as:

< scheduling of work activities, e.g., alternate days for slaughter and meat processing activities; alternate times for the preparation of raw meat products from the handling of ready-to-eat meat products, (if performed in same room, such as, after effective cleaning/sanitizing and inspection of equipment and room);

< providing cleanable, physical barriers to separate areas within a room for the handling of incompatible products, e.g., the handling of raw and ready-to-eat meat products

< providing employee training programs on safe handling procedures and operating policies that may also include, the use of coloured coded working apparel and hand wash practices

prior to contact with products and each time hands have been contaminated

The operational controls employed must be effective and regularly monitored, maintained and verified in order to achieve the same results in respect to segregation of incompatible activities. Operational procedures (controls) may include but are not limited to the following;

< provide separate work tables, work stations and identify designated areas within a work room for handling of raw meat products from the handling of ready-to-eat meat products.

< designate equipment and utensils for each 'stage' of the meat product, e.g. equipment used for raw meat preparation is different than the equipment used for ready-to-eat meat preparation, e.g.

< containers, knives, grinders, slicers, etc., or the equipment is properly cleaned and sanitized prior to changing work activities.

< develop and maintain frequent employee training programs that include employee hygiene, hygienic handling of food, ways to avoid contamination of food products, as well as, an understanding of the risks associated with contamination of food by microbiological, chemical and physical hazards.

< effectiveness checks of sanitation procedures, in order to verify sanitation procedures and methods are performing as intended and are effective (microbiologically).

< the use of coloured coded or different working apparel or equipment, and footbaths at entrances of work rooms can strengthen control and prevent cross contamination

4.4.9 Refrigerated Storage Rooms

Rooms equipped with adequate refrigeration shall be available within the establishment for the safe storage, chilling, freezing and handling of perishable meat products. The required areas/rooms include the following operations or activities :

< Cooler storage temperatures should be maintained at 4°C or lower;

< Chill Coolers should be maintained at 2 °C or lower;

< Offal Coolers should be maintained at 1°C or lower; or at acceptable temperatures that rapidly chill meat by-products;

< Curing rooms at 6 °C or lower; or at acceptable temperatures that effectively assist with the curing activity/process of prepared meat products

< Holding Freezers should be maintained at -18°C or at temperatures or lower and/or at freezing temperatures that prevents thawing of meat products;

< Deficiencies shall be followed-up with appropriate corrective actions, Blast or Sharp Freezers at -25°C or lower or at temperatures that prevent evidence of thawing of meat

products

< Processing/Packaging Rooms maintained at 10°C or lower, *(unless the operator has received written permission for refrigeration exemption of processing rooms - Refer to Part 11, Processing and Meat Standards for additional information);*

4.4.10 Dry Storage Rooms

A separate room within the facility should be utilized for the storage of cartons, packaging materials and non-meat ingredients, (spices, binders, filler, etc). Should a separate room not be available, a designated area within the plant may also be acceptable, providing the area does not subject the materials to contamination, such as cleaning chemicals and agents, or dust, dirt, flies, if located in areas where there are exterior doors.

The materials should be stored on designated shelving racks as to prevent direct contact with floor areas and the materials shall be adequately protected or covered during the period of storage.

The choice of materials used to construct a dry storage room, (i.e., drywall material; smooth sawed or planed lumber; unfinished concrete block, acoustic ceiling tiles), shall determine the appropriate method of cleaning, in order to minimize dust, dirt and unsanitary conditions from occurring.

4.4.11 Spice Room

Where spices and restricted ingredients e.g., nitrites/nitrates, are prepared, mixed or measured into units, a separate room or a designated area should be made available for this purpose. The room shall be constructed of cleanable and durable materials and equipped with ventilation. Should a separate room or designated area not be achievable within the plant layout, then operationally, the ingredients may be stored in a protected manner, in a dry storage room and brought into the work room to a designated area within the room for mixing and weighing activity. Remaining unused ingredients shall be completely covered and protected, as well as, identified as to their content, prior to returning to storage.

4.4.12 Chemical Storage Room/Area

Cleaning chemicals and agents may be stored in a separate room, or a designated area, or in a separate storage cabinet. The room, area or cabinet shall establish control over the storage and use of chemical substances.

The room or area shall be constructed of cleanable and durable materials; equipped with floor drainage (or the operator has developed an acceptable method of cleaning the area, including a procedure for accidental spillage) and adequate ventilation.

All chemicals and agents shall be clearly identified and labelled, to prevent misuse of substances.

4.4.13 Equipment Wash-up Room

A separate room designated for the cleaning and sanitizing of mobile equipment and utensils should be provided within the plant layout of rooms. An equipment wash-up room shall be constructed of

materials that are cleanable and durable; equipped with floor drainage, hot and cold potable water for cleaning purposes and adequate ventilation for the removal of vapor, steam, etc.

Should existing premises not have an available separate room for the purpose of cleaning equipment during manufacturing operations, an area within the plant may be found acceptable for this purpose. The area used for equipment cleaning shall not pose any likelihood of contamination to meat and meat products, or packaging materials or non-meat ingredient materials, by either chemical water spray and/ or airborne contaminants. The alternate area used shall be found acceptable by an inspector.

4.4.14 Retail Outlet

Access from an establishment to a retail outlet or public store, that is operated by an establishment operator for the purpose of sale of meat and meat products to the public, shall be permitted.

The retail store area shall be physically separated (with walls and doors) from the establishment's processing activities. The room used for retail trade shall be maintained in a clean and sanitary manner and shall contain a sufficient amount of refrigerated storage displays or coolers for products being stored or displayed within the retail store.

Doors located in retail store that access the establishment shall be maintained closed when not in use.

Access by visitors to an establishment shall be controlled by operators. Visitors shall be required to comply with company policies in respect to working apparel when entering the plant environment, (i.e., head covering, footwear, work clothes).

4.4.15 Monitoring Procedures: *What is Done and How is it Done*

The operations of an establishment shall be monitored at pre-determined frequencies in order to ensure that the compatibility of operations are either physically separated and/or are operationally segregated and controlled throughout storage, transferring and processing operations.

In order to achieve compliance with the National Meat and Poultry Regulations and Code, the operator shall ensure that each room within the establishment is visually inspected for;

< the compatible of meat products handled in the same room at the same time, that may subject the products to potential risk and/or cross-contamination;

< the storage and/or transferring of incompatible meat products that may subject the products to cross-contamination or the materials being handled or stored

< the safe storage of chemicals and agents in designated areas/rooms. The identity of containers, if leak proof and if located in areas away from packaging materials, non-meat ingredient storage, meat processing rooms and storage rooms. The area is ventilated and that the storage activity does not pose any risk to meat products and/or materials.

< the storage of inedible meat products in designated rooms or areas. Inedible containers are

clearly identified, covered, leak proof, and their location and use does not pose potential risk of cross-contamination to edible meat products.

< the cleaning of equipment in areas that may potentially contaminate packaging materials, ingredient materials and/or meat products as a result of chemical spray.

< the proper and clear identification of spices and ingredients; ensuring that the ingredients are adequately covered/protected and prepared in rooms found acceptable for that purpose

< cleanliness of retail store; doors to plant from retail maintained closed when not in use; control of access by public to manufacturing areas of the facility.

Monitoring, deviation and verification activities shall be documented and should products be affected, shall include an assessment on product safety. Deficiencies shall be followed-up with appropriate corrective actions, including product dispositions. Records shall be completed and maintained by the operator for a period of time found acceptable by an inspector.

4.4.16 Shipping and Receiving

Rooms dedicated for the receiving and shipping of meat products shall be constructed of cleanable and durable materials. Wall areas may require curbing or suitable sanitary bumpers in order to protect from damaged by motorized vehicles. Shipping and receiving rooms may not require refrigeration if meat products are being immediately transferred for distribution or refrigerated storage within the establishment. Facilities and areas intended for the loading and unloading of incoming materials, such as, non-meat ingredients, cleaning supplies and packaging materials, shall be:

a) separate from entrances for customers, plant employee staff and,
b) shall be physically separate from live receiving areas for reception of live animals.

The activity of loading and unloading of incoming and outgoing materials shall be performed in areas or rooms of an establishment that,

c) does not open directly to where exposed meat and meat products are handled, packaged, transferred or stored.

The area or room used for the shipping and receiving of materials shall be configured to promote handling of meat products and shall be adequate in size and design for the quantity of meat products being transported, as well as, the size of the transportation vehicles being used.

No unprotected meat and/or meat products shall be shipped or received from a multi purpose entrance, nor shall the shipping activity be performed directly from rooms where unprotected meat products are being handled or stored.

4.4.17 Temperature and Humidity Controls

In areas of the establishment where meat products are handled or stored, the operator must have appropriate mechanisms to control the temperature, humidity and other environmental factors.

Dry storage rooms shall have adequate temperature control to prevent freezing temperatures and excessively high temperatures. This may be achieved by insulating walls or ceilings or by installing an overhead heater or some other acceptable means to achieve the same objective.

Freezer and cooler rooms shall be equipped with thermometers and thermostats that control the refrigeration temperatures within the rooms. Should freezers be used for anti-parasitic treatments, they shall be equipped with suitable automatic devices that continuously record time and temperature.

Process equipment and rooms involved in fermentation, drying, smoking, of meat products shall be equipped with a shatter resistant indicating thermometer, or equivalent devices.

4.4.18 Monitoring Procedures: *What is Done and How is it Done*

An establishment shall be monitored at pre-determined frequencies to ensure that shipping and receiving areas of the building continue to be adequate in size to accommodate carrier vehicles being used and the room continues to promote hygienic handling of meat products during loading and unloading activities. An establishment shall implement appropriate mechanisms to monitor and control temperature, humidity and other environmental factors where meat products are being handled or stored.

In order to achieve compliance with the National Meat and Poultry Regulations and Code an operator shall develop building/premises or preventative maintenance programs, that describes what is done, how is it done, when is it done, deviation procedures and verification procedures. The monitoring tasks shall include:

< a visual inspection of unloading/loading areas to ensure that adequate space is provided for room's activities and the room continues to be adequate in size and quantity for the meat products being transported and can easily accommodate the size of vehicles being used;

< a visual inspection of equipment or devices that record, store data, measure, and control the temperature and/or the humidity of work and storage rooms in areas of an establishment where meat products are handled or stored, to ensure that equipment is functioning properly and as intended;

< outside contractors (if applicable), assigned to service equipment that control temperature and humidity, shall document the work performed, the frequency and any deviation procedures. Verification procedures shall be included within a company's maintenance programs, together with records verifying task completion.

Monitoring records shall be completed and maintained, including deviations or corrective actions and verification procedures. Records shall be kept on file for a period of time found acceptable by an inspector.

4.5 Birds Received in a Slaughter Establishment

4.5.1 Live Poultry Receiving and Holding Rooms

Rooms utilized for the unloading and loading of live birds shall be designed separate from meat processing, handling and storage..

The area used for unloading live birds should be equipped with a cover, adequate ventilation and facilities for cleaning and sanitizing crates and vehicles. Cleanable containers shall be provided for the holding of birds found dead on arrival and birds killed following condemnation as a result of ante- mortem inspection.

4.5.2 Carrier and Crate Cleaning Facilities

Ideally, a separate room located in an area physically separate from live poultry receiving and holding should be allocated for the cleaning and sanitizing of bird crates, holding containers and transport vehicles.

The room shall be constructed of materials that can be adequately cleaned with approved cleaning chemicals and designed to contain adequate floor drainage, hose bib connections for cleaning purposes and sufficient ventilation.

4.5.3 Monitoring Procedures: *What is done and How is it Done*

An establishment shall be monitored at pre-determined frequencies to ensure that a room or area continues to be provided for the purpose of receiving and shipping; for the unloading and storing of crates and other transport containers; and that the designated area is provided with facilities for cleaning and sanitizing of the transport containers or equipment.

In order to achieve compliance with the National Meat and Poultry Regulations and Code an operator shall develop appropriate training programs to employees responsible for cleaning and sanitizing procedures for bird crates; the procedures for receiving, unloading and storing of crates or similar type equipment.

A written sanitation manual shall include the method of cleaning and sanitizing bird crates and operational inspection records used for monitoring and verification of the written program. The monitoring tasks shall include:

< a visual observation of receiving, unloading and storing of bird crates being performed in designated and separate areas of an establishment;

< a visual inspection of the designated area used to clean and sanitize bird crates to verify that the activity is being performed within the designated area and that facilities are equipped with water at a temperature and pressure that effectively cleans equipment;

< a verification procedure to ensure that cleaning and sanitizing is being performed properly and in accordance with the sanitation program for bird crate washing procedures and methods.

Monitoring records shall be completed and maintained by the operator, including deviation, corrective actions and verification procedures. Records shall be kept on file for a period of time found acceptable by an inspector.

4.6 Sanitation and Hygiene Facilities

4.6.1 Washroom Location and Requirement

Plant employee washroom's shall be located within an establishment that prohibits direct access into any area of the plant where meat products are handled or stored.

The amount of washroom facilities to be made available within an establishment shall accommodate the various activities performed, i.e., slaughter, meat processing.

Each province has ordinances pertaining to the number of toilets and urinals required. The following minimum numbers or the numbers required under provincial ordinances, whichever are the greater shall be provided:

Number of Employees	Number of Toilets
01 - 09	1
10 - 24	2
25 - 49	3
50 - 100	5
Over 100	1 for each additional 30 employees

In male washrooms a urinal may be substituted for a toilet.

Should an establishment performed both slaughter of food animals and meat processing activities, it is recommended that, in addition to the aforementioned a separate toilet, change room and lunch room area be provided for those employees involved in live receiving, stunning and bleeding activities, in order to minimize physical and biological hazards.

4.6.2 Washroom Construction and Equipment

Employee washrooms shall be constructed of cleanable and durable materials in order to promote daily sanitary maintenance. The washrooms shall be equipped with adequate ventilation and access doors shall be equipped with self closing devices. The equipment within the room shall include:

a) hand washing and drying equipment that is hands-off or timed;
b) supplied with hot and cold potable water;
c) have available within the room, soap and a method of drying that uses single-service products, (i.e., soap dispensers and paper towel dispensers);
d) any adequate supply of toilet paper and other toiletries necessary for the room;
e) a 'WASH HANDS' sign posted within the room to remind employees to wash hands after using facilities;
f) constructed of wall, ceiling and door materials that can be wiped clean; effective removal of dust, dirt, from surface areas;
g) constructed of floor materials that can be satisfactorily cleaned; a design and/or a method of cleaning that does not permit liquids to collect or create water pooling;
h) equipped with adequate ventilation to remove odours effectively;
i) equipped with self-closing devices on door entrance

4.6.3 Hand Washing Facilities

Hand wash facilities that are directly drained shall be located within each work and meat product handling room of the establishment.

The facilities shall be:

a) located within the work room upon entering the room in locations that are easily accessible for plant employee use;
b) adequate in number to facilitate the room's operations;
c) be equipped with direct drainage and hot and cold potable water and a sign that demonstrates/ explains proper hand washing techniques;
d) be equipped with soap and towel dispenser units and garbage container;
e) used for no other purpose than hand washing.

4.6.4 Change rooms

Where appropriate, change rooms should be made available within an establishment, in order to provide a room for the purpose of changing from street clothes to work clothing. The change room should be located in an area of the establishment that is considered compatible with the plant's operational flows. The materials used to construct the room should be cleanable.

4.6.5 Inspectors Facilities

In an establishment, facilities shall be made available for use by an inspector that are appropriate for the inspection being made and adequate for the inspector's reporting obligations. An operator shall provide for the inspector's use:

a) a desk and chair;
b) a cabinet (with a locking device) for control over documents and government stamps;
c) supply cupboards/shelves for equipment, supplies and stationary;
d) access to a telephone;
e) access to a wash room, change room, and shower facilities, where appropriate.

4.7 Refrigeration , Freezing and Fermentation Facilities

4.7.1 Cooler Rooms/ Dressed Carcasses

Refrigerated rooms capable of maintaining a temperature of 2 °C or lower to permit rapid chilling of dressed carcasses immediately after slaughter shall be provided within an establishment. The location of the 'chill cooler' room should be in keeping with the operational flows of slaughter operations, in order to prevent backtracking of dressed carcasses through incompatible areas and to minimize contamination to meat products.

A suitable and designated area with a cooler room, known as 'a detained area' should be provided to accommodate the chilling and storage of *detained* carcasses and parts. The detained area shall be segregated from the remainder of the cooler and shall be equipped for sealing or locking devices or

another types of acceptable control devices found acceptable by an inspector.

4.8 Pork Products Frozen to Destroy Trichina

4.8.1 Self Recording Thermometers

In establishments where pork products are frozen as an anti-parasitic treatment to destroy Trichina, the freezer room shall be equipped with accurate automatic devices that continuously record time and temperature.

Time/temperature recorders and thermometers shall be tested for accuracy against a known standard thermometer and clock. The test shall be performed prior to installation and at least once per year or more frequently if necessary to ensure the equipment's accuracy. (*Refer to Part 11, Processing and Meat standards for additional requirements).*

4.9 Meat Products Packed in Hermetically Sealed Containers

4.9.1 Self Recording Thermometers

Meat products packed in hermetically sealed containers must be incubated and the retort equipment must be equipped with a mercury thermometer and an accurate recording thermometer. Alternate temperature indicators with comparable accuracy and reliability to a mercury thermometer may be installed, providing the regulatory authority has found the equipment acceptable.

A separate room or a separate compartment to incubate a representative sample of appetised meat products shall be provided by the operator. The room or equipment shall be of an acceptable size to incubate the sample lot and of acceptable construction in order to provide sanitary maintenance. (*Refer to Part 11 Processing and Meat Standards, and Appendix "F" Canning for additional requirements).*

PART 5

EQUIPMENT

PART 5 - EQUIPMENT

PART 5 - EQUIPMENT

Design, Construction and Maintenance of Equipment
Equipment used for Processing Procedures
and/or Storage Activities

Reference: Part 5 - Sections 15, 16 & 17 of the National Meat & Poultry Regulations

OUTCOME REQUIRED

< The design, construction, installation and maintenance of equipment that facilitates hygienic processing of animals and prevents contamination of meat products.

RATIONALE

< The purpose of these requirements is to prevent the contamination of meat products by microorganisms, by other food, by dust, and by foreign material such as rust, lubricant and particles coming from the equipment.

< Poor design and construction may result in equipment which may be difficult to clean and may require higher degree of maintenance. Contamination problems may arise from poor

< maintenance, misuse of equipment, exceeding the capacity of the equipment, use of worn-out equipment, and improper modification of equipment.

< Equipment arranged in an orderly manner permits cleaning of adjacent areas and does not interfere with other processing operations. It also minimizes circulation of personnel and optimizes flow of material.

5.0 Design, Construction and Maintenance of Equipment

5.1 General

In order to effectively control operational sanitation, equipment and containers coming into contact with meat and meat products, should be designed and constructed to ensure that, where necessary, they can be adequately cleaned, disinfected and maintained to avoid contamination of meat products.

Equipment and containers, in direct contact with meat and meat products, should be made of non-corrosive and rust-resistant material, such as stainless steel. Where necessary, equipment should be durable and capable of being disassembled to allow for maintenance, cleaning, and inspection.

5.2 Equipment Specifications

The use of new materials and equipment, however, is not permitted in an establishment until acceptance has been received from the *Regulatory Authority* having jurisdiction.

The following general principles apply to construction of equipment for use in an establishment:

(a) metal over wood in the construction of equipment is not permitted. The use of concrete curing vats are not recommended and should be replaced by stainless steel or other acceptable materials.

(b) copper is not acceptable for equipment which contacts edible meat products. Copper piping should not be used where ammonia refrigeration is utilized.

(c) cadmium is not acceptable in the construction of equipment used for handling of edible meat products.

(d) lead shall not be used in the construction of equipment contacting edible meat products, except that it may be employed in dairy solder in an amount not to exceed 5%.

(e) the use of containers or equipment made of enamel ware or porcelain is not acceptable for handling and processing of meat products.

(f) aluminum may pit and corrode when exposed to certain chemicals. When friction occurs between aluminum and meat or fat, a black oxide is produced which discolours the meat. Anodizing the aluminum does not eliminate this problem. The use of aluminum is therefore limited to applications where the metal does not directly contact the meat or in which the meat is suspended in water.

5.2.1 Equipment Design, Installation, Operation and Maintenance

Equipment, equipment utensils and accessories located in work and storage rooms must be of a design, construction and installation to function as intended, to permit effective cleaning, maintenance and inspection and to prevent contamination to meat and meat products and/or contamination of work rooms within the establishment.

5.2.2 Criteria for Equipment Intended for use in an Establishment

Equipment intended for use in an establishment shall comply with the following criteria. Equipment shall be:

< of a design, that easily disassembles for cleaning, sanitizing, inspection and maintenance; and that permits proper drainage where applicable;

< of a construction which does not impart any physical, chemical hazards or biological hazards to meat and meat products;

< installed in such a manner that achieves and maintains the desired results of operation without imparting any environmental hazards (i.e., properly exhausted to exterior to prevent condensation problems), or congestion problems within the plant and/ or physical hazards as a result of improper welding of joints;

< installed in such a manner that provides sufficient distance from walls and ceilings to permit access to areas around the equipment, or alternatively, be completely sealed to walls and ceilings; and shall not be located in areas of an establishment that may subject the equipment to sources of contamination;

< properly maintained in accordance with the manufacturer's recommendations and/or as a result of operational requirements;

5.3 Equipment Installation

When installing equipment other factors may have to be considered in order to ensure its proper operation. Services (air, water, electricity) shall be connected in a manner that facilitates proper sanitation of the equipment, as well as, the surrounding areas. All equipment as well as service lines (e.g.: water pipes, drain pipes, air hoses, etc.) shall be installed away from walls and ceilings, to provide sufficient access for cleaning purposes or be easily movable to permit cleaning and sanitation. Alternatively, permanently mounted equipment should be completely sealed to walls, floor or ceiling.

Use of electric cords shall be based on both sanitary and safety considerations. Drop cords suspended from the ceiling may be retractable and used to connect portable equipment as required provided the cords are properly wired to the power source and they are kept in a suitably sanitary condition. Electric cords shall not be strung across the floor even on a temporary basis.

Where compressed air is used for equipment, the air intake shall be properly filtered. Any storage tanks shall have a drain and there shall be water and oil traps located between the storage tank and the point of use.

5.4 Equipment (Direct Contact)

All food contact surfaces shall be constructed of suitable materials and shall be maintained in a manner that

prevents contamination of meat and meat products. Food contact surfaces shall be constructed of materials that are:

< smooth, non-corrosive, non absorbent, non toxic and that do not impart any physical, biological or chemical hazard to products contacting equipment surfaces;

< free of pitting, cracks or crevices that harbor bacteria and are unable to be effectively cleaned or sanitized as a result of their condition;

< can withstand repeated cleaning and sanitizing procedures without showing evidence of deterioration or physical characteristic changes of the material; equipment that has demonstrated, microbiologically, that it is suitable in construction and design and can be effectively cleaned and sanitized;

< unaffected by food; food contacting the equipment does not alter the components of the materials and the composition of materials used. Equipment composition does not impart any physical, chemical of biological hazards to foods in contact with the equipment.

5.4.1 Materials used for Food Contact Surfaces

All equipment and utensils intended for use in an establishment shall not cause contamination to meat and meat products or the plant environment. With this understanding and considering that the equipment in this category contacts the meat and meat product directly, choices of material have been listed below:

< stainless steel;

< galvanized metal or hot dip galvanized;

< metal materials that are non corrosive and rust resistant;

< equipment constructed of plastics, resins, fibreglass, latex and numerous combinations thereof, if found acceptable (food grade) for use by the appropriate *Regulatory Authority.*

In addition to the above, equipment shall have continuous, smooth, even, welded joints and wherever possible, junctions and corners coved.

5.4.2 Equipment Not Acceptable For Use (direct contact)

In order to minimize and protect meat and meat products from physical, chemical and biological contamination the following equipment shall not be permitted for use in an establishment for direct contact with food:

< equipment with applied painted surfaces;
< metal over wood in the construction of equipment;
< equipment constructed of lead;
< equipment constructed of cadmium;
< equipment constructed of copper;

< or any other equipment found unacceptable by a representative of the appropriate *Regulatory Authority*.

5.4.3 Non-Food Contact Equipment

All equipment intended for use in an establishment shall not cause contamination to meat and meat products or to the plant environment. With this understanding and considering other types of equipment that do not contact food products directly, the following has been provided;

< metal based equipment that is non corrosive and rust resistant. Applying approved paints, coatings, finished on materials to prevent rust and corrosion would be acceptable in areas or rooms where meat and meat products do not contact an equipment surface directly;

< stainless-steel equipment;

< galvanized metal or hot dip galvanized metal;

< baked enamel /coated finish;

< plastic (resins) equipment that are cleanable and impervious;

< painted equipment (i.e., shelving racks for packaged or completely protected meat products in dry storage rooms, freezer rooms, etc.,);

< smooth wooden materials such as rack shelve units; wooden materials used in the construction of walls, ceilings, etc., in rooms or areas of the plant where moisture would not be a factor and the method of cleaning is suitable for the room and equipment within the room.

In addition to the above equipment with no direct contact to food products shall be free of unnecessary ledges, projections and crevices. The design and construction of the equipment shall also facilitate cleaning and maintenance.

5.4.4 Monitoring Procedures: *What is Done and How is it Done*

Equipment shall be monitored visually, and in operation, at pre-determined frequencies, in order to ensure that equipment is of a design, construction, operation that prevents contamination of meat and meat products. Equipment continues to be cleaned and sanitized effectively and does not impart any hazards or contamination to products in contact with the equipment or being processed through the equipment or to the room where the equipment is installed.

An operator shall ensure that equipment within an establishment is visually inspected on a regular basis in order to verify continual suitability, and:

< equipment is free of contamination;

< equipment is free of rust or corrosion;

< that the equipment does not transmit odour or taste to food and do not allow migration of unsafe substances into food; that the equipment is unaffected by food;

< equipment is located and installed in areas of an establishment that permits accessibility for inspection, servicing and cleaning;

< the condition of equipment is non-absorbent; smooth and free from pitting, cracks or chipping;

< equipment continues to be capable of withstanding repeating cleaning and sanitizing and performs as intended.

Equipment monitoring, deviation and verification activities shall be documented by an operator. Any deficiencies shall be followed-up with appropriate corrective actions, that include both short term and long term actions. An operator shall complete and maintain records for a period of time found acceptable by an inspector.

5.5 Preventative Maintenance Program

An operator shall develop a written preventative maintenance program for each area and room within an establishment, as well as, applicable equipment and instruments which control factors critical to food safety.

This program shall include a list of equipment and instruments within the premises. The frequencies and types of preventative maintenance activities conducted shall be based on the manufacturer's manual or equivalent, or based on operating conditions that may affect the condition of the equipment.

5.5.1 Preventative Maintenance and Calibration

An operator shall have a written preventive maintenance program that includes identification of equipment requiring regular maintenance and calibration, maintenance procedures, frequencies, and identification of trained individuals performing these activities, etc. An operator shall document maintenance and calibration activities. The frequencies and types of preventive maintenance activities conducted shall be based on the manufacturers' manuals or equivalent or are based on operating conditions that may affect the condition of equipment.

All other equipment shall be maintained so that no physical, chemical or microbiological hazards result. For example, flaking paint, rust, excessive lubrication, cracks, crevices, and inappropriate repair.
The written program shall include:

b) persons responsible for monitoring (visual inspections) and frequency;

b) a description of inspection procedures for walls, floors, ceilings, overhead equipment, doors and facilities, in order to maintain the structural premises free from flaking paint, rust, excessive lubrication, cracks, crevices and inappropriate repair;

c) records for monitoring the premises and equipment, corrective actions, planned completion dates and verification procedures to verify the effectiveness of the preventative maintenance program for the building and the equipment therein;

d) a listing of equipment that requires regular maintenance;

e) a description of equipment maintenance procedures and frequencies;

f) a listing of equipment and/or instruments that require calibration; and

g) calibration procedures and frequencies and identification of trained individual and/or company performing these activities

5.6 Equipment used for Processing Procedures and/or Storage Activities

5.6.1 Processing Equipment (Control and monitoring equipment)

Equipment used to cook, heat, treat, cool, store or freeze meat should be designed to achieve the required food temperatures as rapidly as necessary in the interests of food safety and suitability, and shall be able to maintain them effectively.

Such equipment should also be designed to allow temperatures to be monitored and controlled with accurate operating devices or controls that record, chart, print, etc., for example, time, temperature, relative humidity, ph levels, water activity, etc. Where necessary, such equipment should have an effective means of controlling and monitoring air-flow and any other characteristic likely to have a detrimental effect on the safety or suitability of meat and meat products.

In addition, all monitoring devices and any equipment that impacts on food safety, such as, ovens, kettles, refrigeration units, thermometers, etc., shall be calibrated. Calibration monitoring and verification records shall be maintained by an operator for a period of time found acceptable by the appropriate *Regulatory Authority.*

The aforementioned requirements are intended to ensure that:

(a) harmful or undesirable microorganisms or their toxins are minimized to safe levels or their survival and growth are effectively controlled;
(b) where appropriate, critical limits established in HACCP-based plans can be monitored; and

(c) temperatures and other conditions necessary to meat safety and suitability can be rapidly achieved and maintained.

Refer to Part 11, Processing and Meat Standards for additional information and requirements.

5.6.2 Containers for Waste and Inedible Substances

Containers for waste, by-products and inedible or dangerous substances, should be specifically identifiable, suitably constructed and, where appropriate made of impervious material. Containers used to hold dangerous substances should be identified and, where appropriate, be equipped with a lock to prevent malicious or accidental contamination of meat and meat products.

5.6.3 Specialized Equipment Construction

Pumps, piping and other conduits, used to transfer products, re-circulated chiller water or water used to transport products from one machine or room to another, shall be easily de-mountable by means of dairy or sanitary-type fittings, and be of such size and length as to be capable of easy and regular cleaning.

Portable equipment used for the collection, holding and transfer of condemned and other inedible material must be of rust-resistant metal or other acceptable material, be watertight and covered, where necessary. This equipment must be distinctly and uniformly marked, for ready identification.

Painted racks are not recommended for use in high moisture areas since they are subject to chipping, which may result in the formation of corrosion and deterioration. However, no objection will be taken to the use of painted racks for packaged or boxed products in dry storage or freezer rooms where there is a limited amount of moisture and cleaning required.

5.6.4 Cleaning of Equipment

Adequate hot and cold water must be available in all workrooms, to clean stationary equipment. It is recommended that high-pressure spray-cleaning equipment be installed or an acceptable method of cleaning that achieves the same results.

A room or an area shall be set aside for the cleaning of portable equipment or an area found acceptable by an inspector designated for cleaning and sanitizing of equipment. All mobile equipment and equipment which can be dismantled should be moved to that room or area, for cleaning. When stationary equipment is cleaned, meat products must either be removed from the room or area, or adequately protected from splash contamination.

All knives, scabbards, steels, hooks, and other tools used by employees, as well as their aprons, are to be considered as an integral part of plant equipment and must be maintained as such and stored on conveniently-located rust-resistant racks or multiple scabbards, and not in clothes lockers. If locker storage for personal tools of employees is used, the facilities shall be separate from those used for clothing.

5.6.5 Monitoring Procedures: *What is Done and How is it Done*

Equipment shall be monitored at pre-determined frequencies in order to ensure that the equipment is operating as intended; that time/temperature instruments and associated control devices which control factors critical to food safety are being maintained and calibrated so that it performs consistently and as intended for the safe production of food.

An operator shall visually inspect equipment used to cook, heat, treat, cool, store or freeze meat products and all applicable records, documents and written programs to ensure that:

< all instruments and control devices that impact on food safety are operating as intended;

< equipment requiring calibration at specified frequencies and procedures are being performed either by trained individuals or by an outside company at pre-determined frequencies;

< all processing records identify deviations and corrective actions that ensure the safe production of meat products; and

< all applicable records and document programs are maintained on file for a period of time found acceptable by the appropriate *Regulatory Authority* and that programs for equipment calibration are being maintained up to date and complete.

PART 6

MAINTENANCE AND SANITATION

PART 6
MAINTENANCE AND SANITATION

PART 6
MAINTENANCE AND SANITATION

Sanitation Program
Maintenance Programs
Pest Control Programs

Reference: Part 6 - Sections 19 & 20 of the National Meat & Poultry Regulations

OUTCOME REQUIRED

< The development and implementation of sanitation programs that ensure effective control of physical, chemical, and microbiological contamination of equipment and premises used in the manufacture of meat products.

RATIONALE

< Sanitation facilitates the continuing, effective control of meat hazards, pests and other agents likely to contaminate meat. A planned written program is essential to ensure product safety.

6.0 General

6.1 Definitions

As defined in the Regulations.

6.2 Sanitation Program

An operator of an establishment shall develop a written sanitation program. The program shall be designed to include cleaning methods, procedures and frequencies for all rooms (walls, floors, ceilings, overheads equipment, drains, doors, refrigeration units, heaters, etc), and equipment within the entire premises. The documented program shall include inspection procedures and methods prior to operations, together with, a description of any operational inspections or housekeeping functions that occur during operations.

The effectiveness of a sanitation program is the responsibility of the operator. In addition to pre-operational inspection programs, checks for effectiveness of the sanitation program shall be implemented by the company. Work procedures, chemical preparation and application procedures and other sanitation activities shall be verified by the operator or a representative of the company (ie., outside chemical suppliers, to assure themselves the written program is being followed. Microbiological methods are also used to verify the effectiveness of an operator's sanitary programs. Some of the tests may include, swab tests, contact plates, ATPase tests, Total Plate Count, etc, at a frequency necessary to demonstrate adequacy.

6.2.1 A Sanitation Program Shall Include the Following Minimum Requirements

(c) *Name of person responsible* for (or outside cleaning company, if applicable) monitoring, verification and any effectiveness checks of the company's sanitation program.

The written documents shall describe the responsibilities of all those involved in the sanitation program; what is done and how is it done? Who is responsible for maintaining the written program and corresponding records, current and accurate

(d) *A list of the cleaning chemicals, sanitizer agents* and equipment lubricants/agents, (approved by the *Regulatory Authority)*. Currently, the Canadian Food Inspection Agency, publishes, the "Reference Listing of Accepted Construction, Packaging Material and Non Food Chemical Agents", a complete listing of chemicals and agents accepted for use in registered establishments.

(e) *The chemical concentration levels* of cleansers and sanitizers used to clean each room and each piece of equipment located in the establishment.

(f) *The methods and procedures, (what is done and how is it done), used to clean rooms,* areas and equipment, including recommended or appropriate water temperature requirements for each stage of cleaning and sanitizing.

A written program that describes, what, how and when walls, floors, ceilings, doors, drains, overhead structures, overhead heaters, rails and rail support systems, equipment, windows, livestock pens, etc., are cleaned and sanitized. That identifies what cleaning agents and chemicals are used to clean and sanitize rooms and equipment. How chemicals are prepared and mixed, as well as, product contact time.

(g) *The program addresses equipment disassembly and assembly procedures;* food contact surfaces and equipment; specialized cleaning equipment used for particular equipment, (i.e., clean in place (CIP) or clean out of place (COP).

(h) *The frequencies of cleaning/sanitizing rooms* and equipment within the establishment, in order to maintain a hygienic environment and prevent food contamination.

(i) *A description of pre-operational inspection, monitoring and verification*; Sanitation Procedures, for cleaning and/or sanitizing during production activities, where applicable. A Pre-Operational and operational program that identifies who, what, where, how and why, and contains the following components:

10. the authority of the responsible person doing the pre-operational inspection,
11. the responsibilities for corrective actions and verification
12. reporting records that identify deviations and the appropriate corrective actions taken in order to correct the situation and to maintain/achieve compliance with the National Meat and Poultry Regulations and Code

(h) A description of the various microbiological testing methods performed,(i.e. swab tests contact plates, ATPase tests, Total Plate Count, etc.). The frequency of the testing, in order to verify the effectiveness of the company's Sanitation Program.

In addition, microbiological testing shall be performed when, or at times, new changes are introduced to the Sanitation Program, (i.e., new equipment, changes to cleaning methods, applications, new cleanser or sanitizer used, new manufacturing processes etc..), or as a result of consumer complaints or product defects.

Representatives from chemical companies, or companies with background in the areas of sanitation, and chemical usage/concentrations, may at times, be utilized as possible sources of expertise, should assistance be required in the development of Sanitation Programs. A knowledge and understanding of the total environment in which meat products are handled should be a prerequisite for those engaged in the development of a sanitation program.

6.3 Pre-operational Programs, Inspection and Monitoring

A pre-operational inspection of the establishment involves a responsible employee visually inspecting equipment and rooms, prior to start of operations, in order to verify that the sanitation program has been completed in accordance with the written document program.

The written program shall describe how the pre-operational inspection works, and include as a minimum:

a) authority of responsible employee doing the inspection,
b) responsibilities for initiating corrective actions,
c) responsibility for verifying corrective actions,
d) identification and use of monitoring records.

Plant employees who carry out pre-operational inspections in the monitoring of the cleanliness of product contact surfaces and/or rooms within the establishment, use their senses of sight, smell and touch to determine the effectiveness of the clean-up.

In order to assist with the monitoring and inspection tasks involved in a pre-operational program, the following guidelines have been provided:

a) Visually inspect all meat contact surfaces; inspection of complex equipment should be examined prior to assembly; inspect all equipment accessories, ie., conveyor belts, pipelines, exhaust units, etc. Use a flashlight when inspecting equipment such as grinders, emulsifiers, stuffing machine and or complex equipment.

b) Visually inspect small utensils and equipment parts, tools, hooks, knives, gloves, aprons, etc.,

c) Visually inspect areas of equipment which do not contact meat products directly, such as, undersides of equipment, ceilings, walls, floors, overhead rails, etc., for cleanliness and possible physical contamination, (ie. flaky paint, rust, corrosion, etc).

d) Lift drain covers, check for cleanliness, unusual odours, rodents baskets. Visually check hand, wash facilities and sanitizers in order to confirm that the facilities are functioning as intended and supplied with soap, paper towels, waste containers and hot/cold water.

e) Visually look up and around on walls and ceilings for evidence of damage, cracks, peeling paint, rust, loss of galvanization, opened seams or joint areas loose and any other type of wear and tear that may affect the safety of meat and meat products handled or stored within the room. Potential sources of contamination located above meat products are generally more critical than walls, floors, or undersides of equipment.

f) Visually inspect temperature gages or thermometers used to measure refrigeration in rooms where perishable meat products are handled or stored, and with the use of a thermometer check the temperatures of knife sterilizer units, in work rooms.

g) Visually inspect walls and ceilings for evidence of condensation; observe if condensation problems are as a result of faulty ventilation, or poor insulation, or insufficient air movement, or mechanical problems due to the refrigeration system.

6.4 Records or Checklists for Pre-operational and Operational Monitoring/Inspection

Pre-operational inspection records and operational records used for documenting the operator's sanitation program shall be completed on a daily basis for all rooms and equipment located within the premises. Checklists shall also include lunchrooms, change rooms, washrooms used by plant personnel.

The records shall include, as a minimum;

(a) date and frequency of the inspection or monitoring task;
(b) names of the persons responsible for monitoring the findings and the corrective actions;
(c) corrective actions taken or planned completion dates, where applicable;
(d) signature and frequency of the person responsible for verification of the programs effectiveness and completeness of the pre-operational and operational sanitation programs, (Operational sanitation).

6.5 Operational Sanitation

A written program for Operational Sanitation shall be developed and incorporated into the Sanitation Program, together with, related effectiveness programs, in order to address not only the cleaning methods for the premises and equipment, but also the maintenance of sanitary conditions during manufacturing operations.

Operators shall implement a sanitation program that is effective in maintaining the building and equipment in a sanitary manner. Housekeeping procedures and their frequencies provide work and storage rooms in a condition that is tidy and organized during the day's operational activities.

Where areas, rooms or equipment, require cleaning during manufacturing operations, the procedures used for cleaning shall not pose a risk to meat and meat products. In other words cleaning of rooms and equipment shall not proceed should there be any likelihood of contaminating meat products, or materials. Should the method of cleaning involve high pressure applications, the operator shall ensure that all exposed meat and meat products, ingredients and packaging materials are removed or completely protected to prevent contamination.

In rooms where ready-to-eat meat products are handled, the methods and procedures of operational sanitation shall be such that, the risk of contamination by chemicals or meat particles from floor areas or equipment shall be avoided.

Employee's responsible for operational sanitation procedures, shall be fully trained in cleaning procedures and application of chemicals in order to minimize the potential for situations involving cross-contamination. Should the same employee be responsible for other activities within the plant involving the handling of meat and meat products, operational controls such as, washing of hands and changing working apparel may be employed to prevent contamination.

6.6 Equipment Wash-up Rooms

The activity of cleaning, sanitizing or servicing equipment within the establishment shall not pose a risk of contamination through chemical of biological hazards as a result of such activities.

Many manufacturing processes require utensils and mobile equipment to be cleaned during operations. As a result, a separate room, designated for the cleaning and sanitizing of such equipment should be made available within an establishment,(equipment wash-up room), as well as, a separate room for the servicing and maintenance of equipment, (maintenance room). The purpose of having separate rooms for these activities is to prevent contamination from their operations to meat and meat products.

However, should an existing premise not have separate rooms for cleaning, sanitizing and servicing of equipment, an operator must ensure that these activities are performed at times, when manufacturing operations have ceased or in a compatible area of the establishment, which does not pose a risk to materials or meat products.

6.7 Cleaning of Non-Refrigerated Rooms (Mid-shift Cleaning)

Unless an operator is able to demonstrate continual microbiological acceptability of a work environment, by means of a valid microbiological sampling program, a complete mid-shift clean up of contact surfaces shall take place at least once every *4 hour period* during operations.

A mid-shift cleanup procedure shall consist of:

(a) equipment dismantling, where applicable;
(b) removal or acceptably covering all meat, ingredients and packaging materials prior to cleaning;
(c) should condensation be created on overhead structures, as a result of cleaning procedures, the condensation shall be completed removed prior to start-up;
(d) an operational inspection shall be performed prior to resuming operations to ensure that product contact surfaces meet the same criteria as a pre-operational inspection stage;

Note, that, any unclean equipment that was previously used and left unused for a period of *2 hours or more* shall be completely taken apart, cleansed and sanitized, (where appropriate) before being reused.

6.8 Effectiveness Programs for Sanitation and Pest Control

Programs that verify sanitary work procedures, chemical preparations and application procedures, any other related sanitation activities, deviation and verification procedures, as well as, pest control programs can be viewed as effectiveness programs.

All operators of an establishment shall develop and maintain an effective pre-operational and operational program for each day of slaughter or manufacturing operation. Pre-operational monitoring tasks and verification tasks shall verify that the sanitation methods, procedures and chemicals used are effective for the plant's operations.

Appropriate methods of sanitation shall be assessed through pre-operational or operational checklist records.

Any areas or equipment found to be unacceptable on more than one occasion or that do not meet the required objectives of the sanitation or pre-operational programs, shall be re-evaluated.

Repetitive deviations found as a result of sanitation procedures shall be investigated and the appropriate corrective actions employed by the operator in order to achieve and maintain compliance.

Microbiological methods used as verification of the effectiveness of the sanitation program should be used, eg., ATPase tests, Total Plate Count, etc., at a frequency necessary to demonstrate adequacy.

A pest control program, that is either provided by an outside company or provided by an operator shall be monitored and verified to ensure that the written program is being followed and that the programs achieve the objectives of maintaining the establishment free of pests and infestation of rodents.

6.9 Managing Refuse, Waste and Garbage Materials

Refuse, garbage materials shall be removed either at mid-shift breaks or more frequently to maintain an acceptable level of sanitation and housekeeping during manufacturing operations. Floors shall be squeegeed to prevent accumulations of protein and fat materials and to maintain work rooms clean and tidy during operations. Poor housekeeping practices during operations promote the growth of microbes and can lead to poor work habits of plant employees. Regular schedules for removal of solid waste materials from rooms and areas, as well as, basic janitorial services, shall minimize possible hazardous situations from occurring.

6.10 Written Pest Control Program

Pest Control Programs shall be developed, implemented and maintained at pre-determined frequencies in order to prevent entry of pests and the like to the plant premises.

Pests shall not be tolerated in any area of an establishment. Chemical controls such as residual bug sprays shall be limited to non-production areas within the premises. Mechanical controls shall be used in production areas. Rodent chemical baits are limited to exterior use only. Pest Control agents applied in an establishment shall be approved by the appropriate *Regulatory Authority.*

Good housekeeping practices within a facility, as well as, regular building maintenance programs shall prevent and/or rodents and pests.

A written pest control program shall be maintained and verified by operator and shall include the following components:

(a) The names of the persons responsible for the program's development, implementation, verification and effectiveness and/or the name of the outside company performing the service.

(b) A list of approved pest control substances/agents, (poisons used, plus approval dates or letters of acceptance for use). Note, that pesticides used or other chemical products shall be restricted to those listed in the *Pest Control Products Act*.

(c) Details on how and where the pest control agents are applied and their locations within the plant or outside of building (if applicable).

(d) Frequency of applications and monitoring activities, (or visits to the establishment by outside pest control companies).

(e) The frequency of verification activities.

(f) Deviation procedures and/or methods.

(g) A map, (a floor plan showing the layout of rooms including a site plan) showing the location of all pest control devices both inside and outside the establishment.

(h) The operator shall maintain applicable records that verify the effectiveness of the pest control program for monitoring and verification purposes.

Note that, preventative maintenance programs that are designed for regular and effective building maintenance shall enhance pest control efforts and procedures, by ensuring that repairs to walls, foundations, openings or damaged areas, broken screens, etc., are replaced in a timely manner to minimize contamination and to discourage entry locations for pests and the like. (*Refer to Part 4, Establishment: Design and Facilities for additional information and requirements).*

6.11 Chemicals and Agents

Cleaning chemicals and agents used within the establishment, shall be in accordance with the manufacturers recommendations and shall be approved for use and listed in the "Reference Listing of Accepted Construction Materials, Packaging Materials and Non-Food Chemical Products", or the operator has received "a letter of no objection from Health Canada".

The approved listing ensures that cleaning chemicals and agents used for equipment maintenance do not impart any biological, physical or chemical hazards when used in food production areas.

6.12 Storage of Chemicals and Agents

6.12.1 Cleaning Chemicals and Equipment Lubricants

All approved chemicals shall be stored separate and securely from production areas, storage rooms, packaging materials and food ingredients, in order to prevent misuse and possible chemical hazards to meat and meat products.

A designated area, or room, or cabinet, shall be provided for the storage of chemicals and agents. The placement of the room or cabinet should be in a compatible area of the establishment. Chemical agents shall be clearly labelled and shall have a means of securing the containers to prevent leakage or spillage.

Authorized use, and handling of chemicals shall be given to plant employees or outside companies that have been given training in safe handling procedures and use of chemicals.

6.12.2 Storage of Hazardous Non-Food Chemicals

Should the operator store hazardous non-food chemicals such as rodenticides, herbicides, etc., at the establishment the following requirements shall apply:

(a) the containers shall have labels, affixed securely. A clear description/identification of the substance contained within the container and directions for use shall be on the label or marked on the container

(b) either the chemicals are stored off the premises and only required amounts are brought into the establishment for use by designated/trained plant employee or,

(c) should it be necessary to store chemicals in the establishment, they are to be stored in a separate room or a partitioned area of a compatible storage room, or well separated from other non food items, ideally under lock and key, with controlled access be given to those people trained to handle and apply the chemical substances within the establishment

6.13 Containers Used for Inedible and Waste Materials

Containers used for the collection, conveyance and storage of inedible and condemned materials shall be removed to the inedible room within the facility for storage. The containers shall remain in an inedible room pending removal from the premises, at frequencies to minimize contamination.

The equipment used to hold inedible materials shall be clearly labelled and identified for this purpose. The containers could be identified through colour coding, or design, or clearly and permanently labelled as “INEDIBLE”. Inedible containers shall be equipped with lids, or other acceptable covering, where appropriate.

When inedible containers are removed to an inedible room, the containers must be thoroughly cleaned and sanitized, prior to re-entering any production room. Employees responsible for handling of inedible wastes materials and/or inedible equipment, shall be trained to understand the importance of the microbial hazards associated with the movement and handling of inedible waste materials. Employees handling inedible materials, shall not handle any edible meat products or ingredients, or packaging materials, unless hands are washed and work clothing changed or appropriately covered, in order to prevent cross-contamination to edible meat products.

Inedible materials may include intestinal packs, paunches, hides, feet, meat scrapes from floor, etc., as well as waste materials within livestock pens, such as manure and straw. Such waste materials may be collected and deposited on a hard surface slab for subsequent removal. The sanitation operational programs may address the removal of this type of waste material so as to prevent possible harbouring of flies, vermin and odours. (*Refer Part 4, Establishment: Design and Facilities for additional information and requirements).*

Cardboard waste and packaging type materials should be neatly piled and removed to the refuse area at break times, or more often as necessary, to prevent accumulations during operations and to maintain an acceptable level of sanitation and housekeeping during operational activities. At no time, should refuse materials be allowed to cause physical congestion in meat processing rooms.

(*Refer Part 10, Inedible Meat Products for additional information and requirements.)*

PART 7

WATER

PART 7
WATER

PART 7 - WATER

Water Supply
Potable and Non-Potable Water Systems

Reference: Part 7 - Sections 21 & 22 of the National Meat & Poultry Regulations

OUTCOME REQUIRED

< Supply of potable hot and cold water at adequate pressure and volume, and with facilities for its storage, distribution and temperature control ensures the hygienic processing of meat products.

RATIONALE

< Potable hot and cold water is used extensively in meat processing, handling, packaging and storage areas. Water may carry contaminants and it is therefore important to ensure that its quality is appropriate to the operation and that its use will not contribute to direct or indirect contamination or cross contamination.

< Non-potable water systems are potential sources of contamination and must be completely separate and clearly identified from potable systems to prevent mixing and inadvertent use on meat contact surfaces, materials and in meat product.

< An adequate water supply is necessary to ensure effective cleaning, sanitizing and other processing operations. Therefore water must be supplied in quantities that encourage adequate and appropriate use.

< Water, ice and steam used in cleaning, sanitizing and processing operations must be of a safe and sanitary quality in order to avoid the contamination of facilities, equipment, containers and food product.

7.0 Water Supply

7.1. Potable Water Supply

All establishments shall have available an adequate supply and source of hot and cold potable water, as well as, steam and ice generated from potable water. It is the sole responsibility of each operator to ensure that the source of water for use in an establishment is potable and is maintained potable at all times. Each establishment shall develop a *Water Quality Program* that describes and includes:

(d) frequency of testing the potable water supply for water, ice and steam analysis,
(e) procedures for collection,
(f) sample site locations for water testing,
(g) person responsible for the collection and corrective actions should a deviation occur,
(h) identification of applicable records maintained at the establishment,
(i) type of testing performed (coliform, total plate count, or chemical, pesticide),
(j) name and location of laboratory performing the analysis,
(k) certificate on analysis (where water or ice is supplied by outside suppliers)

7.1.1. Potable Water Supply

The availability of potable water shall either be supplied by:

(a) provincial or municipal (public) water systems;

(b) or from a private well, that is constructed, maintained, and operated to meet health requirements, and is approved by the local or provincial regulatory agency.

7.2. Water Sample Site Collection

When collecting water samples for testing the operator shall choose sample sites that represent the various water outlets located within the establishment. It is recommended that a floor plan be developed to identify the various locations for the purpose of sampling.

Sterile containers for the collection of water samples and instructions on collections and shipment should be supplied by the laboratories performing the analyses.

Note, that, when samples for chemical analysis are being submitted (i.e. well water source), it is recommended that the water be collected at the end of the spring runoff or immediately following an extended period of wet weather.

7. 3. Potable Water Analysis - Municipal Source

Water and ice shall be collected by the operator and submitted for bacteriological analysis by provincial or municipal authorities having relevant jurisdiction and/or private laboratories recognized by the National Meat and Poultry Regulations and Code.
The frequency of the water testing program should be on a *semi-annual basis* with satisfactory results.

7.3.1 Minimum Acceptable Bacteriological Standards

Water samples shall be tested at either accredited laboratories or a laboratory approved by the appropriate Regulatory Authorities. The test results shall meet the minimum health requirements as prescribed in the current publication of the *Canadian Drinking Water Quality Guidelines.*

Each sample submitted for bacteriological analysis shall be tested for total plate count and the enumeration of coliform per 100 ml.

Bacteriologically Acceptable Tolerances shall not exceed the standards described in the following Table:

a) Coliform Count: per 100 ml water;	< 10 Total Coliform per 100 ml water; No Faecal Coliform
b) Total Bacteria Count:	< 500 organisms per ml.
c) Chemical Substances	Refer to Table 1
d) Pesticide Substances	Refer to Table 2

7.3.2 Exceeding Acceptable Levels

Tests results that are proven positive for Coliform should be immediately retested at the same water site to exclude the possibility of contamination as a result of sample taken. Positive Coliform results after retesting should be identified to the municipality for investigation and corrective solutions.

Tests for chemical analysis should be carried out for substances listed in the following Tables 1 and 2. Should the water test results exceed acceptable levels, the operator shall consult with the applicable health authorities for further sampling, investigation and corrective solutions.

Water test results exceeding acceptable tolerances and indicating contamination of the establishment's water supply, either chemically or biologically, shall not be used for the plant's manufacturing operations or sanitary cleaning programs, until such time as acceptable levels related to health, have been obtained.

Test results for water potability must be retained by the operator of the establishment for a period of time found acceptable by the *Regulatory Authority*.

7.4 Potable Water Analysis - Private well

Establishments that either supplement municipal supplies with water from private wells or using solely water from private wells, require bacteriological analyses on a *monthly basis* with satisfactory results.

In addition, water from private wells shall be subjected to at least one initial chemical analysis with satisfactory results. Should there be a need for further sampling, the appropriate *Regulatory*

Authority shall determine the frequency. Refer to section 7.5 of this Part for Chemical Standards.

7.4.1 Chlorination Systems

Water originating from wells not meeting acceptable levels as per section 7.3.1. of this part, shall be treated by approved disinfection agents. The methods approved for continuous disinfection include the addition of chlorine, iodine, or hydrogen peroxide, or treatment of ozonation or ultraviolet light. Chlorination and ozonation both provide a means of continuous monitoring.

The approved systems shall be installed, tested for efficacy, health and safety in conjunction with an annual maintenance check by the operator and the company installing the system. Acceptable tests as determine by Health Canada for monitoring shall be completed by the operator on a daily basis and a monitoring record shall be maintained by the operator for a period of one year.

7.5 Chemical Standards

When collecting water and ice for chemical analysis, the operator shall establish a range of tests in consultation with the appropriate health authorities and municipal water plants. The range of chemical analysis shall depend on the establishment's location in respect to local exposure to industrial pollution, seepage from soil treated with fertilizers/ pesticides, and other mitigating circumstances.

The following tables, (Table 1 and 2), have been provided as a recommendation of limits for chemical and pesticide substances related to health:

Table 1 Recommended Limits for Chemical Substances Related to Health

SUBSTANCE	***MAXIMUM ACCEPTABLE CONCENTRATION mg/L***	***OBJECTIVE CONCENTRATION mg/L***
Inorganic		
Antimony	--	0.0002
Arsenic	0.05	0.005
Barium	1.0	0.1
Boron	5.0	0.01
Cadmium	0.005	0.001
Chromium	0.05	0.0002
Cyanide (free)	0.2	0.002
Lead	0.05	0.001
Mercury	0.001	0.0002
Nitrate (as N)	10.0	0.001
Nitrite (as N)	1.0	0.001
Selenium	0.01	0.002
Silver	0.05	0.005
Sulphate	500.0	150.0
Uranium	0.02	0.001

Organic Nitrilotriacetic Acid (NTA)	0.05	0.0002
Pesticide (Total)	0.1	- -
Trihalomethanes	0.35	0.0005

Table 2 Recommended Limits for Pesticides

PESTICIDES mg/L	***MAXIMUM ACCEPTABLE CONCENTRATION mg/L***	***OBJECTIVE CONCENTRATION***
Aldrin Dieldrin	0.0007	5x10 -8
Carbaryl	0.7	5x10 -4
Chlordane (Total Isomers)	0.0007	5x10 -8
DDT (Total Isomers)	0.03	5x10 -8
Diazinon	0.014	1x10 -6
Endrin	0.0002	1x10 -8
Heptachlor Epoxide/Hepta	0.003	1x10 -8
Lindane	0.004	1x10 -6
Methoxychlor	0.1	5x10 -8
Methyl Parathion	0.007	1x10 -6
Parathion	0.035	1x10 -6
Toxaphene	0.005	5x10 -8
2. 4D	0.1	1x10 -3
2.4.5-TP	0.01	1x10 -3
Total Pesticides	0.1	----

7.6 Water, Steam and Ice

7.6.1 Water Systems

All water, steam and ice shall be generated using potable water. The supply of hot and cold potable water shall be under sufficient pressure and quantities to meet all manufacturing and clean-up requirements.

Submerged water lines shall be equipped with vacuum breakers to prevent back siphonage and to prevent back flows through cross connections. The installation of such devices shall be in compliance with local plumbing and/or building codes. Should cisterns be present they must be sealed, and maintained in a manner that prevents contamination of the water supply.

Water temperatures, shall be in accordance with the requirements for any given area/room or equipment, as described within the company's written Sanitation Manual (SOP's), as well as, the recommendations of the chemical manufacturer. Insufficient water temperatures may not dissolve the proteins on equipment and prevent effective cleaning and sanitizing, which may result with potential biological hazards.

Water pressure, shall be sufficient to serve the needs of the plant. Water at appropriate pressure can make a difference between the water being effective for its intended purpose, (removal of fat on equipment and pressure that permits good flow in drainage systems, sinks and other facilities within the establishment) and not being effective.

Water quantity, shall be sufficient to serve the needs of the plant's manufacturing operations and sanitation procedures. An inadequate supply of potable water at an establishment may result with potential biological hazards, as a result of insufficient amount of water to effectively clean and sanitize the equipment and rooms within the premises.

Sanitation Programs, as well as, Maintenance Programs shall ensure through monitoring tasks, verification procedures and recording systems that potable water, steam and ice used within the establishment are controlled and maintained to ensure the hygienic processing or meat products. *Refer to Part 6, Maintenance and Sanitation for additional information on these programs.*

7.6.2 Steam

Steam used in cleaning operations or in manufacturing of meat products, shall be in adequate supply to meet operational requirements, and be derived from a potable water source.

Should the operations of an establishment involve the use of non-potable water for the production of steam, the steam shall not come in contact with meat or meat product surface areas.

The operator shall maintain records that demonstrate the microbiological and/or chemical safety of the water used to produce the steam supply.

The quality of the water supplied by either the municipality or by a well shall be controlled by the operator to prevent the buildup of hard water scale on equipment or excessive sulfur/iron or other interferences which could pose biological, chemical or physical hazards to meat products. Should boiler treatment chemicals be used, the chemical substances shall be approved by the *Regulatory Authority* and shall be used in accordance with the manufacturer's recommendations.

7.6.3 Ice

Ice manufactured at the establishment or purchased from an outside supplier shall be tested semi-annually for biological analysis, to ensure that the water is free of contaminants and shall not impart any contamination to meat, meat products and/or materials within the premises. Ice derived from a well-water source shall be tested monthly for biological analysis and once yearly for chemical analysis.

Another option for ice testing, would be to have the supplier of ice (outside companies), provide to the operator of the receiving establishment, a certificate of analysis, that includes the bacteriological results and the frequency of the ice sampled by the company. Certificates of analysis shall be kept in the company's Water Quality Program and made available to an inspector or auditor upon request for verification purposes.

To note, the re-use of ice or the use of ice that has been previously used is prohibited in an

establishment's manufacturing operations.

7.7 Non-Potable Water Supply

Non-potable water shall not be used where edible products are processed, handled, packaged or stored.

The use of non-potable water shall be such to prevent the contamination of potable water sources and may not be used where potable water is required.

Should non-potable water be stored at the premises for the purpose of fire prevention or for condensers on refrigeration systems, it must be kept separate from the potable water system and clearly identified to prevent any mixing and inadvertent use in areas which require potable water.

Potable water if stored must be protected against sources of contamination by the use of back flow preventors and/or check valves.

7.8 Monitoring Procedures: *What is Done and How is it Done*

The operator shall monitor the plant's water supply, (including steam and ice), at pre-determined frequencies in order to ensure that the building is supplied with an adequate amount of hot and cold potable water. The objective of the monitoring task is to verify that all manufacturing operations in which water, steam and ice may come in contact with, including chilling or conveying of a meat product, or sanitary procedures, are free of contaminants. Monitoring tasks shall verify that Non-potable water systems are separate from potable water systems and the piping systems are clearly identified.

The operator shall develop a Water Quality Program that includes:

< Microbiological testing and chemical testing, (if applicable), at pre-determined frequencies and at acceptable levels approved by the appropriate *Regulatory Authority*. Monitoring, deviation and verification procedures to ensure that the water quality programs meet current requirements of *"Guidelines for Canadian Drinking Water Quality"*.

< A visual inspection of the plant's drainage systems and related plumbing/mechanical blueprints, at pre-determined frequencies, (note, that, monitoring task could be incorporated into company's preventative maintenance program) to ensure that non-potable water supply continues to be separate and apart from all potable water sources and systems. That back flow preventors and/or back siphonage are installed and operating as intended.

< A visual inspection, and at times, with the assistance of a measuring device, to verify that the water supply meets the required temperature and pressure to performed the plant's operations, at frequencies to ensure adequacy and effectiveness.

< A visual inspection of chemicals, (labels, records, written programs and storage rooms), used to treat water to ensure chemicals are approved for use and are used properly in accordance

with the manufacturer's recommendations. The inspection shall verify that all equipment devices are operating properly for the intended purpose.

< Records and/or reports accurately completed and that include the monitoring tasks performed; deviation's procedures and verification methods and frequencies, to ensure compliance with written Water Quality Programs and Procedures. Records and documents shall be maintained by the operator for at least a period of one year and made available upon request to an inspector or auditor representing the appropriate Regulatory Authority for verification purposes.

PART 8

PERSONNEL

PART 8
PERSONNEL

PART 8 - PERSONNEL

Employee Training Programs

Reference: Part 8 - Sections 23, 24, 25, 26 & 27 of the National Meat & Poultry Regulations

OUTCOME REQUIRED

< The establishment and maintenance of hygienic practices, procedures, personnel requirements and behaviors that effectively prevent physical and microbiological contamination of meat products, and risks to health and safety of plant personnel.

RATIONALE

< People who do not maintain an appropriate degree of personal cleanliness, who have certain illnesses or conditions or who behave inappropriately, can contaminate food and transmit illness to consumers.

< It is essential that personnel employed in the production of food understand and be capable of demonstrating their duties relative to food safety. If the operations involved are highly technical in nature, they may require constant vigilance, attention to details, and a high degree of competence on the part of employees.

< Inadequate training of personnel, or the absence of an appreciation of the importance of good manufacturing practices, often contributes to the production of food products which may pose a hazard to health.

8.0 General

8.1 Hand Washing

The importance of hand washing must be promoted by every operator to minimize physical, chemical and microbiological contamination of meat products.

All employees upon entering a work room shall wash and sanitize hands. The purpose of hand washing is to ensure hands are clean and do not pose as a contamination source to unprotected meat products.

As such, hands shall be washed and sanitized as frequently as necessary to minimize cross contamination. For example, hands shall be washed and sanitized, at times:

< each time, upon entering a work room;

< after handling raw meat products;

< at times when handling incompatible meat and meat products;

< after handling materials such as, chemical agents/substances, wooden pallets, or similar type of materials that may impart physical, chemical and/or biological hazards to meat and meat product;

< after handling inedible meat products and/or containers or garbage waste containers;

< after using toilet or urinal facility

< and each and every time hands have been exposed to possible sources of contamination

Proper hand washing shall be monitored and strictly enforced during manufacturing operations, in order to reduce the risk of transferring bacteria to food products. Hand wash stations shall be located at the entrances of each work room and equipped with hot/cold potable water and supplied with soap and drying equipment or paper towels.

8.2 Controlled Access

The operator shall implement and maintain procedures for restricting access to areas in an establishment where meat and meat products are handled or stored to ensure that no person who has a disease that is transmissible through food may be admitted unless there is no likelihood that a meat product will be contaminated as a result.

8.3 Plant Clothing

All employees are required to cover their street clothing with clean working apparel (outer garments), prior to entering work rooms where meat and meat products are exposed and/or handled.

The requirement for protective clothing and suitable head covering extends to all persons visiting the establishment and that enters rooms or areas where exposed meat or meat products are handled or prepared.

Working apparel shall be changed at frequencies to prevent contamination to meat products, and at times, when food handlers change work stations from raw meat preparations to ready-to-eat (such as, fermented, dry cured or cooked meat products). In addition, should a production employee, at times, be tasked with handling of inedible meat products or garbage waste materials, their hands shall be washed and if necessary their footwear and working apparel changed or covered.

All production employees shall remove their outer garments and place them on designated wall hooks before leaving the work area or in an area of the plant that does not subject the work apparel to sources of contamination. Work garments/equipment shall not be worn in washrooms or when using toilets/urinal facilities, in lunchrooms or outside the establishment. Should the removal of work clothes, prior to using toilets not be practical, the operator shall employ additional controls in order to achieve the same results, such as, the use of washable aprons worn by an employee upon entering the work room.

Employees that must enter areas of the establishment such as the barn/slaughter floor, shall take appropriate measures in order to prevent cross-contamination (e.g., different coloured garments or cover garments, washing and sanitizing of footwear, hands).

Work apparel, in need of repair or its condition is no longer acceptable, shall be replaced by the operator. Storage of clean working apparel shall be separate and apart from employees street clothing. Work apparel shall not be stored in employees lockers. Lockers or shelving racks should be used for the storage of employees street clothing and/or personal belongings.

8.4 Gloves, Aprons

All reusable gloves, aprons and similar type equipment used in food handling areas, shall be maintained in a sanitary condition and of good repair. Gloves and aprons properly used and stored may protect meat products from sources of contamination, and conversely, may protect employees from exposure to pathogenic microorganisms.
The wearing of such equipment does not replace or exempt any person engaged in exposed meat and meat product handling from washing their hands at regular intervals to minimize contamination.

Should cotton gloves be worn, they shall be covered with plastic gloves or replaced at each 2 hour interval, or more frequently if contaminated. Cotton gloves shall not be worn by employees handling ready to eat meat products.

The use of aprons must not become a source of biological contamination through the growth of molds, yeasts or soils. In most cases, this type of protective working apparel is made of rubber, nylon or other waterproof plastics which if not properly cleaned and dried become a source of microbial contamination.

Employee lockers, change rooms or washrooms shall not be used for the storage of reusable gloves, aprons and employees knives and related equipment. Designated rooms or cleanable storage cabinets

shall be used for this purpose. In small establishments where these items are personally owned by employees they may be stored in locked employees lockers provided the lockers can be cleaned and the cleaning method and frequencies are incorporated into the companies written sanitation program.

8.5 Head Covering

Sanitary hair coverings shall be worn by all employees working in areas where meat and meat products are exposed or unprotected. The purpose of suitable head covering is to prevent the introduction of fallen hair from contact with meat products. Hair coverings shall be worn in such a manner that all exposed hair is covered and protected. It may be necessary, at times, to instruct employees with beards to wear beard nets if assigned to work rooms where exposed meat or meat products are handled or stored.

Compliance with head covering requirements shall minimize the physical presence of hair in meat and meat products and the potential for biological or chemical hazards.

8.6 Footwear

Employee's footwear shall be maintained in a clean and sanitary manner at all times. Footwear should be in good condition and shall be stored in locker room areas when not in use.

It is recommended that the footwear be placed on appropriate boot racks within a change room to facilitate sanitary maintenance and housekeeping practices.

At times, it may be necessary to wash and sanitize footwear for those employees accessing through incompatible work rooms. For example, employees responsible for handling of inedible meat products, employees accessing slaughtering floor in order to enter an edible processing room and employees working in raw meat production rooms entering ready to eat rooms. The purpose of boot washing is to minimize contamination carried on footwear.

8.7 Jewelery and Other Objects

Jewelery, pens, thermometers or any type of foreign object that may become a source of physical contamination to meat products, shall not be worn on or in working apparel, unless securely affixed to prevent the object from falling out. The wearing of jewelery is not recommended. Such items, which could become detached, can contaminate food or cause an injury to an employee operating equipment. Necklace, bracelet, or some other form of medical alert jewelery shall be exempt from this policy for health and safety reasons, and shall be worn in such a manner that the materials are completely covered and secured on the person.

8.8 Conduct and Behavior

An operator of an establishment shall advise all plant employees that eating, drinking and smoking is confined to employee lunch room areas, except for drinking of water provided from water fountains that may be located in work rooms. Behavior and practices, such as spitting, smoking, horseplay shall be prohibited in all areas of an establishment.

8.9 Use of Knife Sterilizers/Equipment

An operator is responsible for ensuring that employees' receive training in the maintenance of their equipment and work tools, which may include knives, steels, hooks, mesh gloves, etc., including proper cleanliness and appropriate storage. All such equipment must be cleaned and sanitized immediately if subjected to gross contamination during operations (e.g., ruptured abscess during postmortem operations). Sterilizer units located in work rooms (ie., slaughter floor, boning/cutting room) must be checked at appropriate frequencies to ensure that they are functioning properly and operating at correct temperatures, (180°F is recommended).

8.10 Open Cuts or Wounds

Employees with opened small and large cuts, abrasions, etc., shall not be permitted to continue with their work activities until the injury has been treated, and the wound or cut has been suitably dressed and covered with an acceptable waterproof covering and if necessary, plastic gloves. Should an employee be affected with a suppurating wound or sore, they shall not be permitted to continue to handle meat products, until the condition has been properly treated and/or the wound can be completely protected to avoid contamination to food products.

8.11 Health of Personnel

8.11.1 Communicable Diseases and/or illnesses

Adequate and ongoing training of plant employees responsible for the handling of edible meat and meat products shall act as the first and most important element to prevent the transmission of pathogenic organisms from employees to food products.

An understanding of the risks associated with contamination of food by microbiological, chemical agents, and physical hazards, as well as, the various ways to avoid contamination of products shall be part of the operator's training programs.

Employees that are infected, or that have been in contact with persons or objects that carry harmful microbes involved in several types of communicable diseases, may spread the disease throughout the establishment if they do not maintain an appropriate level of personal hygiene, as well as, avoid habits that may contaminate food products.

An operator of an establishment must have controls in place to ensure that employees showing obvious signs of illness or disease that could be contagious, do not create a risk of transmission to meat products or surfaces with which meat products come into contact. An operator must determine whether the person should undergo a medical examination or be excluded from certain work areas of the establishment. All operators have the authority to exclude any person from any area of the establishment if there is likelihood that the person may contaminate a meat product.

8.11.2 Reporting Illness or Disease Transmissible Through Food

Employees must immediately report any illness or disease that is likely to be transmitted through food products to the operator of an establishment.

In cases where there is reason to believe that an employee has been absent from work due to a sickness which may have an impact regarding his suitability to handle meat products, the operator shall request a Doctor's note or certificate, verifying that the employee is fit to handle meat and meat products, prior to permitting the employee to handled exposed food products.

8.12 Monitoring Procedures: *What is Done and How is it Done*

An operator shall monitor plant personnel, and observe employees during their various work activities at pre-determined frequencies, in order to ensure that hygienic practices and procedures and manufacturing procedures do not pose a risk to health and safety of plant personnel or to meat products.

An operator shall visually observe plant employees as they perform their various work activities to ensure that the following requirements are being maintained:

< Work apparel is clean, in good condition and worn in appropriate areas.

< Work apparel is stored in designated areas or cabinets.

< Work tools and equipment is clean and in good condition and being properly used.

< No employees are found with wounds or cuts unprotected.

< No employees that appear to be sick are found working edible production areas.

< No spitting, or smoking or horseplay observed in work areas.

< Employees are found complying with jewelery policy.

< Employees are found complying with hand washing policy.

< Employees are following designated operational flows.

< Work rooms are clean, organized and tidy during operational activities.

< Performance of work tasks are found in accordance with training programs.

< Employees responsible for technical work activities (i.e. monitoring critical control points, sanitation procedures, maintenance procedures, calibration of equipment, etc.) are performing their work as per company requirements and procedures. Records for monitoring, deviation and verification are being completed accurately and correctly.

8.13 Training of Establishment Workers

8.13.1 Plant Employee Training Programs

Some of the objectives of training programs for plant personnel are to ensure that employees have the necessary knowledge, skills and tools to process and handle food products in a safe manner. All plant employees shall understand their roles and responsibilities in avoiding contamination of meat products. It is an operator's responsibility to ensure that all employees are trained adequately and are competent to perform their assigned duties.

At times, an operator may employ outside companies to provide specific training to plant employees. The trainers shall have expertise and knowledge in the training materials they are presenting to a company in order to comply with the National Meat and Poultry Regulations and Code.

An operator should promote food safety education through ongoing training, which may include classroom instruction, or on-the-job training, or films, seminars and employee meetings, etc.

An operator shall develop, implement and maintain written programs related to overall training for plant employees in personnel hygiene and hygienic handling of edible meat products. In addition, specific technical training, (such as, maintenance, shipping, receiving, processing controls or critical control points and sanitation procedures) shall be provided to those employees involved in activities that require technical training. An operator shall establish records in order to provide a document program that identifies training elements, as well as, those employees receiving the training. The programs and training records shall serve as verification that ongoing training program are being provided to plant employees to verify competence and continuity in their assigned work activities.

Ultimately, each operator is responsible for the development, implementation and maintenance of training programs that provide a clear understanding to all plant employees engaged in:

< the production of food products, (slaughter activities and processing procedures, packaging, labelling and storage activities),

< the receiving of incoming materials and the distribution of meat and meat products,

< the transportation and storage of food products,

< the maintenance and servicing of equipment,

< the handling of inedible meat products and waste materials,

< the sanitation of equipment and premises,

< the maintenance of pest control programs,

< recall procedures and product coding.

8.13.2 Training Elements (Plant Personnel)

The training programs may include all or some of the following elements and shall result with an adequate knowledge of work tasks and responsibilities:

- humane handling of live animals,
- collection and storage of inedible meat products,
- housekeeping and storage activities,
- personnel hygiene requirements,
- hygienic practices,
- cleanliness and conduct,
- communicable diseases transmissible through food handling,
- the risks associated with product handling to prevent contamination to meat products.
- product coding and labelling,
- receiving and shipping activities/responsibilities,
- sanitation procedures; chemical mixing and application,
- equipment maintenance and calibration procedures,
- operational and employee flows; access to plant

Training sessions shall be conducted at times, when new employees are hired, at intervals that ensures compliance with written training programs, and verify plant personnel maintain an adequate knowledge to perform their work activities. Training programs may include the following:

- On-going training of employees in hygiene, proper meat product handling procedures and Good Manufacturing Practices, (GMP's). This information should be given in writing to each employee as training reading materials;

- Correct "operational flows" to be followed for meat products, employees, materials and inedible meat products;

- Operational controls and procedures to minimize cross-contamination of incompatible meat products, through handling, transferring and storage activities;

- Training of sanitation employees to identify unsanitary conditions, to avoid cross-contamination, proper procedures for cleaning and applications of sanitizers.

- Operational sanitation; cleaning during operations; procedures and methods to avoid contamination of products and materials; housekeeping practices and procedures; inedible material collection and removal and cleaning/sanitizing of containers.

- Training in processing operations to have adequate knowledge of critical control points in an operation that may contribute to food borne illnesses.

PART 9

ANTE-MORTEM, SLAUGHTER AND DRESSING AND POST-MORTEM PROCEDURES

PART 9
ANTE-MORTEM, SLAUGHTER AND DRESSING, AND POST-MORTEM PROCEDURES

PART 9 ANTE-MORTEM, SLAUGHTER AND DRESSING, AND POST-MORTEM PROCEDURES

Ante-mortem and Postmortem Inspection/Examination, Identification and Disposition
Reportable Disease
Humane Handling
Hygienic Production of Meat Products

Reference: Part 9 - Sections 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, & 60 of the National Meat & Poultry Regulations

OUTCOME REQUIRED

< Ante-mortem and post-mortem inspection/examination of slaughtered animals and the maintenance of hygienic practises that are carried out to ensure that fresh meat produced for human consumption is safe and wholesome.

RATIONALE

< The purpose of ante-mortem and post-mortem inspection/examination is to ensure that meat passed for human consumption is safe and wholesome, and to prevent the introduction of zoonotic diseases associated with meat into the food chain.

< Consistent routine slaughtering and dressing procedures, the maintenance of hygienic controls and effective inspection procedures, are necessary to prevent physical, chemical and microbiological contamination of product, and risks to health and safety of plant personnel and consumers.

9.0 Definitions

As defined in the Regulations.

9.1 Inspection and Performance Standards (Ante-mortem and Post-mortem Inspection/ Examination)

9.1.1 Performance Standards

The application of this standard is based on the following criteria:

< Microbiological safety
< Prevention of physical contamination
< Prevention of zoonotic disease associated with meat
< Prevention of harmful or unacceptable chemical residues
< Conformance with consumer images of product wholesomeness

9.1.2 Microbiological Safety

Carrying a bacteriological load consistent with a safe and wholesome product. Microbiological Standards remain to be developed.

Requirement:

< Microbiological testing shall be required for process verification in Process Control Based Programs or Hazard Analysis and Critical Control Point Systems, (HACCP).
< Microbiological guidelines shall be developed by the appropriate Regulatory Authority to ensure that microbiological conditions are within acceptable ranges;
< Appropriate corrective actions shall be initiated when a high microbiological level is detected;

One-Log Growth:

< A one-log (ten fold) increase in the load of bacterial pathogens is considered achievable by hygienic production techniques and strict control of temperatures;
< *E. coli Biotype 1* shall be used to indicate pathogen loads for the purpose of achieving no more that a 1-log increase;
< Microbiology is to be used as a tool to verify that the process is delivering good results on a continuous basis;

Types of testing:

< Total Visible Count *(TVC*), is an ideal testing work surface used to test the overall hygiene and the slaughter process. This test receives a result, but is limited in applications of post-chilling;
< *E. coli* Biotype 1, is a good indicator of enteric contamination. It is also useful post-chilling because it is one of the major group of bacteria which stop growing at about 7 °C.
< *E. coli* testing is best used for meat and meat surfaces.
< *Coliforms*, can be used preferably in addition to *E. coli* as an indicator post-chilling. This measure is useful as an indicator of process hygiene, not just faecal contamination.

9.1.3 Physical Contamination

Means contamination with material presenting a risk to product safety, including material likely to carry a heavy microbiological load, (visible physical contamination - faeces, ingests, hair, abscesses, parasitic lesions, dust, dirt, grease). Standards to be developed.

Requirements

< Acceptable Programs (i.e. Acceptable Quality Levels, AQLs) for monitoring and verifying the level of physical contamination of a carcass, offal and raw meat products shall be developed and implemented by operators;

Purpose

< AQL's should be based on a uniform system of inspecting a representative sample of product of a similar type which indicates that the product has obtained a predetermined quality level;
< An AQL System is suitable for incorporation into approved programs of production based on quality assurance principles and serves as an adjunct to official auditing procedures for the assessment of compliance with company quality systems;

Monitoring

< Monitoring functions are used to assess physical contamination of meat (in a final product form) produced at, or introduced into, an establishment;
< Monitoring functions provide control, uniformity, information and feedback in order to determine origins of dressing errors and other defects allowing necessary corrective action;

HACCP Programs

< An AQL System can be used as a mechanism to monitoring standards achieved under a company's program of production and can be applied at any point in the production process to provide a mechanism for verification of a HACCP Program

9.1.4 Residue Standard

< The provision of wholesome meat to the consumer requires an assurance that the product does not contain residues of chemicals which may be harmful to human health
< Residues may result from intentional treatment of an animal, or if its feed, with a drug or chemical, such as pesticide for therapeutic or other purposes; or from environmental contamination.

Residue Compliance

Residue compliance of meat produced at an establishment shall be based on:

< The appropriate Regulatory Authority setting standards for chemical use, withdrawal periods and acceptable tolerance levels;
< Systems of animal identification and trace back when violative residues are detected;
< Identification and quarantine, or other appropriate management strategies, of farms known to produce animals with violative residues or to administer chemicals to animals that result

with tolerance levels exceeding acceptable levels;

Quality Assurance Systems

< Quality Assurance Systems implemented at establishments shall contain provisions for consideration of the residue status of animals purchased

9.2 Inspection Requirements

9.2.1 General

All animals intended for slaughter at an establishment, must first receive an examination (ante-mortem inspection/examination), by an inspector or an examiner, prior to proceeding to slaughter.

9.2.2 Qualifications of an Inspector and an Examiner

9.2.3 Inspector and Examiner

An inspector or an examiner shall attain the following basic training and acquired knowledge in order to perform the functions and tasks required in accordance with the National Meat and Poultry Regulations and Code:

< Ante-mortem and Postmortem Requirements, Inspection/Examination and Procedures, including sample taking for microbiological testing;
< Meat Hygiene;
< Sanitation principles, procedures and methods;
< Process Control Based Programs, such as, Hazard Analysis and Critical Control Point (HACCP)- based hygiene control program;
< Working knowledge of (The National Meat & Poultry) Regulations & Code;
< Compliance and Enforcement;

In order to determine the level of understanding of requirements and procedures, a “Barrier Exam” shall be arranged for examiners and inspectors. The exam shall be developed and administered by the Regulatory Authority. Re-enforcement of training and knowledge shall be verified at regular intervals determined by the
Regulatory Authority, in order to ensure that an acceptable level of competence and knowledge is being maintained for those persons assigned the roles of inspectors or examiners.

9.3 Enforcement and Compliance

Enforcement and Compliance will be developed and implemented by the Regulatory Authority.

9.4 Ante-mortem

9.4.1 Specific Aims of Ante-mortem Inspection/Examination

< to identify animals showing clear evidence of being affected with a disease, or condition, or

suspected of having been treated with antibiotics or other chemotherapeutic agents that could render the carcass unfit for human consumption or pose a threat to the health of personnel handling the carcasses;

< to detect the presence of exotic or other reportable diseases;

< to separate and prevent the normal processing of animals suspected of having a disease or any other condition that could make the carcass or part of it unfit for human consumption for segregated slaughter;

< to prevent animals that are grossly contaminated with extraneous matter from entering the slaughter floor;

< to ensure that all animals and, in particular, injured animals are treated humanely; to identify animals requiring special handling for humane reasons;

< to provide a disposition regarding the suitability of animals for slaughter.

9.4.2 General Requirements of Ante-mortem Inspection/Examination

(12) When animals arrive at an establishment, the following requirements must be met by an operator:

< All animals must be handled in a humane manner throughout all stages of unloading, holding, movement and stunning or sticking (bleeding);

< all handlers of animals shall be provided with adequate training and knowledge in order to handle animals humanely;

< equipment or instruments used to restrain, slaughter or render an animal unconscious, shall be used by competent persons with the ability to perform the work without causing pain and discomfort to an animal;

< the use of electrical prods shall only be used when necessary on healthy animals and when such equipment is used, shall not be applied to the anal, genital or facial areas or to the udder of an animal. Physical abuse of live animals is strictly prohibited.

(2) Animals that show evidence of exhaustion or excitement shall be adequately rested, prior to slaughter.

(3) All animals, except for poultry and rabbits, shall be placed in secure and clean pens, and shall be supplied with an adequate amount of water prior to slaughter;

< facility design of livestock pens shall meet the requirements of Part 4 of this Code, and shall correspond to the physical characteristics and behaviour traits of each species handled in the establishment;

< animals shall be protected against inclement weather, heat and frostbite;
< cleaning and disinfection of pens, crates, (holding areas/containers) shall be performed regularly to minimize contamination;

(4) Animals known to have been treated with, or exposed to, a drug, chemical or biological substance, or affected with certain reportable diseases, may be slaughtered under certain conditions agreed upon by the Regulatory Authority.

(5) Animals to which preventative action is being applied should be kept separate from healthy animals while awaiting slaughter and further disposition.

(6) Animals shall proceed to slaughter once an inspector or an examiner has approved the animal on ante-mortem inspection/examination;

< animals identified for disposition as a result of ante-mortem are kept separate from healthy animals while awaiting slaughter.

(7) Animals shall be slaughtered within 24 hours after n ante-mortem inspection/examination and slaughter, or if not slaughtered within that period, reinspected within 24 hours before slaughter.

(8) All animals, intended for food, shall be slaughtered in an establishment as described in the relevant slaughter and dressing sections of this part and in accordance with all sections of Part 9 of the Regulations.

9. 5 Ante-mortem Inspection/Examination

9.5.1 Performing Ante-mortem Inspection/Examination

Inspectors or Examiners shall perform an ante-mortem inspection/examination of animals prior to slaughter procedures.

Animals shall be examined both at rest and while in motion to detect abnormalities in movement and behaviour. Inspectors and Examiners should be looking for anything that deviates from normal and may include but not limited to the following:

(a) Difficulty in breathing; or animal coughing:
< indication of respiratory problems

(b) Abnormal behaviour:
< animal pushing head against the wall;
< animal walking in circles;
< animal charging at various objects;
< animal with an anxious or dull expression in its eyes;
< animal behaving very aggressively;

(c) Abnormalities in gait:

< animals with abnormal gait or reluctant to move, usually indicates pain;
< animal may be experiencing pain in legs, chest or belly;
< animal showing above abnormalities may have a nervous disorder;

(d) Abnormalities in posture:
< animal may stand with the belly tucked up;
< animal may lie with its head turned and along its side;
< animal may stand with its feet stretched out in front;
< animal may stand with its head and neck extended;
< animal may be unable to rise.

(e) Abnormal discharge/extrusions from body openings:
< discharge from the nose;
< bloody diarrhoea;
< excessive saliva coming out of mouth
< afterbirth hanging out of the vulva;
< intestine protruding from rectum;
< uterus protruding from vulva;
< growth protruding from eye.

(f) Abnormal colour:
< black areas on the skin of swine;
< red areas in light coloured skin (inflammation);
< dark blue areas (gangrene of the udder);
< yellow discolouration of the white of the eye or skin (jaundice);

(g) Abnormalities in appearance:
< swelling of the skin (abscesses);
< enlarged joints;
< swelling of the navel;
< udder greatly enlarged;
< bloated belly;
< swollen legs;
< enlarged jaws (“lumpy jaw”);
< pear-shaped belly (hanging down);
< swelling of lymph nodes (glands) under the skin.

(h) Abnormal odour: examples of odours found on ante-mortem:
< stinkweed
< medicinal
< punctured abscess odours

9.5.2 Results of Ante-mortem Inspection/Examination

Following ante-mortem inspection/examination of animals, examiners and inspectors shall form one of the decisions listed below:

(1) Animals are found to be healthy with normal behaviour and approved for slaughter; or,

(2) Animals are found to show signs or evidence of abnormal behaviour and appearance

< animals are identified and detained;
< animals are segregated from healthy animals and held in an acceptable area;
< animals shall be referred to an official Veterinarian for a secondary inspection and instructions on disposition;

An official veterinarian may provide instructions, in advance, to an examiner or an inspector, that,

(i) the animal need no further examination and is approved for slaughter; or,
(ii) the animal is to be disposed of in accordance with instructions provided by the Veterinarian;

An official Veterinarian shall provide a disposition, when:

(a) an animal is near death or dead; or,
(b) suspects on reasonable grounds that an animal is infected with a disease of the central nervous system; or,
(c) suspects that an animal is infected with a disease or affected by a condition that might render the carcass or meat produced from the animal unfit for human consumption;
(d) all animals receiving a disposition of condemnation, may be slaughtered in the livestock area, or an inedible area of the establishment and disposed of in accordance with the National Meat and Poultry Regulations and Code.

As such, the Veterinarian must ensure that the identified and detained animal is:

(a) handled as condemned and disposed of in accordance with section 65(2) of the Regulations; or
(b) held and segregated from all other animals in an acceptable area, for rest, treatment or slaughter.

9.6 Crippled Animals

Animals found injured, lame or crippled:

< must receive ante-mortem inspection/examination by an official veterinarian, or an examiner or inspector;
< affected animals must be clearly identified up to postmortem;
< animals must be segregated from normal ambulatory animals and shall be dealt with expeditiously;
< animals may be stunned and bled in stockyards/pens or other areas approved by the Regulatory Authority;

9.6.1 Slaughter and Dressing of Crippled Animals

9.6.2 Requirements

- stunning and bleeding of the animal must be carried out in the presence of an inspector or an examiner;
- bleeding of animals must be conducted in a sanitary manner (hollow knife and bag method is recommended);
- the carcass of slaughtered animals are transported in an enclosed leakproof container to the closest slaughter establishment (if possible). Whenever possible, slaughter and transport should be arranged so that the carcasses arrive at the termination of the establishments regular slaughter shift;
- carcass dressing procedures commences at the slaughter establishment as soon as possible

9.6.3 Disposition After Ante-mortem Inspection/Examination

After ante-mortem inspection/examination has been completed, one of the following dispositions shall be provided:

(1) Procedures for determining the fate of animals detected with abnormalities at ante-mortem are given in Table Appendix B**;** (summary of dispositions) or,

(2) Approved as fit for slaughter; or,

(3) Animal is detained and segregated from healthy animals for rest or treatment and reinspection and further disposition;

- reinspected animals are either approved for slaughter; or,
- condemned in accordance with section 65(2) of the Regulations;

(4) Animal is immediately slaughtered to prevent deterioration of an abnormal condition, providing:

- the condition would allow all, or part, to be passed for human consumption and processing would not jeopardize the hygienic production of meat; or,
- processed under restrictions which prevent unacceptable contamination of the processing floor and which permit more detailed post-mortem inspection/examination;

(5) Rejected as unfit for slaughter, and destroyed by humane means and then disposed of in an approved manner:

- condemned animals maybe slaughtered in the livestock area or an inedible section area of the establishment;

9.6.4 Disposal by Operator

An operator, with the approval of the Regulatory Authority, may at times, decide to slaughter and dispose of *any animal, carcass, parts or blood*, that is not detained as condemned animal. Should this be the case, the animal shall be disposed of in accordance with section 65(2) of the Regulations.

Permission to allow subsequent slaughter procedures and/or further instructions on disposition shall be provided by a representative of the Canadian Food Inspection Agency.

A listing of reportable diseases under the Health of Animals Act, is listed in Appendix B of this part.

9.7 Ante-mortem Identification

Operators must ensure that live animals are:

< adequately identified up to postmortem
< detained or suspect animals are segregated and identified up to the completion of post-mortem inspection/examination

9.8 Reportable Diseases

In the case of animals found on ante-mortem inspection/examination, to be suspected of a reportable disease or residue, the nearest Veterinarian employed by the Canadian Food Inspection Agency shall be notified immediately.

9.9 Stunning of Animals

Stunning Area:
Designated area, where stunned animals are discharged from the knocking box, shall be kept as clean and as dry as possible;

(a) any spillage of ruminal or faecal material shall be hosed off the animal in the dry landing area;
(b) sufficient space and time must be made available for bleeding so that blood will be confined to the bleeding area

9.9.1 Stunning Methods

Only stunning equipment and devices which have been reviewed and accepted by the Regulatory Authority shall be used**.** The following methods to render an animal unconscious may be used:

< *Reversible or irreversible electrical stunning; or,*

< *Modified atmosphere technology*, such as, stunning with carbon dioxide gas. This method is only used for stunning of hogs; and,

< *Stunning by mechanical means*. Under this category we are dealing with methods such as, the use of a penetrating or non-penetrating percussion pistol by which the live animal receives a blow to the head, (pictorial is provided in Appendix A)

Stunning equipment shall be maintained in good working condition. Operators of stunning equipment shall be properly trained in equipment use and where applicable, equipment

maintenance.

NOTE

Stunning by manual means, such as delivering a blow to the head with a hammer or similar device, is not permitted.

9.9.2 Ritual Slaughter

In the case of animals slaughter under religious purposes:

(c) animals need not be stunned prior to bleeding;
(d) animals must be adequately restrained in suitable equipment design for this purpose*;*
(e) animals shall receive a single cut which shall result in rapid, simultaneous and complete severance of jugular veins and carotid arteries so as to cause rapid unconsciousness and exsanguination of the animal;
(f) sticking, in order to bled the animal must be carried out humanely and efficiently;

9.9.3 Birds and Rabbits

In the case of birds and rabbits:

(a) animals may be hoisted or shackled prior to being rendered unconscious;
(b) the hoisting and shackling of animals must be performed in a humane manner;
(c) the bleed time for birds shall not be less than 90 seconds.

9.9.4 Stunning Procedures

Animals shall be adequately restrained in a suitable restraining device/equipment and stunned prior to slaughter.

(a) stunning and sticking shall be carried out at a rate that allows for only one animal to be on the landing area at any one time;
(b) sticking of an animal for bleeding purposes shall be performed in a manner does not sever the esophagus to avoid contamination of the carcass with ingesta;
(c) portions of any carcass, including the head shall not be allowed to come into contact with the floor at any stage after sticking;

9.9.5 Rate of Slaughter

Slaughter shall proceed at a rate which allows adequate time:

< for carcasses to be dressed in a hygienic and orderly manner;
< to maintain physical separation of carcases;
< to avoid congestion;
< for effective inspection.

9.10 Post-mortem Inspection/Examination and Disposition

9.10.1 Post-mortem Inspection/Examination Specific Aims

< to detect and eliminate abnormalities including diseased, bruised or contaminated meat;
< to ensure that only meat fit for human consumption is passed for food, by performing organoleptic examinations, treatment and/or microbiological testing.

9.10.2 Post-mortem Inspection/Examination (General Requirements)

Operators of an establishment are responsible to develop and implement programs that ensure the effective maintenance of the following requirements**:**

< examinations of carcass and body parts for disposition shall be carried out by person(s) with training and qualifications which enable the accurate recognition of the conditions described and their correct disposition;
< every carcass is slaughtered and dressed as efficiently as possible;
< to ensure that all carcasses and parts are presented for postmortem examination in such a way as to permit proper inspection (i.e. proper presentation of viscera, etc.);
< to provide and maintain adequate facilities and equipment (adequate space, sufficient lighting; viscera equipment, inspection stand, if applicable, etc.), to facilitate inspection procedures of body and organ system described;

9.11 Inspection/Examination Procedures

9.11.1 Post-mortem Inspection/Examination of Cattle and Bison

(a) Head inspection

Requirements:
< heads must be clean, free of hair, pieces of skin, contamination, horns, tonsils removed, etc., before presenting for inspection.
< head must be presented with all lymph nodes exposed for proper post-mortem inspection/examination

Inspection procedures:
< visually examine all external and internal surfaces, including eyes and tongue for dressing defect or abnormality;
< observe and palpate tongue to detect abscesses, erosions, actinobacillosis, and other abnormal conditions;
< trim any localized conditions, such as scars, sores, erosions from tongue;
< incise and observe parotid, retropharyngeal and mandibular lymph nodes;
< incise and examine masseter muscle area to detect parasitic lesions, such as c.bovis;

Additional Requirements:
< the head shall be available for disposition until post-mortem inspection/examination of the corresponding carcass is completed;
< inspector or examiner frequently checks heads for properly identification tag to maintain

carcass-head identity;

(b) Viscera inspection

Inspection procedures

Heart:
< observe, palpate and if required, incise four deep incisions into heart longitudinal from its base to the apex through the wall of the left ventricle and the interventricular septum to detect for parasitic lesions, such as *C. bovis*;
< visually inspect and palpate lungs to detect chronic pneumonia, abscesses, tumors, etc.;
< right and left bronchial, cranial and caudal mediastinal lymph nodes shall be incised and visually examined for abnormalities;
< visually examine the esophagus and trachea;

Liver:
< visually examine and palpate to detect adhesions or abnormalities;
< incise and examine hepatic lymph nodes to detect for presence of liver flukes;

Abdominal cavity:
< visually observe, incise and examine mesenteric lymph nodes,
< incised once in the middle, parallel to the intestine to detect adhesions;
< observe the stomach, (rumen, omasum and abomasum) and intestines;
< palpate the ruminoreticular junction to detect for abscesses caused by punctures from foreign bodies
< visually examine the reticulum and uterus;

Spleen and Kidneys:
< visually examine and palpate spleen and kidneys to detect for tumors or abscesses;
< kidneys should be incised if a complete examination is found to be necessary;

Additional Requirements:
< synchronization and/or identification between the viscera and the carcass must be maintained until inspection is completed;

(c) Carcass inspection:
< visually examine dressed carcass externally and internally after the carcass has been split, but before trimming and washing;
< visually examine carcass to detect for bruises, contamination, warbles, tumors, abscesses, injection sites, etc.,
< visually examine and palpate carcass joints and outer muscular surfaces to detect for lesions;
< observe and palpate superficial inguinal/supramammary and internal iliac lymph nodes;
< visually examine the body cavities, the diaphragm and its pillars, the peritoneum, the pleura and the neck to detect for contamination, abscesses, tumors and any unusual odours;
< visually examine the spine and all joints for abscesses or arthritis;

9.11.2 Post-mortem Inspection/Examination of Hogs

(a) Head inspection

Head:
< visually examine head surfaces to detect abnormalities (enlargements, distortions, abscesses);
< observe and incise mandibular lymph nodes to detect for abscesses, calcified cysts, etc.;
< observe tongue and palpate if necessary, to detect abscesses or erosions;
< unclean heads must either be condemned or skinned on the kill floor;

(b) Viscera inspection

Heart:
< visually examine and palpate for adhesions or any abnormalities;
< observe and palpate lungs for evidence of pneumonia, abscesses, tumors or parasitic lesions;
< observe and palpate bronchial and mediastinal lymph nodes;

Abdominal cavity:
< observe and palpate intestines, stomach, spleen, mesenteric lymph nodes;
< observe the liver and palpate portal lymph nodes;
< visually examine bladder and uterus;

Kidneys:
< visually observe and palpate enucleated kidneys

(c) Carcass inspection

< visually examine external and internal surfaces to detect skin infections, melanosis, bruises, abscess or tumors
< incise joint areas if evidence of swelling or abscess are found
< observe and palpate superficial inguinal/suprammary and internal iliac lymph nodes

(d) Additional procedures

In animals found to be infected or suspected of being infected with *Cysticercus cellulosae*:

< incise the internal and external masticatory muscle, tongue, muscles of the averted heart and diaphragm after removal of the serous membranes. Observe all exposed muscle surfaces;
< In animals found to be suspected of being infected with generalized arthritis:
< incise iliac lymph and costo-axillary lymph nodes.

(e) Inspection procedures for boars, stags, ridgling and other hog carcasses affected with pronounced sexual odour

Requirement standards:
< Boars means a male hog that has one or more external testicles and is not a ridgling;

< "Ridgling" means a male hog that has one or more undescended testicles. They shall be handled the same as boars;
< "Stag" means a mature male hog that has been castrated prior to slaughter. These should be treated and adjudged in the same manner as boars.

Additional Requirements
< Boars may be slaughtered at the beginning or end of the killing operation;
< carcasses shall be checked for strong urine and pronounced sexual odour;
< carcasses found free odour can be approved as edible meat;

Heat testing options for odours:
< suspected animals shall be identified and placed in a designated area of a cooler room
< a heat test shall be performed the next day by boiling or frying a sample of tissue from the carcass; or,
< by applying heated irons in the scrotum, loin and jowl areas; or,
< take a sample of two small pieces of dorsal fat and leaf lard, weighing not more than 50 g, into a plastic bag, and boil in water until the fat starts melting; opened bag and test for odours.

Disposition:
< carcass and viscera shall be condemned if found with odour

9.11.3 Post-mortem Inspection/Examination of Poultry

(a) Poultry other than ratites

Requirements:
< carcasses must be hung in a manner that facilitates post-mortem inspection/examination;
< carcasses presented for inspection shall be completely defeathered and clean;

Inspection procedures

Heads:
< observe heads and feet of carcasses, if not removed from carcasses prior to evisceration to detect abnormalities;

Viscera Inspection:
< viscera the parts shall remain correlated with the carcass for inspection;
< inspector/examiner grasps the viscera and examines the heart, liver and spleen with minimal manipulation; palpate only when necessary;
< palpation of viscera is required for suspected lots;
< visually observe exterior cavity for fractures, bruises, blisters, tumors, skin conditions, etc.;

Kidneys:
< kidneys, in portions intended for mechanically separated meats must be removed;
< kidneys and reproductive organs (except from chickens under 8 weeks of age) and lungs must be completely removed on the evisceration line before the final wash, and handled as

inedible material;

Additional Requirements:
< oil glands, crops and tracheas are inedible products and may be used as mink food or for the preparation of other animal food;

(b) Ratites (ostriches, rhea, emu)

Requirements:
< inspection areas shall be equipped with hand wash and knife sanitizer facilities and adequate lighting and suitable inspection equipment (viscera trucks as used for large calves).

Inspection procedures

Head:
< observe the head, eyes, sinus openings and neck to detect for abnormalities;

(c) Viscera inspection:
< observe, palpate and incise through the interventricular septum to expose the inner surfaces of the heart;
< observe and palpate the lungs;
< observe oesophagus and gizzard;
< observe abdominal and thoracic airsacs in situ;
< observe and palpate the liver and spleen;
< observe the kidneys with the carcass (in situ), then remove to an inspection tray and palpate;

Additional requirements:
< neck , heart, gizzard, and liver may be salvaged as edible if handled and processed in a sanitary manner;
< kidneys shall be condemned unless growers/processors desire to save kidneys as edible and provide data indicating that levels of heavy metals (primarily Cadmium) are within a range acceptable to the *Regulatory Authority*

(d) Carcass inspection:
< observe internal and external carcass surfaces

9.11.4 Post-mortem Inspection/Examination of Calves

Requirements:
< visually observe hide-on carcasses to detect for contamination or parasitic lesions;
< inspection for cysticercus bovis may be omitted in the case of calves under six weeks old.

Inspection/Examination procedures (refer to cattle)
< all other post-mortem/inspection/examination procedures are identical to those for cattle, except that routine incision of the mesenteric lymph nodes is not required;
< lymph nodes are to be examined visually and palpated

9.11.5 Post-mortem Inspection/Examination of Sheep, Lamb and Goat Carcasses

Requirements:

< visually examine the head and the hide for abnormalities;
< visually examine the dressed carcass and viscera;
< observe and incise mandibular and portal lymph nodes and the bile ducts;
< observe and palpate the mesenteric and superficial body lymph nodes;
< observe and palpate the lungs, heart and liver to detect any abnormalities;

Additional Requirements:

< incision of masseter muscles is not necessary

9.11.6 Post-mortem Inspection/Examination of Horse Carcasses

(a) Head inspection

Head:

< observe head surfaces, including the guttural pouch;
< incise and observe parotid, retropharyngeal and submaxillary lymph nodes;
< observe and palpate tongue;

(b) Additional requirements

< discard nodes without inspection either through excision or by discarding head;
< discard guttural pouches without inspection either through excision or by discarding head;

(c) Viscera inspection

< visually examine the abdominal walls to detect for encysted parasites;
< visually examine the neck region for fistulous conditions near the first two cervical vertebrae, and of the axillary and subscapular spaces of white and gray horses to detect for melanosis;

All other inspection procedures are similar to those for cattle, except that:

< incising the heart and visual inspection of diaphragm, brisket is not necessary;
< incising lymph nodes on liver for liver flukes is not required;
< routine incision of mesenteric lymph nodes (lymph nodes located inside fat area) is not required;
< horse kidneys and livers, have been found with high cadmium content, as a result, these organs are not salvageable for edible purposes and shall be removed from the carcass and treated as inedible material.

9.11.7 Post-mortem Inspection/Examination of Domestic Rabbit Carcasses

(a) Requirements:

< proper bleeding and stunning is mandatory;

< hides must be pulled before carcasses are washed;
< after washing, the carcasses are opened

(b) Inspection procedures

Heads:
< observe head surfaces to detect abnormalities, such as, purulent discharges from the nose;

Pelts:
< observe hides or pelts to detect certain conditions, (purulent material on the dewlap and front legs alerting to a possible respiratory problem;
< observe hides to detect for parasitic conditions of pelt, subcutaneous abscesses, bruising and broken bones. The perineal area may be soiled (diarrhea) thus indicating the possibility of a digestive problem. A large udder may be an indication of recent kindling (birth) and a blue discolouration may indicate mastitis;

(c) Viscera and carcass inspection
< visually examine the dressed carcass and viscera to detect for abnormalities;
< palpate and incise organs and lymph nodes, should a condition or a disease be suspected;
< observe spine and all joints to detect for abscesses;

Additional Requirements:
< approved carcasses are washed with potable water and chilled immediately.

9.11.8 Post-mortem Inspection/Examination of Reindeer, Caribou and Muskox Carcasses

(a) Head inspection

Heads:

< in the case where heads and/or tongues are not saved for human consumption, it will be sufficient to visually examine the head to detect any gross abnormality. Otherwise, mandibular lymph nodes shall be exposed, examined visually and then incised, and the tongue palpated.

(b) Thoracic and abdominal viscera inspection

Procedures:
< observe and incise hearts longitudinally by at least four deep incisions to for parasitic and other lesions;
< observe and palpate lungs;
< incise and observe associated lymph nodes;
< observe and palpate the liver;
< observe and palpate mesenteric lymph nodes;
< observe exposed kidneys;

(c) Carcass inspection

Procedures:
< observe internal and external surfaces of the dressed carcass, prior to washing;
< observe all joints, outer muscle surface, the body cavities, the diaphragm and its pillars;
< incise pillars of the diaphragm to detect Cysticercus bovis;
< observe and palpate the prefemoral lymph node to detect pathology resulting from warble migration;

(d) Additional Requirements:
< adequate facilities to permit sanitary dressing, inspection and handling as well as satisfactory welfare facilities and accommodation for the inspection staff and employees must be provided by an operator.

9.12 Post-mortem Inspection/Examination Disposition

9.12.1 Results of Post-mortem Inspection/Examination

As a result of post-mortem inspection/examination and inspector or examiner may determine that the carcass, parts and blood appear healthy and shows no evidence of abnormalities and approves as edible and fit for human consumption.

Should an examiner or an inspector, as a result of post mortem examination, determines that the carcass and/or body parts appear to show evidence of abnormalities, the affected carcass and corresponding parts and blood shall be:

(a) held pending corrective action, including remedial treatment or, laboratory findings *(Refer to Appendix B)*, or other examination until a post mortem examination has been completed; or,

(b) a carcass, parts and blood is detained and either referred to, or consulted with, an official veterinarian for a secondary inspection for final disposition; or,

(c) held and salvaged (due to contamination localized condition, etc.) until made to conform to the National Meat and Poultry Regulations and Code (i.e. trimming, freezing, etc.);

(d) salvaged for animal food or for pharmaceutical purposes;

(e) condemned as unfit for human consumption or animal food and disposed of in accordance with section 65(2) of these Regulation;

(f) dispositions are described in Appendix B of this part.

9.12.2 Animals Contaminated with Drugs or Chemical Agents

In cases where an examiner or inspector determines that an animal has been contaminated with a drug or a chemical agent the carcass, blood and parts shall be detained pending corrective action, treatment and laboratory results, before final disposition:

(a) refer the carcass to an official veterinarian for secondary inspection and final disposition;
(b) take samples and submit for analysis to a laboratory designated by the Regulatory

Authority;
(c) condemn and disposed of the affected carcass in accordance with section 65(2) of the Regulations;
(d) upon receipt of laboratory results *(Refer to Appendix B)*, approve the carcass and parts for edible processing;
(e) if laboratory results determine the level of chemicals and drugs in the carcass exceeds levels permitted by the *Food and Drugs Act & Regulations*, the carcass shall be condemned and dispose of in accordance with section 65(2) of the Regulations.

9.12.3 Secondary Inspection

Scope or work
A secondary inspection, performed by a Veterinarian, requires a more detail examination in order to determine an appropriate disposition and may involve:

(f) a detailed examination of organs and the carcass including body lymph nodes, where applicable, to the extent necessary to determine an appropriate disposition; and/or,
(g) samples taken for testing at a designated laboratory and further disposition pending such results.

9.12.4 Results and Disposition of a Secondary Inspection

While performing a secondary inspection the veterinarian may determine that:

< the carcass, part of a carcass, or blood is fit for human consumption and shall approve the carcass and parts for further processing as an edible meat product; or,

< the animal is diseased and the carcass, parts and blood are unfit for human food, and gives instructions on the disposal of the carcass

At times, the results of a secondary inspection may permit:

< inedible parts of a condemned carcass to be salvaged and processed as inedible products without denaturing the part; or,
< in the case of a localized disease or condition, only the affected parts shall be removed from the carcass and treated as condemned material; and, the remaining parts may be processed as an edible meat product

9.12.5 Reportable Diseases

If observations made during post-mortem inspection/examination suggests, that, an animal displays lesions of a notifiable (including exotic) disease, the Canadian Food Inspection agency shall be notified immediately. The head, carcass and viscera shall be retained until a course of action has been determined by the Regulatory Authority.

A listing of reportable disease can be found in Appendix B.

9.13.0 Slaughter and Dressing

9.13.1 General Requirements

All animals shall be slaughtered humanely, efficiently and under conditions that facilitate the hygienic production of meat products.

All animals shall be eviscerated and dressed in establishments that adequately facilitate post mortem examination and ensure the hygienic production of meat products throughout all stages of handling procedures.

(a) All species

Requirement:
- < where applicable, all species of animals shall be suitably restrained, stunned and bled, with the application of an approved method;
- < in all species, pizzles shall be completely removed, prior to splitting of the carcass;
- < spermatic cords and scrotal sacs shall be removed from all species, except for young hogs;
- < all sticking wounds shall be trimmed, where applicable

(b) Hide removal

Procedures:
- < the method used to elevate and drop carcasses to and from the spreader or hide puller shall not cause contamination due to carcass swing and/or inadequate distance. Where required, a preventative mechanism shall be installed.
- < removal of skins or hides shall be carried out so that no parts of the outer skin surface comes into contact with any part of that carcass or any other carcass;
- < hides and skins shall be removed from the slaughter floor by a suitable means as soon as possible;

(c) Skin-on hogs and goats

Procedures:
- < after sticking, the bodies of skin-on hogs and goats shall be thoroughly cleansed of hair, bristles, scurf and dirt by washing prior opening of body cavity;

(d) Removal of mammary glands

Procedures:
- < mammary glands shall be completely removed to prevent contamination. Should contamination occur, the affected areas shall be trimmed. Associated lymph nodes shall be left in situ for inspection;

(e) Pre-evisceration wash

Requirement:
- < a pre-evisceration wash shall be performed only after all visible contamination is removed by trimming;

Hogs and Sheep:

< where required, a pre-evisceration wash shall only be used immediately prior to the opening of the body cavity;
< carcasses, accidentally opened shall not receive a pre-evisceration wash unless such opening is clipped or pinned to prevent entry of wash water to the body cavity;
< in the case of hogs, eyelids and outer ears shall not be removed prior to pre-evisceration wash;
< where sheep are subjected to a pre-evisceration wash, the perineal skin under the tail and around the anus must be removed and the anal sphincter shall not be cut prior to the pre-evisceration wash;

(f) Evisceration

Requirement:
< evisceration shall be carried out at the earliest appropriate time after death and in a manner that prevents contamination of the carcass;
< skin opening incisions shall be made in a manner to prevent contamination of the carcass;
< the urinary tract, digestive tract and reproductive organs shall be removed from an animal in a manner that prevents contamination;
< the handling, freeing, dropping or tying of the rectum or lower intestinal tract shall be performed in a manner that prevents contamination;

(g) Plant Employees

Requirement:
< employees shall maintain hands clean and equipment clean and sanitized throughout operating procedures;
< employees shall clean and sanitize work apparel, equipment and/or work tools when exposed or in contact with contamination;

(h) Contamination

Requirement:
< inedible material shall not be allowed to come into contact with edible material or equipment surfaces which could contact edible materials;
< all inedible material shall be removed from the slaughtering area as soon as possible and in a manner that prevents contamination to edible products;

Procedures:
< whenever contamination occurs, an operator must employ immediate corrective action;
< all visible contamination, or pathological lesions, shall be trimmed prior to washing the carcass
< all trimmings of contamination or pathological conditions from a carcass or an item of offal material shall be condemned
< carcasses shall not be wiped with any material which may contaminate or spread

contamination

(i) Completion of Dressing and Inspection

Requirement:
- < once dressing and inspection is completed, approved carcasses may be subjected to a final wash using minimal water pressure;
- < carcasses shall be removed from slaughter floor to a refrigerated cooler room within two hours of stunning**;**

9.14.0 Dressing Procedures

9.14.1 Dressing Procedures for Cattle and Bison

(a) Hide handling

General
Requirement standards:
- < hides shall be removed as soon as possible from the kill floor to an inedible section of the establishment;
- < equipment (containers, trollies, etc.), used for the collection and storage of hides shall be cleaned at regular intervals in order to minimize contamination.

(b) Brisket opening

Requirement standards:
- < a clean cleaver or saw shall be used to split the brisket;
- < the equipment used shall be maintained in a clean manner during operations;
- < care must be taken to avoid puncturing the viscera which invariably results in carcass contamination.

(c) Evisceration

Requirement standards:
- < contamination shall be trimmed from the midline before opening the abdominal cavity;
- < viscera shall be placed on or in equipment that is clean and suitably maintained;
- < equipment shall be sanitized when contaminated and prior to reuse, (with water of a minimum temperature of 82°C)
- < uro-genital organs such as bladder, ovaries and uterus, all be removed without incising them, and transferred to suitably constructed and leak proof containers or equipment for direct delivery to the inedible section of the establishment.
- < identity between carcass and viscera shall be maintained during the evisceration and dressing procedure;

(d) Carcass splitting

Requirement standards:

- all sources of contamination shall be removed from the back of the carcass before splitting;
- splitting saw or cleaver must be sanitized after becoming contaminated or after splitting a "detained" carcass.

(e) Trimming and carcass washing

Requirement standards:
- carcass trimming, such as, stick wounds, any residual piece of hide, blood clots, bruised tissue and contamination shall be removed prior to placing in drip cooler room;
- a monitor check shall be instituted for carcass for cleanliness, prior to washing;
- all carcasses shall be washed to remove blood and bone dust and placed in a drip cooler room.

9.14.2 Dressing Procedures for Hogs

(a) Bleeding

Requirement standards:
- hogs shall be rendered unconscious prior to bleeding;
- hogs shall be bled as soon as possible following stunning;
- stick wound shall be as small as possible and care should be taken to avoid shoulder sticking;
- blood intended for edible purposes must be collected without contamination and shall be clearly identified with the corresponding ;
- conditions found on post-mortem inspection/ examination which requires total carcass condemnation makes it necessary to locate and condemn not only the organs, but also the blood;.
- sufficient bleeding time must be allowed following sticking to permit complete bleeding prior to carcasses being placed in the scald tank or prior to skinning;
- working tools shall be maintained in a clean and sanitary manner.

(b) Scalding of Hogs

Requirement standards:
- temperature of the scald water and the time carcasses remain in it shall be sufficient to facilitate subsequent hair removal and skin cleaning;
- should scald water additives are used, they must be registered with the *Regulatory Authority*.
- skinned hogs should follow procedures similar to that used in the dressing of beef.

(c) Dehairing, singeing, resin-dipping, polishing and shaving

Requirement standards:
- hog carcasses shall be washed and subsequently opened;
- any bristle removal necessary after the opening of the carcass must be done by skinning;
- toenails must be removed;
- feet must also be free of dirt, scurf and bristles

(d) Head dropping (partial severance from the rest of the carcass) or removal

Requirement standards:
< heads must be free of all bristle, dirt and scurf
< scalping the head should be done after the carcass wash to minimize contamination of exposed head tissue.
< head can either be dropped or removed for inspection to expose the mandibular-lymph nodes for inspection;
< heads or tongues or both are removed, they must be identified in such a way that identity is maintained until inspection is completed;
< transferring of heads must not result in common contact or cause product contamination;

(e) Evisceration

Requirement standards:
< work tools must be maintained in a clean and sanitized condition;
< evisceration procedures shall be performed in a manner that prevents contamination of the carcass and its viscera;
< identity of carcass and viscera must be maintained until completion of inspection;

(f) Carcass splitting, trimming and washing

Requirement standards:
< work tools and equipment shall be maintained in a clean and sanitized condition;
< prior to final washing, all carcass trimming shall be performed in a compatible area;
< carcasses must be free of stick wounds, bruises, contaminants, blood clots and dressing defects;
< edible products may only be removed after final post-mortem inspection/examination and approval.
< all approved carcasses shall be washed before proceeding to a drip cooler or if applicable, hot boning room.

9.14.3 Dressing Procedures for Poultry

(a) Bleeding

Requirement standards:
< adequate time elapse following stunning and sticking shall be provided to allow bleeding out of the carcass.

(b) Cleaning of poultry carcasses

Requirement standards:
< all hair, feathers, dirt, scurf, etc., must be completely removed and the carcass thoroughly washed prior to any further incision being made;
< spray washing of carcasses must occur within as short a time as possible, (recommend

fifteen seconds) after defeathering and after carcass transfer (rehang);
< sprays at both washing stations shall be of sufficient volume, pressure, and number;
< all visible foreign material from the surface of the entire carcass including the hock and especially exposed surfaces of the neck resulting from sticking or decapitation shall be removed.

(c) Removal of oil glands, heads, and feet

Requirement standards:
< oil glands, heads and feet may be removed from poultry carcasses, either before or after evisceration;
< removal of the above shall be performed before evisceration, to prevent contamination of cut surfaces, such removal may only take place after carcasses have been defeathered and thoroughly washed;
< remove manure from feet should feet remain on the carcass until after inspection.

(d) Evisceration

Requirement standards:
< evisceration procedures shall be performed in a manner that precludes fecal contamination;
< the internal cavity, viscera and external carcass shall be presented in a manner that facilitates inspection;
< heads and necks shall be prevented from dragging over equipment along the evisceration line or equipment;
< accumulated water in the vent area must be removed prior to opening the carcass;

Additional Requirements:
< before hands or equipment enter the abdominal cavity, they must be visibly clean;
< the viscera must be properly exposed to allow inspection;
< after inspection, all viscera including the esophagus, crop, lungs and trachea shall be removed from the carcass, except that kidneys and reproductive organs may be left in carcasses of chickens under 8 weeks of a vacuum machine or by manual means may be used to remove kidneys and lungs carcasses shall be washed, both inside and outside;
< thoracic inlet of the bird must be penetrated when performing manual washing and drainage;
< these steps in the dressing procedure shall be performed prior to entering the chilling system or equipment.

Head and feet-on poultry carcasses

Requirement standards
< the feet must be clean, free from disease and have epidermis and toenails removed;
< heads must be free of disease and completely and tightly wrapped with water-resistant paper or plastic prior to chilling;
< head and feet-on poultry carcasses should preferably be air-chilled but may be water-chilled if chilled apart either at the end of slaughter operations, or if the water is changed before fully dressed poultry carcass are chilled.

(e) Application of trisodium phosphate

Should an operator employ the use of Trisodium phosphate (TSP) as a pathogen reducing agent for use in the pre-chill or post chill application on raw poultry carcasses, an application for approval shall be made to the applicable Regulatory Authority for required procedures, equipment, concentrations and standards.

9.14.4 Dressing Procedures for Ratites (Ostrich, Rhea, Emu)

Requirement standards

Establishments shall be approved by the Regulatory Authority in order to verify that the premises has adequate facilities and equipment to engage in the dressing of ratites; and that,

- dressing and evisceration procedures shall preclude contamination of carcasses and the evisceration area;
- contamination to other species slaughtered at the premises shall be prevented;
- sanitary dressing procedures including skin/hide removal operations, shall be similar to those specified for beef carcasses.

(a) Bleeding

Requirement standards:
- after stunning, ratites should be hoisted by a leg in preparation for sticking and bleeding;
- bleeding knife shall be maintained clean and sanitary;
- ostriches, it is preferable to sever the major blood vessels (jugular and carotids) in the caudal cervical area near the thoracic inlet provided the thoracic cavity is not penetrated;
- emus may be bled by cutting the major vessels near the cranial part of the neck similar to turkeys;
- bleeding rail height must be sufficient to preclude neck and carcass contamination.

(b) Dressing

Requirement standards:
- carcasses may be dressed on the rail or on a skinning bed;
- carcasses shall not contact each other from the bleeding area to the last inspection point.

(c) Feather removal

Requirement standards

The following choices are available to the operator:

- feathers may be left on the carcass for skinning. In this case, carcasses should be handled similar to bovine carcasses with the exception that the midline has to be plucked prior to opening; OR,
- feathers may be taken off after stunning and bleeding, prior to skinning. Feathers must be

removed in an acceptable manner such as dry hand picking or clipping;
< defeathered carcasses should be washed prior to opening;
< damaged skin shall be trimmed;
< feathers and dander must be removed prior to evisceration;
< feathers shall be collected in an acceptable manner and be rapidly removed to the inedible area;
< dander contamination of the evisceration area is unacceptable and must be prevented.

(d) Venting

Requirement standards:
< vent shall be carefully dissected from its attachment, encased in a plastic bag, and securely tied to prevent leakage of cloacal contents throughout the skinning and evisceration procedures.

(e) Shank and feet removal

Requirement standards:
< skinning begins on the off-hoist leg by carefully reflecting the skin at a point distal to the hock joint;
< the tarsometatarsus is cut just distal to the hock joint;
< the carcass remains on-line or may be lowered onto a skinning bed. (If skinned on-line, the first leg should be tied or otherwise fastened to prevent the carcass from falling off the gambrel prior to removing the remaining foot). The other metatarsus and foot are removed in a similar manner. Feet and legs affected with conditions found during the ante-mortem inspection/examination must be presented for veterinary diagnosis. If the metatarsi and feet are saved for edible purposes, they must be presented for post-mortem inspection/examination with the corresponding carcass.

(f) Skinning and hide removal

Requirement standards:
< skin must be reflected away from the carcass in a manner which prevents contamination of exposed tissues;
< carcass contamination with dander, feathers, cloacal contents, or other extraneous material shall be prevented;
< sanitary hide removal procedures similar to those required for beef carcasses shall be followed;
< clean filtered air may be injected under the hide to facilitate hide removal;
< work tools and equipment must be sanitized between each use and back-siphonage prevented;
< the remaining skin should be pulled down as for beef carcasses (down puller equipment or manually performed).

(g) Neck & head removal

Requirement standards:

< skin is either manually reflected from the neck or pulled down during the hide removal process;
< neck is then incised longitudinally to expose, strip, and tie the oesophagus;
< clear identification of the neck, head and corresponding carcass must be maintained until inspection is completed;
< head must be carefully handled in order to prevent contamination of edible parts.
< If the neck is to be saved as edible product, the head is removed and placed adjacent to the viscera inspection station or equipment. The neck and the trachea may remain attached to the carcass if the rail height is sufficient to prevent contact with the floor, or, alternatively, the neck and trachea may be removed and presented for inspection with the edible viscera, OR
< If the neck is not to be saved as edible product, the neck, with trachea and head attached, may be removed and placed adjacent to the viscera inspection station or equipment.

(h) Evisceration

Requirements:
< begin by removing breast plate (rattus) by cutting the ribs on both sides of the plate while ostriches are shackled;
< pulled down to expose the thoracic viscera;
< for rheas and emus, the breast bone may be split along the midline.

Procedure:
< evisceration begins with a midline abdominal incision caudal (posterior) to the breast plate as performed in beef cattle;
< air sacs to be evaluated by an examiner or an inspector prior to thoracic components being removed from the thoracic cage;
< heart, lungs and liver may be removed prior to evisceration to minimize potential contamination from gastrointestinal tract.

Vent:
< the bagged vent is pulled through the vent opening into the abdominal cavity.

Liver:
< remove liver (if not previously removed)and spleen with the intestinal tract, separate, and place for inspection in viscera inspection tray or equipment.

Intestines:
< intestinal tract must be placed in a separate tray for examination.

Heart and Lungs:
< heart and lungs are removed (if not previously removed) as a unit and placed with the liver and spleen for inspection.

Kidneys:
< kidneys are observed in the carcass by an inspector or an examiner, then removed from their crypts by an employee and presented with the heart for inspection.

(i) Trimming and carcass washing

Requirement standards:
< trim stick wounds, blood clots, and bruised tissue and place in inedible containers;
< wash carcasses thoroughly and check for cleanliness;
< promptly chill clean carcasses.

9.14.5 Dressing Procedures for Calves

Standard: Reference Schedule I, Part IV of the *Livestock Carcass Grading Regulations*
< "Veal" means the meat of a bovine animal having the maturity characteristics set out in and a warm carcass weight of: less than 205 kg with hide on, or less than 180 kg with hide off;

< *Maturity Characteristics:*
  < bones that are soft and reddish in colour;
  < ribs that are narrow and slightly rounded;
  < sternum bones that show distinct divisions;
  < aitch bones that are covered by cartilage.

Requirements for dressing procedures:
2. similar dressing procedures as described for cattle, except that splitting is not required; or,

2. dressing with hide left attached for later removal ('cold skin' or 'hide-on' carcasses), providing carcasses comply with requirements of the *Livestock Carcass Grading Regulations*. Hides must be thoroughly cleaned and excess water allowed to drain off prior to removal of head and feet and subsequent evisceration. Carcasses with dirty skins, skin showing evidence of parasitic infestation, or pathologic lesions must be dressed as per (1) above.

Requirements standards:
< the interior surface of the thoracic and abdominal cavities of approved carcasses may be washed after inspection;
< physical separation within a cooler room shall be provided for hide on carcasses when placed with fully dressed carcasses of another species,
< a designated area within a compatible room shall be provide for hide removal and prevention of contamination;
< employees working at this station must have adequate facilities and equipment to allow for satisfactory skinning.

9.14.6 Dressing Procedures for Sheep, Lambs and Goats

Requirement standards:
< prevention of carcass contamination must be implemented during pelt removal from sheep, goat and lamb carcasses;
< goat carcasses may be scalded, dehaired with the skin left on;
< other dressing procedures are similar to those described for cattle, except that splitting of carcasses is not required.

9.14.7 Dressing Procedures for Horses

Requirement standards:
- any spraying before slaughter used to control loose hair on the abdomen and legs, the procedure must not result in water dripping on exposed surfaces;
- subsequent dressing procedures are similar to those described for cattle.

9.14.8 Dressing Procedures for Domestic Rabbits

Requirement standards:
- prevention of carcass contamination must be implemented during pelt removal;
- after removal of pelts, a water rinse of carcasses to remove fluffy hair is permitted;
- subsequent dressing procedures are similar to those described for poultry.

(a) Lambs and kids

Requirement standards:
Partial dressing of lamb and kid carcasses may consist of not removing skin, head, heart, liver, lungs and kidneys from the carcass during dressing procedures;

In order to permit partially dressed carcasses weighing 25 kg or less, the following conditions are met:

(a) the skin is clean, dry and free of disease;
(b) the carcass is dressed cleanly and any incidental contamination is removed in an acceptable manner; The median line of skin shall be free of long hairs, i.e. it shall be sufficiently shaved before incision, if necessary, to prevent contamination of tissues during dressing, inspection and other handling;
(c) the carcass is kept segregated from fully dressed carcasses to prevent cross contamination. A sufficient distance from fully dressed carcasses shall be maintained if there is no separate cooler available;
(d) skin-on carcasses are individually wrapped for shipping;
(e) skin-on carcasses may have the unskinned head attached, provided the skin is clean and free of disease; and,
(f) the heart, liver, lungs and kidneys may be left attached to the carcass, provided they are sufficiently exposed for inspection and provided they are clean and free of disease.

If any of the parts that may be left on the carcass (skin, head, heart, liver, lungs, kidneys) are removed the weight of any such part shall be deducted from the 25 kg maximum weight. Actual weight or allowances as follows shall be deducted:

head	1 kg
skin	2 kg
heart, liver, lungs and kidneys	1 kg

Example: An incompletely dressed lamb or kid carcass with the head removed shall not weigh more than 24 g (25 kg minus 1 kg for the head).

(b) Head-on rabbit carcasses

Requirement standards:
< the head must be completely skinned and found free of disease on inspection;
< the carcass must be air-chilled and not water-chilled; and
< the head must be wrapped with water-resistant paper or plastic prior to packaging.

9.15 Salvaging and Preparation of offal and other detached portions for edible purposes, for animal food, for pharmaceutical or research use.

9.15.1 General Requirements

As a basic principle, all edible offal must be chilled or frozen as soon as possible and should not be permitted to remain in unrefrigerated areas for extended periods of time. In addition, when salvaging edible offal materials, the parts shall remain correlated with the carcass up to final post-mortem/inspection/examination.

9.15.2 Bovine Heads

< edible portions obtained from the head, shall not be salvaged for human consumption if stunning is carried out by shooting;
< horns shall be removed and head skinned;
< head shall be placed on suitable equipment for washing (externally and within the nasal, buccal and oral cavities) prior to the tongue being dropped and removed;
< tongue is dropped and tonsils removed, before the head is presented for inspection;
< exposed surfaces must not become contaminated;
< identity of heads shall be preserved until final disposition of corresponding carcasses.

9.15.3 Sheep Heads

< heads shall be skinned if brains are to be salvaged and at times to prevent contamination;
< heads, not skinned and attached to carcass shall not be washed, if there is likelihood of contamination to the carcass or adjacent carcasses;
< heads from which all skin and wool is removed shall be treated as other edible product.

9.15.4 Brains

< brains shall not be salvaged if stunning results in contamination (if lead or fragile bullets are used to stun food animals);
< brains shall be salvaged in a hygienic and approved manner;
< brains shall be washed and refrigerated without delay after inspection and approval for human food;
< brains containing some skin or bone from stunning, or containing blood clots, maybe salvaged for animal food;

< employees shall have clean hands prior to removing brains.

9.15.5 Beef Feet

Beef feet may be harvested for human food provided the following conditions are met:
< identity of beef feet is maintained until corresponding dressed carcass is approved;
< feet from approved carcasses may be harvested for human consumption;
< approved feet are scalded and cleaned;
< hoofs are removed from feet;
< should the proximal end of the foot have been contaminated during scalding and cleaning process, the affected portion shall be removed and handled as condemned;
< approved feet may be sent under appropriate controls from one registered slaughter establishment to another registered establishment for scalding, cleaning and further preparation as an edible meat product.

9.15.6 Beef Tongues

Beef tongues shall be harvested for human food provided the following conditions are met:
< trimmed and washed free of all blood, etc., prior to refrigeration;
< beef tongues may be stamped with an approved legend and used for processing**.**

9.15.7 Thymus Gland (or Sweetbread)

Thymus glands, from beef carcasses, may be prepared for human food, provided:
< they are free of pathological lesions;
< after inspection, thymus glands (sweetbreads) shall be washed to remove blood and blood clots; and,
< chilled before packaging, or packed and frozen.

9.15.8 Hearts

Hearts may be prepared for human food from all food animals providing:
< hearts of red meat animals are cut open to permit the complete removal of all blood clots;
< prior to beef hearts being comminuted, the oscordis shall be removed.

Hearts shall be trimmed and washed as follows:
< the aorta and other major blood vessels are to be removed to within 2 cm of their origin;
< the atria does not need to be routinely trimmed, except to accommodate removal of the major blood vessels and, if applicable, the oscordis (heart bone) - see below;
< cleaned in cold potable water, drained and refrigerated as soon as possible;
< beef hearts may be stamped, used for processing or shipped in accordance with the regulatory requirements relating to marking and labelling.

9.15.9 Livers

Horse Livers:
< Horse livers are not approved as edible due to their high cadmium content. As such, livers

from horse meat shall be treated as inedible and dispose of in accordance with this regulatory standard.

Livers from other food animals:
Livers from all other food animals may be prepared for human food, providing the following procedures are applied:

< remove gall bladder;
< remove by trimming any small areas of dry adhesions, parasitic scars, etc.;
< chill livers by immersion in cold running potable water and hang on racks or place in trays to drain in cooler;
< chill livers by air chilling in a cooler;
< livers may be packed and frozen;
< edible livers derived from red meat food animals may be stamped, used for processing or shipped in accordance with the regulatory requirements of marking and labelling.

9.15.10 Lungs

Regulatory Standard:
The use of lungs in Canada as an ingredient in meat products constitutes adulteration.

Requirements
The salvage of lungs for human consumption may be permitted in an establishment for domestic consumption, providing:

< lungs must be free of pathological lesions and contamination;
< the trachea and main bronchi of lungs shall be split prior to inspection for parasitic infestation and presence of ingesta;
< after inspection, lungs prepared for edible purposes or salvaged for animal food shall be chilled before packaging, or packed and frozen.

9.15.11 Spleens

Regulatory Standard:
The use of spleens in Canada as an ingredient in meat products constitutes adulteration.

Requirements
The salvage of spleens for human consumption may be permitted in an establishment for domestic sale, providing:

< spleens are found free of pathological lesions and contamination.

9.15.12 Tripe, Omasa and Abomasa

Requirements
Tripe, omasa and abomasa may be prepared for human food, provided;

< they are free of pathological lesions;
< preparation of this material shall be carried out in a compatible room separate from the slaughter floor;
< the contents shall be removed and the raw product washed inside and out;

- any contamination on the fat which cannot be removed by washing shall be trimmed;
- the rinsed product shall then be examined by a responsible plant employee, prior to further handling, i.e. chilling and packing in the case of raw product, or scalding in the case of other product.

The following steps must be followed when automated equipment is used:
Any establishment wishing to produce edible tripe omasa or abomasa using automated equipment must submit, in advance, to the Regulatory Authority the details of their process, including length of time, water temperatures, chemicals used, type of equipment and quality control procedures.

- the organs shall be opened and contents removed;
- in the case of the omasa, shaking the organ may be performed, (preferably with an automated shaker to remove heavier contents);
- product shall be rinsed in accepted equipment with a continuous flow of water;
- product shall be visually clean at the exit end before removal from equipment;
- clean product to be placed in accepted equipment for second stage of scalding or scalding and bleaching;
- after scalding or scalding and bleaching, all product shall be rinsed thoroughly in potable water;
- final product must be visually clean, without abrasions, tears or any other abnormalities.

9.15.13 Hog Stomachs

Requirements
Hog stomach may be prepared for human food, provided:
- they are free of pathological lesions;
- hog stomachs shall be opened, emptied and thoroughly washed;
- hog stomachs shall be scalded and the mucous lining shall be completely removed before being used as an ingredient in a prepared meat product;
- hog stomachs salvaged for animal food may be prepared unscalded;
- the preparation of hog stomachs should, as far as plant facilities permit, be carried out in a room separate from the slaughter floor.

9.15.14 Casing Preparation

Requirements
Casings may be prepared from intestines, bladders and esophagi of cattle, calves, sheep, lambs, goats and hogs, provided:
- the portions are free of pathological lesions;
- the preparation of casings should, as far as plant facilities permit, be carried out in a room or rooms separate from the slaughter floor.

9.15.15 Kidneys

Regulatory Standard

Horse Kidneys:

Horse kidneys are not approved as edible due to their high cadmium content.

Kidneys from other food animals

Requirement
Kidneys from food animals other than poultry and horses may be prepared as an edible product, provided:
< they are free of pathological lesions;
< kidneys shall be chilled before packaging or packed and frozen;
< kidneys shall be deeply incised and soaked in water and washed, before they are incorporated into a meat product;
< kidneys shall not be used in the production of lard or tallow.

9.15.16 Fatty Tissues

Requirement
The sanitary collection of clean fatty tissue from approved dressed carcasses and approved detached portions shall be carried out as speedily as possible, and;

< refrigerated or rendered immediately after collection if intended for edible purposes;
< fat trimmings harvested from carcasses prior to approval cannot be considered edible;
< fatty tissues intended for the production of partially defatted tissue shall not contain bone, and in the case of partially defatted pork fatty tissue, skin.

9.15.17 Beef, Calf and Horse Tails

Requirement
< contamination of skinned tails must be removed by trimming, prior to washing to remove blood and loose tissue particles;
< the identity of tails must be maintained until final disposition of the carcass;
< approved tails shall be either placed in containers or hung on racks for refrigeration.

9.15.18 Poultry Giblets

Requirement
Poultry giblets (heart, liver and gizzard) may be prepared for human food provided:
< they are free of pathological lesions;
< free of contamination;
< livers shall be separated from the viscera and the gall bladder shall be removed, before washing and chilling;
< hearts shall have pericardium removed prior to washing and chilling;
< gizzards shall be separated from viscera, opened and contents and lining removed, before washing and chilling;
< giblets shall be chilled immediately after they are harvested and prepared.

9.15.19 Heads Destined for Retail Sale

Requirement

Heads may be salvaged and sent for eventual retail sale, providing:

< heads are skinned or shaved as appropriate and visibly clean;
< heads showing an obvious nasal discharge shall not be permitted to be saved for retail sale.

9.15.20 Other

Any other organ or part of a carcass can be considered edible if harvested from an approved carcass and prepared in a hygienic manner approved by the Regulatory Authority.

APPENDIX - A

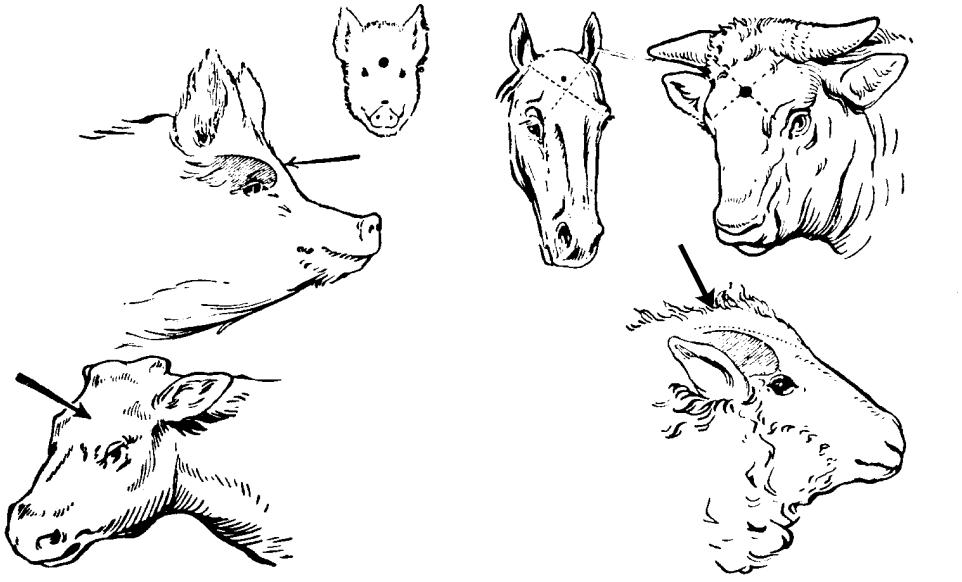
STUNNING BY MECHANICAL MEANS

APPENDIX - A
STUNNING BY MECHANICAL MEANS

Part 9
ANTE-MORTEM, SLAUGHTER AND DRESSING AND POST-MORTEM PROCEDURES

Section 9.9.2 - Of the National Meat & Poultry Code - Stunning Methods

CORRECT POSITION OF CAPTIVE BOLT STUNNER (PENETRATING AND NON-PENETRATING OR FIREARM



N.B. Non-penetrating percussion pistols must not be used on sheep or large bulls. The skull thickness of these animals dissipates the force of the blow, resulting in inadequate stunning.

APPENDIX - B

DISPOSITION CODES

APPENDIX - B

APPENDIX - B

Part 9
ANTE-MORTEM, SLAUGHTER AND DRESSING AND POST-MORTEM PROCEDURES

Section 9.4.1, 9.6.3, 9.8, 9.12.1, 9.12.2 & 9.12.5 - Of the National Meat & Poultry Code

DISPOSITION CODES

A list of diseases and conditions requiring specific dispositions is provided below, together with the appropriate disposition in a coded and summarized form for reference purposes. This list is divided into three subsections: one deals with diseases and conditions that can be diagnosed in slaughterhouses, based on the organoleptic examination (visual, tactile and olfactory) of carcasses; diagnoses, the other section is based on judgements made by veterinarians at slaughter based on laboratory results. It is understood that in some cases, because of past experiences with a similar condition, a veterinarian can pose such diagnoses without a lab report; and finally, a section on reportable diseases that can be seen at slaughter are listed.

ANTEMORTEM

A	Totally Condemn
B	Retain Animal for Rest and Treatment
C	Treat as “Suspect”

POSTMORTEM

D	Approve
E	Approve Subject to Specific Treatment
F	Totally Condemn
G	Partially Condemn (Condemn Affected Parts and Approve Remainder)
H	Utilization for Animal Food
HI	Utilization for Animal Food After Removal of Lesions or Condition on Affected Parts, then for Removed Parts
I	Rendering by Authorized Establishments
J	Retain under Refrigeration and. If appropriate, test on site
K	Take Samples for Laboratory Analyses
NOS	Not Otherwise Specified
*	Suspicion of Antibiotic use, Tests Approved By Regulatory Authority to be Performed

Red Meat Species

Diseases and conditions diagnosed by organoleptic examination of lesions or anomalies and/or reported to the Regulatory Authority

Diseases and conditions diagnosed by organoleptic examination of carcasses and portions thereof(and/or reported to the Regulatory Authority)			
Name and code of Condition	**Comments**	**Judgement**	**Utilization of condemned material**
Abnormal Muscle Metabolism (P.S.E. in pork, D.F.D. (dark cutting) in beef.)	Associated with fatigue or other stress.	D	
Abscess * 001	**Antemortem:** depending on obvious systemic effects present or not.	A or C	I
	Postmortem: **Beef Liver:** - single abscess - multiple abscesses	F F	H1 I
	Carcass: -if localized, not numerous and no systemic effect	G	I
	- if numerous or associated with systemic effect	F	H1
Actinobacillosis 401	Depending on extent (note: if head affected, tongue also condemned).	C then F or G	H1
Actinomycosis 403	Depending on extent (note: if head affected tongue also condemned).	C then F or G	H1

Diseases and conditions diagnosed by organoleptic examination of carcasses and portions thereof(and/or reported to the Regulatory Authority)			
Name and code of Condition	**Comments**	**Judgement**	**Utilization of condemned material**
Adhesions 511	**Viscera:** - Dry adhesions: trimming is possible; trimming is not possible (because of quantity or time factors)	G	H
	-Wet adhesions	F	H
	Parietal pleura and peritoneum: - Dry adhesions with no inflammation or suppuration	F	I
	- Wet adhesions or dry adhesions associated with inflammation or suppuration consult Pleuritis or Peritonitis	G	H
Anemia 910	If severe	A or C then F	I, or I, if associated with septicaemia, otherwise, H
	If moderate disposition dependent on other findings.	C then D, G or F	I or H I, if associated with septicaemia, otherwise, HI or H
Arthritis 512	**Antemortem -** depending on severity and systemic effects.	A or C	I
	Postmortem - no systemic effects.	G	I, if infected otherwise, H
	Systemic effects or all affected portions not removed.	F	I, if associated with septicaemia otherwise, H
Atrophic Rhinitis 455	If localized and no suppurative nasal discharge.	D	I
	If localized with suppurative nasal discharge.	G	
	If any systemic effects e.g. abscessation of lungs.	F	H1
Blood Splashing 574	If minor in extent, otherwise.	D G	H
Bruising	Depending on extent.	C then G or F	H
Caseous Lymphadenitis 420		G or F	I H1

Diseases and conditions diagnosed by organoleptic examination of carcasses and portions thereof(and/or reported to the Regulatory Authority)			
Name and code of Condition	**Comments**	**Judgement**	**Utilization of condemned material**
Central Nervous System Disorders	Reportable disease suspected eg. scrapie, pseudorabies, rabies, BSE., etc.	A	For reportable diseases or scrapie, consult with Animal Health Officers, otherwise I
Contamination 010		G, rarely F	H
Edema (Ascites) 320	**Antemortem**: if extensively affected, otherwise	A	I
	otherwise	C	H I, if associated with septicaemia otherwise, H
	Postmortem: disposition will depend on cause and total postmortem findings.	G or F	
Emaciation 220	Must be distinguished from leanness. Try to determine underlying cause for reporting purposes, otherwise report as emaciation.	C then F	H
Eosinophilic Myositis 551	Individual muscle or groups of muscles with well defined greenish foci becoming whitish in presence of air. Disposition depends on extent. For disease reporting purposes, until the exact etiology is determined, please report this condition as eosinophilic myositis even if an histopathological diagnosis of sarcocystosis in beef is made.	G or F	H
Fistula (withers) 002	**Antemortem**: if extensive otherwise	A	I
		C then G	1
		or F	HI
Focal Hepatic Necrosis (Sawdust Liver) 520	**Liver**: - If slight and removable,	G	I
	- otherwise	F	I
Gastroenteritis According to the most affected organ: 530 Enteritis 535 Gastritis	**Antemortem**: depending on systemic effects	A or C	I
	Postmortem: - if acute, hemorrhagic or systemic effects	F	I, if associated with septicaemia, otherwise, HI;

Diseases and conditions diagnosed by organoleptic examination of carcasses and portions thereof(and/or reported to the Regulatory Authority)

Name and code of Condition	Comments	Judgement	Utilization of condemned material
	- in less severe cases	G	I
Granulomatous Lymphadenitis 495		G or F	I
Heatstroke (heat exhaustion, sun stroke)	Differentiate from pyrexia.	B then C	
Icterus/Jaundice 920	Must be distinguished from other yellow discolourations.	A or C,	I
		then F	I, if associated with septicaemia, otherwise H
Immaturity - Veal 030		B	
Inadequate bleeding 096	Verify improper bleeding procedure	G or F	H
Injection Sites (Injection myositis) 265	Suspect possible residues, perform test found acceptable by Regulatory Authority.	J	
	- **if negative** for residues and uncomplicated	G	I
	- **if positive**, confirm with laboratory	K	
	If associated with widespread suppuration or tissue reaction or positive for residues from laboratory.	F	H1,
Laminitis 102	Depending on acuteness, systemic effects.	A or C	I
		then G or F	H
Liver Flukes (Distomiasis) 760	Livers and lungs but no systemic effects.	G	I
	If systemic effects.	F	H1
Mange (others) see reportable diseases, section for psoroptic and sarcoptic mange. 102	Disposition depends on absence or presence of systemic effects. **Note:** in species where hide is removed, hide need not be condemned. Removal of hides is mandatory in affected calves	C then G or F	H
Mastitis * 547	Disposition depends on absence or presence of systemic effects, and residues	A or C	I
		then G	I

Diseases and conditions diagnosed by organoleptic examination of carcasses and portions thereof(and/or reported to the Regulatory Authority)			
Name and code of Condition	**Comments**	**Judgement**	**Utilization of condemned material**
		or F	I, if associated with a septicaemia otherwise, H1
Melanosis 071	Important to rule out neoplasms. Does not apply to pork skin	G	H
Metritis * 548	Disposition depends on absence or presence of systemic effects and residues.	A or C	I
		then G	I
		or F	I, if associated with a septicaemia otherwise, H1
Moribund		A	I
Necrobacillosis* 102	**Antemortem**: severely affected animals with systemic signs,	A	I
	otherwise	C	
	Postmortem: localized lesions with no systemic effects,	G	I
	otherwise.	F	H1

Diseases and conditions diagnosed by organoleptic examination of carcasses and portions thereof(and/or reported to the Regulatory Authority)			
Name and code of Condition	**Comments**	**Judgement**	**Utilization of condemned material**
Neoplasm (NOS) 660	No metastasis or systemic effects	G	H
	Metastasis or systemic effects Note: Lymphosarcoma and bovine squamous-cell carcinoma have their own code in laboratory analysis section below. Schwannoma is discussed below in the present section.	F	H
Nephritis 560	Chronic lesions with no abscessation or evidence of systemic effects.	G	I
	Otherwise	F	I, if associated with a septicaemia otherwise, H1
Odour (NOS) 061	May be associated with residue problems.	B then C then J then D, E or F	H
Odour (Sexual) 062		J then D or F	H

Odour (Stinkweed) 063	**Antemortem** - give feed free of this toxic weed	B then C	H
	Postmortem	then J then D, E or F	
Omphalophlebitis* 445	Disposition depends on absence or presence of systemic effects and residues	C then G	I
		or F	I, if associated with septicaemia otherwise, H1
Osteohemochromatosis (Congenital Porphyria) 130	If no systemic effect, bone out.	G	H
	If systemic effects.	F	H
Over scald 046		G or F	H
Peritonitis* 573	If acute or associated with systemic effects.	F	I, if associated with septicaemia otherwise, H1
	Otherwise.	G	I

Diseases and conditions diagnosed by organoleptic examination of carcasses and portions thereof(and/or reported to the Regulatory Authority)			
Name and code of Condition	**Comments**	**Judgement**	**Utilization of condemned material**
Photosensitization		C then G	I
Pleuritis 577	If acute or associated with systemic change,	F	I, if associated with septicaemia otherwise, H1
	Otherwise	G	I
Pneumonia 579	**Antemortem:** - if obvious, serious systemic involvement, otherwise	A	I
	otherwise	C	
	Postmortem: - if acute and extensive, or if accompanied by systemic change,	F	I, if associated with septicaemia otherwise, H1
	Otherwise	G	I
Purpura Hemorrhagica 102		A or C	I
		then F	I
Pyelonephritis * 566	If acute or associated with systemic changes.	F	I, if associated with a septicaemia otherwise, H1
	If subacute or chronic and no evidence of systemic changes.	G	I
Pyrexia (Fever)	Differentiate from transient elevated body temperature or heatstroke. Try to determine underlying cause for reporting purposes.		I
	If evidence of a primary condition causing fever,	A	I
	if not	B or C	
	if evidence of a pathology causing fever otherwise judge according to the lesions seen.	F	
Schwannoma 660	May trim carcass in processing. Condemn portions depending on the extent of lesions	G	H
Septicemia 930		A or F	I
Serous Atrophy of Fat 250	Affected carcasses may be chilled for up to 48 hours before making a final disposition. (Do not use for emaciation.	J then D or F	H

Diseases and conditions diagnosed by organoleptic examination of carcasses and portions thereof(and/or reported to the Regulatory Authority)			
Name and code of Condition	**Comments**	**Judgement**	**Utilization of condemned material**
Subcutaneous Granulomas 623	May cause reaction to tuberculin test.	C then J & K	
	If negative for T.B.	G	I
Telangiectasis 200	**Liver:** - if slight and removable	G	H
	- otherwise	F	H
Toxemia 960	May be difficult to diagnose on antemortem. To differentiate from asphyxia.	A or C	I
		then F	I, if associated with septicaemia otherwise, H
Uremia 350	Differentiate from urine contamination.	A or C	I
		then F	H
White Muscle Disease (Vit. E/ Selenium deficiency) Nutritional myopathy 211	If suspected on **antemortem.**	C	
	Postmortem - if localized with no evidence of systemic effects,	G	H
	Otherwise	F	H
Xanthosis 079	If localized.	G	H
	If present throughout carcass musculature.	F	H

Diseases and conditions generally diagnosed and reported based on laboratory analysis (histopathology, culture, serology, residues testing, etc.)

Name and code of Condition	Comments	Judgement	Utilization of condemned material
Bacillary Hemoglobinuria 102		A or F	I
Blackleg 102	Condition due to Clostridium chauvoei	A or F	I
Clostridial Disease 102		A or F	I
Coccidioidomycosis	Need to distinguish from T.B.	J and K	I
	If neegative for T.B.	G	
Cysticercosis 735 C. cellulosae Others C. ovis, C. pisiformis, C. tenuicollis	See reportable diseases section for C. bovis Condemn regardless of extent, report to Regulatory Authority .	F	I
	Disposition depends on extent.	G or F	
Erysipelas	**Antemortem**: check temperature.	A or C	I
	Postmortem: skin lesions only and no lymphatic reaction or systemic effect.	G	I
	Otherwise	F	I
Malignant Catarrhal Fever 102		A or F	I
Malignant Edema (Gangrenous septicemia) 102		A or F	I
Metabolic Diseases 102	Accurate diagnosis is important.	A or C	I
	Postmortem disposition dependent on findings.	D, F	H
Neoplasm (Bovine Squamous Cell Carcinoma) 620		A or C,	I
		then G	I
		F	HI
Neoplasm (Lymphosarcoma) 635		A or C,	I
		then F	H

Name and code of Condition	Comments	Judgement	Utilization of condemned material
Neoplasm (Melanoma) 645	If pigmentation present in lymph nodes: - if metastasis confirmed - otherwise	J and K F G	 H H
Residues 065: Antibiotics 102: Others	Requires test results for disposition.	C then J & K	
Sarcosporidiosis/ Sarcocystosis 770	Disposition depends on extent. See eosimophilic myositis	G or F	I
Strangles 102	disease caused by Streptococcus equi	A or F	I
Yellow Fat Disease (Steatitis) 102	If obvious or accompanied by fishy odour.	F	H
	If doubtful test for rancidity, any degree of rancidity.	J & K F	H

Reportable diseases (Red Meat Species)

Name and code of Condition	Comments	Judgement	Utilization of condemned material
Anaplasmosis 102	Reactors or suspected clinical cases.	C	
	Carcasses showing lesions of disease.	F	I
Anthrax (Charbon) 102		A F F	
Bovine Brucellosis (from a reactor herd) 102	**Affected organs:**	F	I
	-udder, genital organs and related lymph nodes	F	I
Cysticercus bovis 735		G and E	I
		or F	I
Equine Infectious Anemia 102	Disposition depends on systemic effects e.g. Anemia jaundice, emaciation.	A or C	I
		then G or F	I
Psoroptic mange (Scab) 102	No longer mandatory to condemn on antemortem. Postmortem see mange (other).	C	
Sarcoptic mange- In cattle 102	Postmortem see mange (other).	C	
Trichinosis 101	Antemortem. Postmortem.	C G or F	I I
Tuberculosis 490	Antemortem.	C	I
	Postmortem.	G or F	I
Sheep Pox (Variola Ovina) 102		A or F	I

POULTRY SPECIES

Diseases and conditions diagnosed by organoleptic examination of carcasses and portions thereof and/or Regulatory Authority

Diseases and conditions diagnosed by organoleptic examination of carcasses and portions thereof(and/or reported to the Regulatory Authority)			
Name and code of Condition	**Comments**	**Judgement**	**Utilization of condemned material**
Abscessation 001	Generalized or evidence of systemic involvement.	F	H1
	Otherwise	G	I
Airsacculitis 426		C then G	1
		or F	HI
Anemia 910	Try to determine underlying cause	F	I, if associated with septicaemia otherwise, H
Arthritis/ Periarthritis 512	Disposition depends on extent. Condemn if evidence of systemic involvement. e.g. wasting.	G	1
		or F	HI
Ascites/Right Heart Failure-Chicken 320	Disposition depends on extent. Condemn if evidence of systemic involvement.	A or C	I
		then F or G	H
Breast Blisters (Sternal bursitis, keel cyst) 003	Depending upon involvement of underlying tissue.	G	1, if infected otherwise, H
		or F	HI, if infected otherwise, H
Bruising 051	Depending upon extent of bruising	F or G	H
Cannibalism 007	Depending upon extent of lesions	F or G	H
Cellulitis 800	Depending upon extent	F or G	H
Coligranuloma 008	Differentiate from T.B. lesions.	G	1
		or F	HI
Contamination 010		F or G	H
Cyanosis/Asphyxia (Dark coloured carcass) 090	Differentiate from a septicaemia. Verify breast muscles.	A	I
		or F	H
Deficient(faulty) dressing procedures	Correction of these is the operator's responsibility.		
	If not corrected.	F or G	H

Diseases and conditions diagnosed by organoleptic examination of carcasses and portions thereof(and/or reported to the Regulatory Authority)			
Name and code of Condition	**Comments**	**Judgement**	**Utilization of condemned material**
Dermatitis 810	Depending upon extent and involvement of underlying tissue	F or G	H
Dyschondroplasia/Osteochodrosis		G	H
Emaciation 220	Differentiate from lean or small birds. Try to determine underlying cause for reporting purposes, otherwise report as emaciation.	F	H
Emphysema (Subcutaneous) 082	Depends on extent and concurrent conditions.	G	1, if associated with an infection otherwise H
		or F	HI if associated with an infection otherwise H
Found dead 099		A	I
Fractures 047		C, then F or G	H
Frost Bite	Report as cyanosis (dark coloured carcasses)	A or C, then F or G	I
		then F or G	H
Gout 967	All species with the exception of ratities	F	I
	Ratites, articular or visceral form: depending on extent of lesions and evidence of systemic effects	G	I
		or F	I
Hepatitis/cholangiohepatitis/ hepatosis/ necrotic hepatitis/etc. 545	Depends on extent of lesions and whether or not systemic effects.	G	1
		or F	HI
Icterus/Jaundice 920	Depends on extent. If liver is the main viscera involved, report as hepatitis	A or F	I H for carcass I for liver
Inadequate Bleeding 096	Verify improper bleeding procedure. Differentiate from initial cyanosis stages	F or G	H
Leukosis Sarcoma Group 640		F	H
Loss of identity 097		D or F	H
Marek's Disease (cutaneous form) 642		G	H
Marek's Disease (visceral or nervous form) 641		F	H
Moribund	For red meat only.		

Diseases and conditions diagnosed by organoleptic examination of carcasses and portions thereof(and/or reported to the Regulatory Authority)			
Name and code of Condition	**Comments**	**Judgement**	**Utilization of condemned material**
Neoplasm (Avian Squamous Cell Carcinoma) 611	Depending on extent of lesions and evidence of systemic effects	F or G	H
Odour (NOS) 061	May be associated with residue problems.	C then J then D, E or F	H.
Over scald/Mutilation 046/048		F or G	H
Osteomyelitis 150	Dependant on extent and secondary effects	G	1
		or F	HI
Pectoral Myopathy (green muscle) Myositis 550	Inflammation, degeneration or muscular infiltration: depend on extent of lestions and the possiblity of trimming lesions	G or F	I
Pendulous Crop 009	Depends on systemic involvement.	F or G	H
Pericarditis 571	Depend on extent of lesions and evidence of systemic effects. Ratites can show traumatic pericarditis further migration of a foreign body from the gizzard	G	I
		or F	HI
Peritonitis 573		G	I
		or F	H
Salpingitis 583		G	1
		or F	HI
Scabby Hip Syndrome(Dermatitis) 810	Depends on severity and involvement or underlying tissue.	F or G	H
Septicemia 930	Try to determine underlying cause for reporting purposes.	F	I
Synovitis/(Infectuous) Tenosynovitis/ Ruptured gastrocnemius tendon 102/460		G	H
Toxemia 960	Try to determine underlying cause for reporting purposes.	F	I
Valgus/Varus Deformity 160	When the deformity is the only visible lesion	D	
	When there are traumatic lesions	G	H
	When there are systemic effects.	F	H

Diseases and conditions diagnosed by organoleptic examination of carcasses and portions thereof(and/or reported to the Regulatory Authority)			
Name and code of Condition	**Comments**	**Judgement**	**Utilization of condemned material**
Xanthomatosis 865		F	H

Diseases or conditions generally diagnosed and reported based on laboratory analysis (histopathology, culture, serology, residues testing, etc.)

Name and code of Condition	Comments	Judgement	Utilization of condemned material
Adenocarcinoma 660	Report as Neoplasm (NOS)	F	H
Aspergillosis 405		F	H1
Botulism	Diagnosed at antemortem inspection.	A	I
Chlamydiosis (Ornithosis, Psittacosis) 102	**Risk to human contacts**.	C, then K	
	If suspected take all reasonable precautions, including delaying slaughter of other birds from same source.	F then K	I
	Laboratory confirmation essential	A when confirmed or B	I
Coccidiosis 720	Depending upon extent and systemic involvement.	F or G	I H1
Enteritis (Ulcerative or Necrotic) 530	Depends on systemic effects.	G	I
		or F	HI
Enterohepatitis (blackhead) 430		C then G	1
		or F	HI
Erysipelas 435		F	I
Fowl cholera 102	Difficult to diagnose on antemortem. May be suspected on a flock basis. At postmortem may appear as septicaemia, C.R.D., arthritis, etc. Disposition will be on this basis.	C, then F or G	I
Fowl Pox 965	Disposition depends on extent of lesions and whether or not systemic involvement.	C, then F or G	I
Gangrenous Dermatitis (dermatomyositis) 810	Depends upon severity.	F or G	I
Inclusion Body Hepatitis 545	Only the liver is affected in this case.	F	I
Infectious Bursal Disease (gumboro disease) 102		F or G	I
Infectious Bronchitis 102		C, then F or G	I
Infectious Coryza 102	Depends upon extent of lesions and ability to remove them.	C then F or G	I

Name and code of Condition	Comments	Judgement	Utilization of condemned material
Infectious Sinusitis 102		C, then F or G	I
Leiomyoma 660		G	H
Leiomyosarcoma 660	Malignant form of above - rare. Report as Neoplasm (NOS)	F	H
Listeriosis 102		F	I
Residues 065: Antibiotics 102: Others	Suspicion may stem from abnormal odour or liver lesions. Deal with on a lot or flock basis.	J and K if confirmed F	
Rickets/Osteomalacia 141	Depends upon severity	D or F	H
Tuberculosis 490		F	I
Viral Arthritis (reovirus infection)		F or G	I

Reportable diseases (Poultry Species)

Name and code of Condition	Comments	Judgement	Utilization of condemned material
Anthrax 102	This disease rarely affects birds. Chickens are highly resistant, ostriches are moderately susceptible	AF	
Fowl Plague (highly virulent form of avian influenza) 102		A or F	I
Fowl Typhoid 102	Disposition depends on extent of lesions and whether or not there is systemic involvement.	A, F or G	I
Newcastle Disease (pneumoencephalitis) 863		A or F	I
Pullorum disease 102		F	I

OTHER REPORTABLE DISEASES

African horse sickness	Mange of cattle
African swine fever	Peste des petits ruminants
Anaplasmosis	Pseudorabies Aujeszky's disease)
Anthrax	Pullorum disease
Avian pneumoencephalitis (Newcastle disease)	Rabies
Bluetongue	Rift valley fever
Bovine spongiform encephalopathy	Rinderpest
Brucellosis	Scrapie
Contagious equine metritis	Sheep pox
Contagious bovine pleuropneumonia	Sheep scab
Cycticercosis (bovine)	Teschen disease
Equine infectious anemia	Trichinosis
Equine piroplas-mosis	Tuberculosis
Foot and mouth disease	Varroasis
Glanders	Vesicular disease of swine
Goat Pox	Vesicular stomatitis
Hog cholera	And any other disease designated by the appropriate Regulatory Authority
Lumpy skin disease	Fowl typhoid
Maladie du coit (dourine)	Vesicular exanthema of swine
Fowl plague	And any other disease designated by the appropriate Regulatory Authority

PART 10

INEDIBLE MEAT PRODUCTS

PART 10
INEDIBLE MEAT PRODUCTS

PART 10 - INEDIBLE MEAT PRODUCTS

Inedible Meat Products

Reference: Part 10 - Sections 61, 62, 63, 64 & 65 of the National Meat & Poultry Regulations

OUTCOME REQUIRED

< Consistent, control of inedible meat material that prevents contamination and adulteration of edible products.

RATIONALE

< Strict care and attention needs to be paid by manufacturers in the handling of a meat product that has not been passed for human consumption and is either designated condemned or inedible, or is being held pending further investigatory testing. This meat must be prevented from being mixed with, substituted for, or in any way contaminating meat for human consumption to ensure the safety and wholesomeness of food products.

10.0 Definitions

As defined in the Regulations.

10.1 General

10.1.1 General Requirements

The salvaging of inedible meat products is permitted at establishments providing operational procedures involving the collection, handling, transferring, storage and disposal, do not result in unsanitary conditions and such inedible meat products are not accidentally or fraudulently added to human food or create an animal health hazard.

The responsible operator shall develop, implement and maintain strict control of inedible facilities, the equipment used for inedible waste materials, the collection procedures, the storage activities, the disposal procedures and the training programs for plant employees.

10.2 Facilities and Operational Requirements

10.2.1 Location of Inedible Facilities

An operator shall demonstrate consistent control of inedible meat and waste materials in order to prevent contamination and adulteration of edible products. In order to comply with prescribed standards, an operator provides a separate room in a compatible area of an establishment for the holding of inedible waste materials.

In the case of slaughter operations, an inedible room should be located close to slaughter operations, (kill floor room). A kill floor room mainly generates inedible meat and meat by-products, such as viscera, hides, skin, feathers, etc. As such, locating an inedible room in the general area of the plant's slaughtering operations shall assist in providing an operational flow for dressed carcasses that moves progressively to cleaner areas, and that avoids cross-overs or backtracking as a result of inedible conveyance.

10.2.2 Standards For Inedible Rooms

An inedible room shall meet the standards described below and include necessary equipment in order to prevent contamination and adulteration of edible meat products:

< an inedible room shall be of a size that can accommodate the intended volume of inedible materials without delay or backlog, and without posing a biological risk to meat products or sources of contamination to the remaining areas of an establishment; and

< an operator shall maintain a removal schedule for the disposal of inedible waste materials at frequencies that minimizes contamination in order to prevent backlog and unsanitary conditions;

- an inedible room shall be constructed of materials that can be effectively cleaned and structurally maintained, such as materials that are hard, smooth and impervious to moisture;

- adequate ventilation shall be provided within an inedible room in order to effectively remove odours and to prevent objectionable odours from entering any production area of the facility;

- the room shall be equipped with sufficient floor drainage that permits water to drain properly and prevents accumulation of water or liquids, as well as, facilitates an acceptable standard for sanitary maintenance;

- an inedible room shall have access to a separate loading dock for removal purposes. The loading dock shall be separate from any shipping area used for edible meat products;

- inedible meat products shall be collected into designated containers used for inedible waste materials only; the containers shall be either coloured coded or legibly marked and identified as to their purpose;

- inedible rooms shall be equipped with refrigeration units capable of maintaining a temperature of 4°C or less, in order to minimize biological hazards.

- containers used for inedible waste materials shall be cleaned and sanitized (if necessary) at frequencies to minimize contamination;

- an inedible room shall be provided with effective and suitable pest control devices in accordance with the company's Pest Control Program.

The methods and frequencies of cleaning the inedible section of an establishment and maintenance of the room, shall be described in the company's Sanitation and Preventative Maintenance Programs.

10.2.3 Equipment Used For Inedible Materials

An operator shall provide designated or identified equipment for the collection, detainment and/or removal of inedible materials. The equipment used for inedible waste materials shall be:

Containers

- constructed of materials that can be effectively cleaned and structurally maintained;

- provided with lids or suitable coverings that are secure when closed or affixed;

- leak proof; of a design and construction to prevent spillage and liquids from escaping;

< legibly and clearly marked with the origin of the establishment, contents and statements, such as, "Animal Food" and/or "Not for Human Consumption" and/or "Inedible".

Other equipment *(shovels, forks, working apparel, etc.,)*

< constructed of materials that are durable, and that can be effectively cleaned and maintained;

< legibly and clearly marked for their intended purpose or identified by a colour coding system.

All equipment used for inedible purposes shall be throughly cleaned and sanitized after each use and prior to entering any edible area of the plant. Clean inedible equipment shall be stored in areas of the plant that have been found acceptable for this purpose.

10.2.4 Inedible Handling Requirements

All materials that have been found unfit for human consumption by an inspector or an examiner, shall be collected in inedible containers and transferred by designated and trained plant employees to the inedible section. Once admitted to the inedible section of an establishment, the materials cannot later be readmitted to any other area of the establishment, unless the inedible products, (other than 'condemned' meat products), require freezing or shipping in the frozen state. *Refer to item 10.6 of this section for additional requirements.*

An operator shall develop training programs for plant personnel, as well as, schedules for inedible waste removal. The objectives of the training programs and proposed schedules are to implement and maintain effective controls that prevent accidental misuse of inedible meat products, or unsanitary situations that may contaminate meat intended for human consumption. The training documents and operational procedures should include as a minimum:

a) an understanding of various hazards associated with handling, storage and removal of inedible waste materials. Specific operational controls to be implemented in order to prevent possible cross- contamination or adulteration situations from occurring that may involve edible meat products.

b) appropriate equipment to be used for collection and detainment of inedible waste materials. Procedures for removal of inedible materials to an inedible room and procedures for cleaning and sanitizing of inedible containers.

c) an understanding of operational flows and avoidance of cross-overs when transferring inedible materials. The importance of timely removal of waste materials from edible production or storage rooms, in order to prevent possible biological, chemical or physical hazards from occurring.

d) the importance of control and handling procedures for inedible materials and containers to ensure proper identification and appropriate disposition of materials, as well as, compliance with hygienic operations and procedures of the plant.

An operator shall designate plant employees to be assigned specific work duties or functions involving the collection, the conveyance, the storage and the removal of inedible waste materials. In the case of smaller establishments which may require employees for several functions throughout the days operations, the operator's Personnel Program shall describe hygienic procedures and controls that shall be implemented in order to prevent possible biological, chemical or physical hazards from occurring.

As a minimum, employees engaged in handling activities that involve inedible meat products, shall change protective work clothes or appropriately cover their work clothes and wash hands thoroughly, prior to entering edible areas of the plant, and/or handling edible products or their ingredients or their packaging materials and equipment. It is recommended that footwear, if possible, be changed, or washed, prior to entering edible sections of an establishment.

It may be possible, should an establishment's operations and amount of inedible waste be at such low volumes, to use alternative methods of inedible conveyance. Such as, transferring inedible materials at the end of the days operations and/or at times, when no edible meat products are subject to risk of cross-contamination due to the activities involving inedible waste materials.

10.2.5 Hides

In addition to 'standards of inedible rooms', an establishment that slaughters red meat animals must have facilities for the handling and temporary storage of hides. The storage rooms must meet all structural and sanitary requirements. Shipping areas used for inedible materials must be entirely separate from shipping facilities used for edible carcasses and meat products, unless otherwise agreed upon by the appropriate *Regulatory Authority.*

A separate room located in a compatible area of an establishment shall be designated for the holding of hides. Alternately, a separate storage shed located outside the building could be used for the holding of hides and skins. A hide room shall be maintained in sound structural condition and cleaned at pre-determined frequencies to minimize biological hazards. The room shall be equipped with ventilation and pest control devices and shall receive servicing in accordance with the company's written pest control program.

10.2.6 Collection of Fluid Waste Materials

Liquid inedible waste materials must be removed from applicable areas within an establishment, either through a separate drainage system or via a dedicated system for liquid waste removal, such as, continuous pipe system or manually, in waterproof containers clearly identified for their intended purpose.

Inedible fluid wastes from slaughter meat plants contain large quantities of blood, grease and suspended soils. Due to the high blood content, disposal of such fluid wastes usually involves specific restrictions enforced by municipal authorities. It is the responsibility of all operators to first

comply with all applicable requirements and restrictions governed by *Regulatory Authorities* within their residing province.

Usually, an operator chooses to separate blood at the point of collection, thus preventing it from entering a holding tank. The separated blood may then be disposed of with solid wastes to a rendering company, or if available in large enough quantities pumped out separately by a disposal company.

Blood which is collected for disposal of fluid waste, must be handled, stored and treated as inedible product. The blood collected for disposal shall either be:

a) manually collected and immediately removed from the area to the inedible part of the plant or;
b) collected into a separate holding tank through a separate drainage system or;
c) a dedicated pipe system for collection and conveyance of liquid wastes; or
d) designed and located in such a manner that does not create any cross-connection to the water supply of the plant, or the food processed within the establishment.

10.2.7 Separating Organic Matter

An adequate means of separating organic matter from the plant effluent, such as the use of catch basins, interceptors or grease traps should be provided. In provinces where municipalities have specific by-laws for the use of grease interceptors, catch basins, etc., an operator shall first comply with all applicable legislative requirements.

A catch basin or interceptor equipment should be located in an inedible area of an establishment or located outside the building. The area surrounding a catch basin shall have an impervious surface and should be sloped towards the separating organic matter equipment. The equipment, when in operation, removes solid waste materials and fats from fluid wastes.

The organic material (skimmed material) shall not be transferred through edible areas, unless an operator has an acceptable operational procedure that minimizes the likelihood of contamination to edible products, equipment and rooms.

Organic material in a fresh state, (skimmed material) shall either be rendered sterile in the inedible section of an establishment or removed to an approved rendering plant for such purposes. *Refer to section 10.7.3 of this part for additional information and requirements.*

10.2.8 Solid Waste Handling and Disposal

Corrugated cartons and packaging material waste shall be collected, stored and removed in a manner that does not present potential hazards to food products that are handled, processed and stored in an establishment. Disposal methods and collection procedures must be carried out at intervals that prevent the accumulation of refuse and garbage and minimizes contamination.

Containers used for the collection, storage and/or removal of garbage or solid waste materials shall be constructed of materials that are cleanable and durable for their intended purpose and operation. As part of an effective sanitary maintenance program, all equipment including equipment used for waste handling and disposal shall be cleaned and sanitized at frequencies that minimize contamination and effectively maintains equipment in a sanitary manner.

10.3 Inedible Meat Products

10.3.1 Categories of Inedible Meat Products

(a) condemned meat products
(b) non-condemned meat products

(i) salvaged for animal food

(ii) salvaged for medicinal purposes

(iii) treated by the operator as condemned meat products

(iv) which are by their nature not edible (beef hides, hair, feathers etc.)

In addition to inedible meat products, waste products such as manure from animals, paunch content, contents of intestines, etc. must be disposed of in a sanitary manner.

10.3.2 "Condemned" Inedible Meat Products

This category of inedible meat products include:

a) carcasses and/or portions of carcasses upon *inspection or reinspection*, have been found to be affected by disease or an abnormal condition that renders them unfit for human food;

b) animals condemned on antemortem inspection;

c) carcasses of animals that died en route to an establishment;

d) carcasses of animals that died in the yard or a livestock holding pens;

10.3.3 Segregation and Collection of Condemned Meat Products

Of all the categories of 'inedible', condemned meat products have the most potential to spread disease to humans and animals should, condemned materials not be handled, controlled and disposed of in a sanitary manner. As such, it is essential that condemned (inedible) materials are maintained under strict control until disposed of in a suitable and sanitary manner.

Condemned materials shall be collected in designated containers, distinctly marked "Condemned" or in colour coded containers that distinguish them from containers used for "Animal Food" and "Edible" meat products.

Condemned materials shall be directly conveyed to the inedible section of an establishment in a timely and sanitary manner.

Condemned animals shall not be skinned or otherwise handled using kill floor equipment. Instead they should be directly conveyed from the livestock yards or pens to the inedible section of an establishment.

The collection and conveyance of condemned carcasses or portions must be carried out in a manner that prevents contact with carcasses being dressed or approved meat products. All equipment having been in contact with condemned meat products shall be cleaned and sanitized as required and before reuse. Plant personnel, inspectors and examiners handling condemned meat products shall wash their hands, clean and sanitize work clothing or change working apparel, and clean and sanitize equipment, as necessary to prevent the spread of contamination.

10.3.4 Receipt of Dead Animals or Animals Found Dead

The receipt of dead animals for rendering in an establishment (other than those dying en route to an establishment) is only permitted with special permission from the *appropriate Regulatory Authority*. Permission shall be given when conditions, procedures and controls for animals found dead do not create any unsanitary conditions affecting the premises, and when such a disposal is in the public interest.

Upon receiving approval, such animals shall be admitted directly to the inedible products area.

A rendering operation, may be performed that includes both wet and dry rendering processes. The heating process shall destroy all salmonella present in raw material. It is also important that no re-contamination of the sterilized rendered product takes place.

All reasonable precautions shall be exercised to prevent re-introduction of salmonella and other pathogens or through insects, rodents, birds and other animals. *Refer to Section 10.7 for requirements and rendering process procedures.*

Shipping areas for sterilized inedible meat products shall not be used for the receipt of raw materials for rendering. They shall be well protected to prevent re-contamination. Sterilized and packaged inedible meat products shall be appropriately marked and identified as to their content when shipped from an establishment.

10.4 Non-condemned Inedible Meat Products

10.4.1 Inedible Meat Products For Animal Food

The appropriate *Regulatory Authority* may permit the salvaging of animal proteins for pet food, animal food and for the production of animal feeds, providing the use of inedible meat products does not result in unsanitary conditions. The salvaging of such animal proteins shall not create conditions or situations that may result in inedible meat products accidentally or fraudulently being added to human food or create an animal health hazard.

An inedible meat product may be used for animal food providing the following requirements have been satisfied:

a) the animal was slaughtered in an establishment approved by the appropriate *Regulatory Authority;*

b) the carcass passed inspection by an examiner or an inspector as edible food. Salvaging of products from condemned carcasses is prohibited.

c) an official Veterinarian determines that the meat product will not create a risk to the health of any animal that consumes it;

d) the identity of the products has been maintained until the corresponding carcass passes inspection and disposition by either an "inspector" or an "examiner";

e) the products can be collected in a sanitary manner;

f) the products salvaged are placed in an identified container and the identity of the animal food is followed through to distribution.

g) the products are denatured or otherwise made unsuitable and are not likely to be mistaken for edible meat products. An approved denaturant substance shall be added to the products by trained plant employees and the application of the substance shall be performed in the inedible section, or in another area of an establishment found acceptable by the appropriate *Regulatory Authority*.

10.4.2 Animal Food Collection and Storage (Inedible)

An operator shall have available within an establishment adequate facilities for the salvaging of meat products for animal food purposes. The facilities shall provide physical separation for the chilling, packaging, marking, storage and denaturing of the product, as required.

Approved denaturing substances are required to clearly distinguish organs and portions approved for animal food from those prepared and approved for human consumption. An exception to the use of a denaturant may be made, where by the nature of the products, the products would not likely be mistaken for edible, (i.e. spleens, lungs, udders, uncleaned gastrointestinal tracts and poultry heads and feet, etc.,).

10.4.3 Freezing of Animal Food Products

Permission may be given to an operator who intends to freeze and store frozen products identified as animal food in containers that have been fully marked, in refrigerated storage rooms used for edible meat products, providing;

< the storage activity within the room provides physical separation of edible meat products from animal food products (inedible) and the risk of cross-contamination is not likely to occur;

< the refrigerated storage rooms receive regularly cleaning and maintenance in accordance with the operator's written prerequisite programs, (Sanitation and Preventative Maintenance Programs).

< In addition, meat products used for animal food, may also be shipped from an edible shipping area, providing the activity of loading and assembly does not create any unsanitary conditions or possible biological hazards to edible meat products.

< Products destined for animal food must be collected in clearly identified containers, equipped with secure lids or covers. The containers shall not accumulate on the kill floor, but rather be transferred by designated employees to an inedible storage facility.

< The application of an approved denaturing substance shall be applied in the inedible section of the plant prior to shipping. The shipping of such products shall be separate from the handling and shipping of edible meat products, unless otherwise agreed upon by the *Regulatory Authority.*

10.5 Non-condemned Inedible Meat Products for Medicinal Purposes

At times, an operator may wish to harvest or salvage inedible meat products for medicinal purposes on their premises. Permission may be granted by the appropriate *Regulatory Authority*, should an operator have available facilities within an establishment that provides physical separation, for chilling, packing, marking and storage of such products.

Inedible meat products destined for medicinal purposes that are in containers and fully marked, may be frozen and stored in a freezer room used for freezing and storage of packaged, fully marked meat products for human consumption (edible meat products). Such medicinal products may also be shipped from an edible shipping area.

The freezing, storage and shipping of these fully packaged and marked ("for medicinal purposes") containers shall only be permitted if the containers:

< are organized within the freezer room in such a way, that, segregation from edible meat products is achieved;

< providing handling procedures do not create contamination by conveyance or shipping, nor create any lowering of sanitary maintenance within common areas.

Should an operator wish to engage in other types of harvesting or salvaging of inedible materials for pharmaceutical or research purposes, the operator shall provide to the appropriate *Regulatory Authority* details on the salvaging methods and procedures for evaluation and acceptance.

10.6 Non-Condemned Inedible Meat Products

< *Inedible meat products that are treated by the operator as condemned meat products*

Meat products that are treated by an operator as inedible meat products shall be collected and dispose of in a sanitary manner. Although control over this category of inedible meat product is not critical, as it is in the case of condemned products, the timely removal and sanitary handling are just as important. An products anywhere in the edible section of an establishment.

< *Products which are by their nature not edible*

The collection and disposal of inedible products in this category shall be carried out in a timely and sanitary manner, in order to prevent contamination of any edible meat product.

< *Disposal of animal waste products*

Manure, paunch and visceral contents shall be disposed of in a manner which will not create any sanitary problems on the premises.

10.7 Rendering and Disposal of Condemned Materials

"Render" means to extract the fat from a meat product by the application of heat.

An operator of an establishment is responsible for implementing strict control over the handling, the identification, the conveyance and the disposal of inedible products, as prescribed by regulatory requirements of this standard. A meat product that has been found to be condemned by an official Veterinarian, or an examiner or an inspector, must be clearly identified as condemned and conveyed to the inedible products area of an establishment for the following procedures or treatment:

< rendered or otherwise treated to destroy pathogenic microorganisms; or,
< denatured and conveyed to another establishment for rendering or other treatment to destroy pathogenic microorganisms-organisms; or,
< disposed of in accordance with the applicable federal and/or provincial regulations.

10.7.1 Authorization Procedures for Facilities and Operations Involved in Inedible Rendering

Slaughter operations wishing to render condemned meat products at their establishments or in the case of outside companies wishing to render condemned meat products for sterilization, shall make a request to the appropriate *Regulatory Authority.*

The design and construction of rooms to be used for rendering within an establishment or a separate facility intending to render inedible meat products, must be found suitable by the appropriate *Regulatory Authority*. In addition, an applicant shall submit written procedures and controls describing the rendering process for evaluation and acceptance.

The building and its operations must comply with all federal, provincial and municipal requirements prior to receiving approval and authorization as a facility acceptable for sterilization of condemned animals and meat products by the appropriate *Regulatory Authority.*

Refer to section 10.7.3 of this part, for details on design, construction, equipment and operational requirements for establishments and facilities wishing to render condemned meat products.

10.7.2 Exceptions - Condemned Meat Products Not Requiring Rendering

Condemned meat products that do not require rendering at the establishment or at another approved facility are listed below;

a) an inedible meat product that is salvaged from a condemned carcass, pursuant to section 52(3) of the *National Meat & Poultry Regulations;*

> *Section **52 (3),** Post mortem disposition by official veterinarian, explains that unless an official veterinarian directs an operator otherwise, inedible parts of a condemned carcass may be salvaged and processed as inedible products without subsequent treatment as condemned materials (i.e. rendering process);*

b) condemned meat product approved for animal food as prescribed in section *64(1)(a)(b)(c)* of the *National Meat & Poultry Regulations*;

> *Section 64(1)(a)(b)(c)**,** Animal Food, explains that should an examiner or an inspector or an official veterinarian determine through post mortem examination that the animal from which it comes was slaughtered in an establishment; and the carcass from which it comes was edible; and that the meat product shall not create a risk to the health of animals that consumes it; and it is denatured, or otherwise unlikely to be mistaken for edible meat products; and it is placed in an appropriate and identified container for use as animal food;*

c) condemned meat products for medicinal purposes;

Under the direction of an official veterinarian, an operator may harvest or salvage certain condemned meat products for medicinal purposes, laboratory examinations, research purposes or educational purposes.

d) condemned meat products containing residues exceeding acceptable tolerance levels or that cannot be rendered. *Refer to part 12 for additional information.*

In the case of meat products that are judged to be unacceptable for rendering due to dangerous residues or for other reasons, the products may be disposed of in accordance with local environmental requirements.

e) condemned meat products derived from a food animal affected with a reportable disease shall be destroyed pursuant to subsection 48(1) *Health of Animals Act & Regulations.*

Establishments that receive inedible oils, fats, bones or meat scraps shipped directly from a retail store, restaurant or public institution, shall provide receiving facilities directly to the inedible section of the premises. Receipt of such materials through edible receiving areas is not acceptable. Inedible tallow and other inedible fats may be shipped appropriately identified for industrial use. Separate storage tanks, pumps and pipelines shall be used for the handling of inedible fats.

10.7.3 Authorization Procedures for Facilities and Operations of Inedible Rendering Plants

Requests for authorization of inedible rendering plants shall be made to the appropriate *Regulatory Authority* having jurisdiction. Premises meeting requirements are listed as plants authorized to receive condemned meat products for the purpose of sterilization.

The process of approval involves the following steps:

3. The *Regulatory Authority* (or representative), completes an initial survey of the existing premises to determine the building's suitability for the purpose of rendering.

2. A copy of the inspecting officers' report is forwarded to the applicant of the rendering plant. This report should describe conditions found related to the buildings' existing construction, equipment layouts and operation of the plant.

The report should further outline recommended changes required for authorization of the premises.

3. Should an applicant decide to complete the recommended improvements, clear and legible drawings (to scale), shall be required for evaluation and acceptance by the appropriate *Regulatory Authority or their representative.*

Presentation of documents shall include:

< completed application forms, as provided by the appropriate *Regulatory Authority*;

< the business name of the applicant; the legal address of the premises; the scale measurement for plans and shall include the north point on drawings;

< the location of the premises and identification of surrounding neighboring businesses; all services to the building site (water supply, hydro, etc) - *a site or plot plan;*

- the existing layout of rooms (including employee welfare facilities) and all proposed changes to the premises. A floor plan can also contain the location of all equipment or a separate plan may be included. A listing of all equipment should be submitted with the plan (rendering equipment) - *a floor plan, room layout and an equipment layout.*

- all proposed operational flows; employee flow, condemned meat product flow from the point of receiving, through rendering process to storage or distribution; cleaning chemical flows; packaging or container flows - *operational flows;*

- a floor plan showing the location and specifications of all floor drainage - *a drain plan;*

- a room (floors, walls, ceilings) and door finish schedule - *a schedule of finishes*;

- a plan showing all sides of the premises; location of doors; windows, etc. - *exterior elevations*;

- a plan showing the location of all fresh air intakes and exit areas; ventilation outlets, including exhaust systems for equipment venting; location of roof drainage; location of skylights, if applicable, etc., - *a roof plan.*

4. The plans and documentation shall be evaluated for acceptability by the appropriate *Regulatory Authority*.

A final plant inspection shall be arranged once the applicant has completed all necessary changes to the premises.

As part of the final inspection procedures and requirements, an applicant is expected to provide written document programs in the following areas:

- the rendering process; a written program that is designed, implemented and maintained to ensure the destruction of pathogenic microorganisms; a program that identifies critical control factors within the rendering process that can be controlled and monitored; a program that describes deviations procedures; can isolate defects and contains pre-determined corrective actions and verification procedures;
- transportation and storage, which may include method and frequency of carrier cleanliness and maintenance, as well as, storage temperatures and controls;

- equipment maintenance and calibration programs; equipment calibration procedures and frequencies; preventative maintenance procedures and frequencies for equipment and maintenance of rooms with a facility;

- a pest control program; program for controlling pests; identification of pesticide or other chemicals used; location of all pest control devices;

- sanitation program - frequencies, methods, procedures, chemicals used; methods and procedures for pre-operational inspections and effectiveness checks;

< employee training programs related to the safe handling procedures/processes and related controls involving the handling of condemned meat products.

5. In all instances, inedible rendering plants must comply with all federal, provincial and municipal requirements before authorization is given by the appropriate *Regulatory Authority*.

10.7.4 Structural, Equipment and Operational Requirements

An authorized inedible rendering plant shall be of sound and solid construction, with interior finishes of smooth, hard and impervious materials that can be easily maintained and capable of withstanding repeated cleaning and sanitizing.

Product flow shall be such, that backtracking or intermingling or raw and cooked (sterilized) product is minimized. Similarly, employee flows and handling procedures should achieve segregation of incoming raw materials from finished materials. In addition:

< receiving dock areas or rooms shall be constructed of a hard surface, and shall have suitable drainage. All floors shall be of concrete, tile or other construction materials found acceptable by the appropriate *Regulatory Authority*. Floors shall be adequately sloped and drained to facilitate an adequate level of sanitary maintenance.

< the cooker discharge, percolator, press, grinders and other equipment in a finished product area shall be entirely separate from the charging and other raw material handling area. Each melter and cooker shall be provided with an automatic temperature recording device, suitable for the intended purpose and calibrated at frequencies to ensure that the equipment is functioning properly and as intended.

< the shipping area for sterilized product shall be separate and apart from any raw material receiving area.

< adequate facilities for the washing and sanitizing of vehicles and containers shall be provided. Containers and vehicles returned to other areas shall be cleaned and disinfected, prior to reuse.

< employee welfare facilities shall be provided. The facilities shall include washrooms, showers, change rooms and lunchrooms, if employees consume food on the plant premises. The facilities shall be adequately ventilated and provided with potable water. Employees should be provided with suitable protective clothing for those engaged in raw material handling and the rendering processes.

< the building shall have adequate ventilation and be equipped with condensers to control odours.

- any sterilized product not shipped in bulk containers shall be appropriately identified as to its contents.

- hide storage room shall be separate and apart from the processing section of the plant.

- housekeeping and janitorial services shall be provided and maintained throughout the plant, including during operational activities, in order to keep the plant clean and tidy at all times. All rooms and equipment shall receive a regular program of cleaning and where necessary, sanitizing.

- an adequate supply of hot and cold water be available to facilitate a satisfactorily level of sanitary maintenance.

- suitable disposal facilities for paunch contents shall be available within the plant's layout of rooms.

Management shall be responsible for the provision of watertight containers or other suitable containers for the pick-up of condemned and other inedible materials. Leaking, damaged or unidentified containers presented for pick-up of condemned and other inedible meat products at an establishment shall be rejected by the operator.

Management shall maintain records of condemned meat products receiving sterilization from the establishment, such as:

- records and plan describing the rendering process;
- identification of critical control points;
- monitoring, deviation and verification procedures and records.

Monitoring records shall be kept on file for a period found acceptable by an inspector and made available upon request.

PART 11

PROCESSING AND MEAT STANDARDS

PART 11
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PART 11
PROCESSING AND MEAT STANDARDS

Reference
Part 11 - Sections 66, 67, 68, 69, 70, 71, 72,73 & 74 of the National Meat & Poultry Regulations

OUTCOME REQUIRED

< Consistent routine application of appropriate specific hygienic and manufacturing controls in further processing plants to prevent physical, chemical and microbiological contamination of meat products and to protect consumers against economic fraud.

RATIONALE

< It has long been recognized that control of manufacturing through the implementation of appropriate procedures, rather than testing of finished product is more effective in ensuring that the meat product produced does not pose a health hazard.

< With the incorporation of manufacturing control requirements, the regulatory focus is shifted from finished product specifications to defining in advance the manufacturing practices that achieve acceptable levels of safety, thus promoting self-regulation. Consumer complaints could be an indication of problems with the established procedures of control.

11.0 Definitions

As defined in the Regulations.

11.1 Processing (Non-Prepared Foods)

11.1.1 General

The purpose of this section is to indicate the important points of control where inspector's should direct their efforts when monitoring or auditing processing operations. Inspectors should familiarize themselves with all operations and processes that are being carried out in an establishment under their control. It is recommended that an inspector consult textbooks in order to better understand the physical and chemical changes that may occur in meat products undergoing various forms of manipulation during processing techniques.

11.2 Refrigeration and Related Activities

11.2.1 Condensation

A major problem experienced with refrigeration is condensation, which occurs when relatively warm, humid air strikes a cold surface. Condensation can be reduced by insulating cold surfaces, increasing air circulation within a room, and by reducing the flow of warm air into refrigerated areas. In rooms where condensation occurs, effective operational controls must be implemented to protect meat products being handled, transferred or stored. This latter type of control may consist of the use of drip pans and ducts, the wiping or sponging of surfaces and the placement of exposed product in areas where the dripping of condensation does not occur. Operational measures can be useful to meet short term corrective actions.

However, it is the responsibility of all operators to work towards eliminating constant problems by satisfying long term corrective actions that maintain the establishment and its operations in accordance with the National Meat and Poultry Regulations and Code.

11.2.2 Refrigeration of meat products (excluding rabbits and poultry)

Refrigeration used for both chilling and freezing of meat products play such an integral role in the production and storage of perishable foods, that its importance cannot be over-stressed.

The primary purpose of refrigeration is to preserve meat products by slowing down the chemical and enzymatic changes which occur in tissues after slaughter, and by slowing down or stopping the multiplication of microorganisms which might give rise to spoilage or food poisoning. Refrigerating an environment in which meat products are handled or stored is also important, not only in producing and maintaining lowered temperatures in the products themselves, but also in depressing the rate of multiplication of microorganisms.

11.3 Coolers and Storage Activities

11.3.1 Coolers

Adequately refrigerated and conveniently located rooms of accepted construction will be available for the prompt chilling and subsequent holding of dressed carcasses, portions and processed meat products.
Refrigerated cooler rooms or drip cooler rooms shall have sufficient refrigeration capacity to maintain a temperature of 2 °C or lower in order to permit rapid chilling in chill coolers. In holding coolers a temperature of 4 ° C or less is acceptable.

Other holding cooler rooms available within an establishment and utilized for the purpose of chilling or holding of perishable meat products, shall be equipped with refrigeration units capable of maintaining a temperature of 4 °C or less. In order to verify that such temperature requirements are being maintained, all refrigerated rooms shall be equipped with suitable thermometers. Such temperature monitoring devices shall be properly calibrated at pre-determined frequencies, in order to verify that the devices are functioning properly and as intended, as well as, to provide accurate recordings for temperature controls. The operator shall maintain records for temperature control and for calibration procedures to verify that temperature and equipment calibration requirements are being met and maintained in compliance with the National Meat and Poultry Regulations and Code.

Coolers must be regularly cleaned, preferably when empty, but if this is not practicable the cleaning of the rooms shall be performed in such a manner that carcasses or other unprotected meat products are not subjected to contamination through cleaning chemicals or sanitary procedures. Particular attention should be paid to overhead rails, especially at junctions, in respect to grease build-up, rusting and flaking paint. Coolers must be carefully monitored for the presence of mould, which readily forms in high humidity areas where there is insufficient circulation of air. Every effort should be made to reduce condensation by ensuring that doors are kept properly closed when not in use, and that baffles at the rail opening are effective.

11.3.2 Finished and Processed Product Holding Coolers

Where refrigeration is required for the conservation of a meat product and the product has completed it's cooling process, the rooms used to store the meat product shall be maintained at a temperature not to exceed 4 °C, as measured in the warmest spot of the room.

Incompatible products (for ex., raw and cooked or ready to eat product) shall not be stored in the same holding cooler.

11.3.3 Chilling Red Meat Carcasses

A refrigerated chill cooler or drip cooler room, shall be adequate in size for the anticipated production volumes of the establishment's manufacturing operations. Sufficient room for the prompt chilling of carcasses shall avoid the necessity of placing hot carcasses in coolers that already contain completely chilled carcasses. Normally, coolers have a maximum refrigeration capacity which is dependent not only on the capability of the system, but also on adequate air circulation and humidity control.

The overcrowding of coolers can therefore reduce effectiveness of the refrigeration system, not only by there being too much heat generated from freshly slaughtered carcasses, but also by interference with air circulation. If doubt exists as to whether or not a cooler is overcrowded, the monitoring of internal temperatures of carcasses should be initiated, in addition to the monitoring of room

temperatures, in order to determine that the chilling process is achieving acceptable internal temperatures within acceptable time limits for the species.

Carcasses should not be hung in coolers in a manner that permits contact with either the walls, doors or floor. Where hide-on veal carcasses are placed in coolers, contact which might lead to cross contamination with hair must not be permitted. Hog carcasses and pork cuts must not be allowed to come into contact with carcasses or cuts derived from other species. It is preferable that hog carcasses are kept on separate rails if separate pork coolers do not exist. All held carcasses must be placed on rails designated for that purpose. If packaged or unpackaged meat products are stored in coolers they must be positioned so as to be clear of the drippings from carcasses.

In addition to monitoring the positioning of carcasses, the inspector or the examiner should examine a sample of carcasses in cooler rooms(s) for dressing defects, such as manure and hair contamination which become more readily visible as the carcasses chill. The lighting, (illumination intensity) in cooler rooms shall be sufficient (Refer to Part 4, section 4.3.14 for specifications), to perform the monitoring task. Should the reinspection activity reveal defects, carcasses shall be held or detained with the use of an acceptable tag or form of identification. Plant management shall initiate appropriate actions to correct all defects found, as well as, investigate and implement effective procedures to rectify improper dressing procedures.

11.3.4 Chilling of Offal (Meat and Meat By-Products)

An operator may harvest the hearts, livers, diaphragm, tails, brains, tongues, thymus glands, (meat and meat by-products) during carcass dressing procedures for edible purposes. The harvesting of such meat and meat by-products, shall follow with immediate chilling. Adequately refrigerated rooms must be provided, capable of lowering the internal temperature of offal to 1°C or less, as soon as possible. Equipment designed to promote rapid and thorough chilling, such as racks, shallow trays etc., shall be provided by the operator.

11.3.5 Freezers and Freezing Activities

Freezers, whether blast or holding freezers, should be monitored at pre-determined frequencies with respect to proper maintenance and operation. Since food products stored in freezer rooms are protected, there is less risk of the product being contaminated than in cooler storage rooms. However, the room shall be monitored for broken cartons or accidentally exposed products. Such products are at risk not only to contamination, but also to freezer burn.

To maintain optimum meat quality and prevent deterioration due to microbial growth, the temperature of a holding freezer should be maintained at -18 °C or lower and blast freezer temperatures at -25°C or lower. Temperatures of freezers should be monitored at pre-determined frequencies, either by continuous recording devices or measurement and/or manually recorded.

Good housekeeping in freezer rooms is an important element of product storage. Shelves, racks and wooden, or plastic or metal pallets are used to store meat products off floors. It is important that the aforementioned materials are made of non-toxic components, corrosive resistant and capable of withstanding repeated cleaning without damage. Ice build-up on floors, walls and ceilings may indicate poor air circulation and ineffective operation of the refrigeration system. Should this situation occur, it should not be tolerated. Badly stacked cartons and ice accumulation pose not only

a potential food hazard but may also present an occupational health and safety hazard. Records documenting monitoring tasks, deviation and verification procedures for product in storage must be maintained, together with records for stock rotation, to prevent frozen product remaining in storage for extended periods of time.

11.3.6 Ice

Ice is extensively used in establishments in formulations or other comminuted meat products and particularly in poultry operations. Such ice must be produced from a potable water supply. Ice samples from ice manufactured "in-house" and ice brought in from an outside source shall be subjected to routine testing. *Refer to Part 7, for regulatory requirements on water potability.*

All ice-making and crushing equipment, as well as, ice storage facilities must be closely and carefully monitored for cleanliness and proper maintenance. Ice bins should be carefully checked when empty for metal fragments and damage. Ice should be frequently and carefully examined for the presence of foreign materials. Should the operator purchase ice from an outside supplier, the incoming material shall comply with the company's specification, (i.e., certification of water quality - microbiological results).

All equipment used in handling of ice (shovels, pails, chutes, crushers, etc.) must be constructed of acceptable materials and shall be maintained in a good state of repair and cleanliness.

11.4 Anti Parasitic Treatments

Refer to Appendix A for information and processing approved methods for anti parasitic treatments.

11.5 Refrigeration of Poultry Meat Products

11.5.1 Chilling of Carcasses and Parts

Immediately following evisceration and washing, all poultry carcasses and portions must be chilled to an internal temperature of 4°C or lower, within an acceptable period of time. An exception would be made in the case of poultry carcasses and portions which are intended for immediate cooking within the establishment.

In addition, there is no objection to the practice of packaging poultry carcasses and portions before an internal temperature of 4°C is reached, providing the packaged poultry carcasses and portions are frozen immediately after packaging in order to continue the refrigeration process.

At the discretion of the *Regulatory Authority*, permission may be granted to ship poultry carcasses which have been chilled but have not reached the required internal temperature of 4°C. Permission could be granted where, for instance, carcasses are being transported under refrigeration a short distance to another registered establishment, where chilling will be completed prior to packaging or where the poultry carcasses will be cooked immediately.

11.5.2 Chilling

In chilling, no objection will be made to the addition of common salt to the chilling medium (ice or chill water), provided this is declared on the label of the finished product. The immediate container or package for carcasses, parts or portions so chilled must bear the statement:

"Turkeys (chickens, etc.) chilled in ice with salt added", or words of similar meaning.

11.5.3 Air Chilling

Air chilling can be an efficient chilling method, with the advantage of reducing cross-contamination between birds via the chilling medium. Contact between individual birds should be avoided. The direction e.g. of air flow and the velocity of the air around the product are important for effective heat transfer. The fans for circulating the air must be positioned to provide adequate air circulation, to maintain the relative humidity and prevent condensation.

The operator shall monitor the velocity of the air in order to ensure that sufficient air circulation is provided for chilling carcasses to 4 °C within an acceptable period of time and that air velocity is sufficient to avoid unsanitary conditions such as condensation. The temperature of the air chilling area should be maintained in the range of -2°C to 2°C. It is essential that the chilling area be equipped with a functioning, calibrated thermometer and with an acceptable means of recording temperatures, (i.e., responsible employee monitors temperature of the area and recording same at several times during the day or with the use of a continuous recording device).

The operator shall establish and implement a system to monitor the temperature of birds that have completed the chilling cycle on a time-regulated basis, as well as, monitoring records of the temperature of the final product, to ensure adequate chilling of birds.

11.5.4 Water Chilling

Where continuous chillers are used, it is desirable that poultry carcasses pass through a separate pre-chiller before entering the continuous chill system.

It is required that:

(i) a thermometer be placed at the warmest section of the chilling system and that the temperature at that point not exceed 18°C.

(ii) a sufficient overflow of water is provided in the chilling system to ensure the removal of extraneous materials. Continuous chilling systems are to be provided with a flow-meter, to measure total water used. The volume of the initial water and ice in the chilling system plus subsequent amounts added shall equate to not less than:

-2L per carcass weighing 2.5 kg or less;
-2.75L per carcass weighing between 2.5 kg and 6.5 kg; and
-3.5L per carcass weighing more than 6.5 kg.

Where conventional tank-chilling is used, care must be taken to ensure that:

(i) sufficient overflow of water is provided to ensure the removal of extraneous matter prior to final icing; and the chill tank is not overcrowded, in order to allow poultry carcasses to chill to 4°C in an acceptable length of time; and

(ii) poultry carcasses are not kept in the chilling water for more than 24 hours. If kept in tanks for more than 24 hours, packing in ice with continuous drainage is required; and

(iii) Chill tank water should be maintained between 0 °C and 2 °C for effective chilling.

The adequacy of chilling can only be determined by regular monitoring of temperatures of the birds as they are removed from the chill tank. The use of a probe thermometer to measure deep muscle temperatures is essential. The temperature of the birds removed from the chill tanks must not exceed 4 °C.

11.5.5 Chilling of Giblets

Giblets should be rapidly chilled to 4°C or lower within two hours after evisceration, in order to prevent multiplication of microorganisms. It is unacceptable to accumulate giblets for later chilling.

11.6 Moisture Pick-Up and Retention

It is the responsibility of the operator to establish systems for washing, chilling, and draining that will consistently result in compliance of the regulatory limits. It is also the responsibility of the operator to provide all equipment necessary to conduct moisture tests.

Refer to Appendix B for Moisture Pick-up and Retention requirements.

11.7 Freezing (Poultry Carcasses and Portions)

11.7.1 Blast Freezing

Poultry carcasses and portions thereof are to be frozen to an internal temperature of -18°C or lower, and this shall be accomplished within 24 hours from the time freezing commences. Freezing should commence as soon as possible after packaging. Whenever outside freezing facilities are utilized, packaged poultry shall be kept at a storage temperature of 2°C or lower until freezing commences. The length of time from the commencement of chilling until placement in a freezer should normally not exceed 72 hours. Poultry shall be adequately protected to prevent freezer burn during freezing and freezer storage.

11.7.2 Liquid Freezing

Where liquid immersion or spray freezing is employed, poultry shall be packaged to prevent contact with the refrigerant. Poultry carcasses or portions contaminated with refrigerant are considered adulterated and shall be condemned, except where the contamination with refrigerant is slight and limited to the surface areas. In such cases, the protective bag or wrap shall be immediately removed and the carcass or portions decontaminated in the following manner:

The contaminated carcass or portions are placed in a tank of changing water and soaked to dilute the refrigerant. The carcass or portions are then removed, drained briefly and placed in a second tank of changing water for further dilution, then rinsed in a third tank of changing water. The carcass or portions may now be passed as fit for food, provided that the inspector is satisfied that the refrigerant has been removed. An inspector should submit decontaminated carcasses and portions, from time to time, for laboratory examination to determine the effectiveness of the removal procedures.

An approved colouring agent shall be used in immersion refrigerants to make the detection of leakers easier by operator's as well as consumers.

Colouring agents other than those listed in the "Reference Listing of Accepted Construction Materials, Packaging Materials and Non-Food Chemicals", should be submitted by the manufacturer to the appropriate *Regulatory Authority* .

The following liquid immersion refrigerants have been approved:

< Brine (common salt)
< Calcium chloride
< Propylene glycol

Note, that, neither Sodium Chromate nor Di-chromate are permitted in immersion freezers.

Poultry carcasses may be packaged in either clear or opaque bags for immersion in liquid refrigerant freezers. Operators are to monitor such freezing operations according to the following protocol:

< all packaged carcasses should be verified by a designated plant employee after the shrink tunnel and before the immersion freezer for bag and clip integrity.

< process action, for the purposes of this protocol, is defined as tagging and segregating all products back to the time of the last satisfactory lot test, reinspection of each tagged carcass for evidence of adulteration and/or loss of package integrity, releasing satisfactory packages and the removal of refrigerant and repackaging of satisfactory carcasses.

< operators commence testing at the Normal Inspection Level. Thereafter, subsequent testing for the next shift continues at the same level as occurred at the end of the previous shift except that for shifts ending under process action, operators may elect to test at the Normal Inspection Level for the subsequent shift.

< a unit refers to a bagged poultry carcass.

< Subgroup tests require sample sizes which vary dependant on the production volume and the compliance or inspection level as per ISO Table 2859-1.

< before the start of each shift, regardless of the applicable inspection level, operators must randomly select hourly subgroup test times for each production hour and record these times before product reaches the sampling location.

< samples are to be randomly selected at the exit chute of the immersion freezer.

< each sample should be visually and manually examined. The visual verification will verify the bag integrity, and for opaque bags, a mandatory palpation shall be made to detect soft spots indicative of the presence of coolant liquid.

< inspection staff is to verify the implementation and ongoing application of this protocol (minimum one verification per half shift or at the same frequency as per finished products standards).

The inspection verification will consist of reviewing plant records and once per day, observing one test as performed by the designated plant employee.

< the protocol consists of three (3) inspection levels and is based on ISO table # 2859-1, for an Acceptable Quality Level of 1% at special inspection level # S-3.

The operator shall:

< Normal Inspection Level: conduct 13 unit subgroup tests at preselected random times for line speeds up to 3,200 carcasses per hour. For production ranging from 3,201 to 10,000 carcasses per hour, 20 units per hour should be selected(see Normal Inspection, Code E and F respectively, ISO Table 2589-1).

- if defect(s) are found, see below and the flow chart; if no defects are found, the lot shall be considered acceptable.

- if 10 consecutive lots are found acceptable, than the operator can elect to adopt a reduced inspection level.

< Reduced Inspection Level: conduct five (5) unit subgroup tests at preselected random time for line speeds up to 3,200 carcasses per hour (see Reduced Inspection, Code E, ISO Table 2859-1). For production ranging from 3,201 to 10,000 units per hour, eight (8) units per hour should be selected (Reduced Inspection, Code F, ISO Table 2859-1).

- if defect(s) are found, see below and the flow chart; if no defects are found, the lot shall be considered acceptable.

< Defects for Normal or Reduced Inspection Levels: if the number of defects found is equal to or greater than one, the operator should initiate an immediate retest to eliminate the possibility of a statistical aberration and/or confirm that the lot is not acceptable.

The retest shall be made at the retest inspection level, and Code # G or H (corresponding to the production volume), i.e., require an increased subgroup test sample size as per ISO Table 2589-1.

- if the number of defects found is equal to or less than one, the lot shall be considered acceptable and sampling should return to the previous sampling level, i.e., normal or reduced.

- if the number of defects found on the retest is greater than one, the lot shall be considered not acceptable, i.e., rejected. Adequate corrective measures should be taken on the production line, process action must be initiated immediately and the sample size adjusted to the Tightened Inspection Level (see below and flow chart).

< Tightened Inspection Level: sample size is increased to 20 units for line speeds up to 3,200 (see Code F, Tightened Inspection, ISO table 2589-1) and to 32 carcasses for production rates between 3,201 and 10,000 carcasses per hour (Tightened Inspection, Code G, ISO Table 2589-1).

< if no defects are found than the lot is accepted: individual verifications can be stopped and the monitoring may be adjusted to the normal level.

< if defect(s) are found, the lot shall be rejected, i.e., additional corrective measures should be taken and the individual carcass verifications continued until process action is completed.

< Sample shall continue at the tightened inspection level until a sample is accepted where after monitoring of new production may be adjusted to the normal inspection level.

Further information for this statistical process control is included in ISO Table 2589-1 and the associated flow chart.

Table for sample, sizes and acceptance/rejection levels for poultry carcasses packaged in plastic bags and crust frozen by immersion within liquid refrigerant ISO/2859-1 Single Sampling Plans

	Line Speed[1]	Code Letter	Sample Size[2]	Acceptable Quality Levels[3]	
				Accepted	Rejected
Normal Inspection	0-3,200	E	13	0.00	1
	3,201 - 10,000	F	20	0.00	1
Retest Inspection	0-3,200	G	32	1	2
	3,201 -10,000	H	50	1	2
Reduced Inspection	0-3,200	E	5	0.00	1
	3,201 -10,000	F	8	0.00	1
Tightened Inspection	0-3,200	F	20	0.00	1
	3,201 -10,000	G	32	0.00	1

[1] carcasses/hour
[2] numbers of carcasses or units to be selected
[3] number of defective packages (i.e., containing refrigerant)

11.8 Product Preparation

11.8.1 Thawing Poultry in Water

When ready-to-cook poultry is thawed in water, the thawing practices and procedures shall be such as will prevent the product from becoming adulterated by the absorption of moisture. Such poultry shall be thawed by one of the following methods:

(a) In continuous running tap water of sufficient volume and for such limited time as is necessary for thawing. The thawing medium shall not exceed a temperature of 21°C;

(b) In re-circulated water, maintained at a temperature not in excess of 10°C, for such limited time as is necessary for thawing;

(c) The placing of frozen ready-to-cook poultry into cooking kettles, without prior thawing, is permitted only when a representative sample of the entire lot has been thawed and found to be sound and unadulterated. Thawing practices and procedures shall result in no net gain in weight over the frozen weight, when whole carcasses or parts thereof are thawed for repackaging. Thawed poultry may be held in tanks of crushed ice with continuous drainage, pending further processing or packaging.

(d) Water immersion of poultry carcasses for rehydration, etc.

The plant chilling system may be used for immersing previously chilled poultry carcasses, e.g. to rehydrate or restore bloom or to "soften-up" ice packed carcasses prior to automatic cut-up machines, provided that:

(e) The water temperature does not exceed 4°C;

(f) The average moisture pick up does not exceed 2% and this is confirmed by tests conducted by plant personnel for each lot. The testing will be monitored by inspection staff;

(g) The tank is drained and cleaned prior to use for rehydration; and

(h) Carcasses are not immersed with or after current production.

Where tanks or vats, in which poultry carcasses remain in non-agitated water, are employed for this purpose, the above conditions also apply.

The above conditions are intended to prevent carcass adulteration with excess moisture as well as preventing cross-contamination by food poisoning bacteria, e.g. salmonella and by relatively higher counts of spoilage bacteria between lots of fresh and previously chilled poultry carcasses.

11.9 HACCP SYSTEM (Hazard Analysis and Critical Control Point System)

In order to design and implement food manufacturing processes based on health and safety, the adoption of Hazard Analysis and Critical Control Point (HACCP) principles shall be incorporated into an operator's process control based system, as a systematic and preventative approach to ensure food safety.

The HACCP approach is based on seven principles for identifying hazards in food production, controlling the hazards at critical control points in the process, and verifying that the system is working properly. For a food producer, a safe product depends on critical control points: points in the specific food system where loss of control may result in an unacceptable health risk to the consumer. A hazard is any biological, chemical or physical property that may cause that risk.

Seven basic principles underlie the HACCP System:

4. Identify the hazards and list preventative measures to control them;

5. Determine the critical control points;

3. Establish tolerances at each critical control point;

4. Establish procedures to monitor the critical control points;

5. Establish what corrective action to take in case of a deviation;

6. Establish procedures to verify that the system is working correctly, and;

7. Establish effective record-keeping.

Hazards will vary from one establishment to another because of differences in:

the sources of ingredients,
formulations, method of preparations,
equipment utilization and configuration,
plant layout of rooms and room activities,

ii) the duration of processing and storage,
ii) the experience of plant employees.

It is therefore of the utmost importance that a hazard analysis be conducted on each type of product and manufacturing process; when a new product is being developed, and when any changes occur in raw material specifications, product formulation, method of preparation and processing, packaging, distribution, and intended use of the product.

Hazard Analysis is a five-step process that must consider in each case, biological, physical and chemical hazards:

1. Review incoming material, including ingredients and packaging materials
2. evaluate each step involved in the processing operations
3. observe actual operating practices
4. take accurate measurements, and
5. analyze measurements

Once all the hazards have been identified and analysed, the next stage is to determine the critical control points (CCP's) necessary to control the hazards. A critical control point is any point, step, practice or procedure in a food system where loss of control may result in an unacceptable health risk. For example, a specified heat process, applied for a prescribed time and temperature to destroy bacteria, is a critical control point (CCP). CCP's can include cooking, curing, fermentation, chilling, formulation control and prevention of cross-contamination.

The success of control over hazards depends on the care taken in determining the CCP's, the tolerances that must be met at each one, the monitoring procedures used at each point, and the corrective action taken when there is a deviation at a CCP. A HACCP system is complete when procedures are established to monitor, to correct deviations and to verify that the system is working correctly, together with effective record-keeping.

To meet the requirements of this section, the procedures include:

f) a listing of all potential hazards associated with each step, conducting a hazard analysis, and consider any measures to identify hazards.

g) determination of the critical control points (CCP's) in the process where biological, chemical and physical hazards can be controlled. Although a manufacturer may identify a number of control points in a process to ensure quality of the product, only a limited number of processing steps are critical control points relating to food safety;

h) establishment of critical limits and description of the target levels and tolerances (acceptable operating criteria) for these CCP's which must be met to ensure that each CCP is under control;

i) establishment of a monitoring system to ensure control of CCP's including methods, procedures and frequency of observation, measurement, etc. The methods and frequency of monitoring must be sufficient to provide evidence of the level of compliance of the CCP;

j) establishment of the corrective action to be taken when monitoring indicates that a particular CCP is not under control, that is, when it is outside the acceptable operating criteria that have been established and;

k) establishment of verification procedures. A means of verification that the above system is in place; that the appropriate critical control points have been designated; that they are being effectively and properly monitored and; that appropriate action is taken whenever the critical limits are not being met. This may mean periodic finished product and/or in-line testing, in plant or independent audits or any other means of verification of the system.

l) establish documents concerning all procedures and records appropriate to these principles and their application.

11.10 Refrigeration Exemptions

Refrigeration is one of the most important environmental factors influencing the growth and activity of micro-organisms.

Historically, the more handling involved in the preparation of meat and meat products, the more likelihood of microbial growth, unless procedures and operational controls are in place to minimize biological, chemical and physical hazards from occurring that may affect the products and ultimately create a potential for food borne illnesses. As such, and in order for the operator to process meat products in rooms without refrigeration, certain procedures and operating controls must not only be developed and implemented by the operator, but also verified and maintained. Operators wishing

to process meat products in rooms without refrigeration shall submit product lines and procedures, together with additional supportive programs or analytical results to the appropriate *Regulatory Authority* for acceptance.

As a minimum, operators shall include and address within their submission for approval the following (Section 11.9, HACCP System 1 through 6), together with any additional information required by the appropriate *Regulatory Authority:*

A. The operator has developed and implemented an effective HACCP-based System or Process Control Based System found acceptable by the appropriate Regulatory Authority;

B. The operator has developed *a microbiological program for processed product* to ensure that the processed products comply with the provisions of this Code and any other applicable health and safety requirements;

C. *Any unclean equipment in a non-refrigerated work room that has been used and left for 2 hours or more* shall be disassembled, cleaned, sanitized and inspected prior to reuse;

D. The equipment within the work room, specifically equipment contact surfaces and employee handlers shall not pose a risk of product contamination at any time during operations.

E The *work room* shall be *cleaned and sanitized after each 4 hour period* of continuous work in order to minimize the growth of microorganisms *or the operator implements an approved microbiological sampling program* to ensure continual acceptability of the work environment.

In addition to the above items A through E the following operating conditions and procedures are implemented, verified and maintained by the operator:

i. Meat used in the product was either hot boned immediately prior to processing or previously chilled to an *internal temperature of 4 °C or less*, and

ii. The meat *surface temperature during processing procedures does not exceed 7 °C*; and

iii. In the case of a *cured and non-cured product*, cooking (product must be fully cooked), drying or fermenting of the product *shall start within 4 hours* of the time the product enters a non refrigerated area.

Listed below are types of meat processing procedures/operations that may be performed in rooms not equipped with refrigeration units, providing the operator has complied with the conditions described under Section 11.9., 11.10 of this Part.

1. Cutting/Boning operations.

2. Kitchen/Formulation rooms, (*formulating, stuffing, handling, pre-blending, marination). Providing the meat products enter into the room at relatively low temperatures (4 C) and that the products are intended for further heat processing.*

3. Comminuting operations, (*grinding, emulsifying, dicing, slicing, chopping, etc).*
   Providing meat products enter the room at relatively low temperatures (4 °C) and that the products are intended for further heat processing operations.

4. Processing rooms where, *meat filled pasta, meat filled pastries and continuous line for breaded meat products are performed.*

5. Processing rooms where the *assembly and packaging of entrees, (pizza, t.v. dinners) are performed.*

6. Process Rooms where the *handling and packaging of dry soup mixes, bouillon, broths, concentrations, tallow, lard, suet, edible casing preparation, edible fat and shelf stable dry cured meats* are performed.

11.11 Incoming Material Control

11.11.1 General

An operator of an establishment shall develop, implement and maintain controls for incoming raw meat and meat ingredients, non-meat ingredients, food additives, packaging and chemical/agent materials.

Establishing specifications and effective operational controls of incoming materials received from other facilities or suppliers shall minimize possible physical, chemical or biological hazards in food products. For example, incoming raw meat materials may contain pathogens, hazardous extraneous materials, parasites or an unacceptable microbial load. Ingredient and packaging materials may contain physical or chemical hazards.

11.11.2 Specifications and Control (Meat Products Incoming Materials)

The operator shall develop written specification for raw meat materials that shall include the following:

(i) Incoming meat and meat ingredients are obtained from animals that were healthy at the time of slaughter, (controls may include verification documents of ante-mortem and post-mortem/examination inspection of slaughtered animals from approved establishments. In the case of incoming meat products derived from another country of origin, verification documents that the meat has been inspected and released as domestic product, by the Canadian Food Inspection Agency).

(ii) Specification for acceptable product temperatures upon receipt at the establishment; age of the product or kill date; appearance; odour; microbiological specifications (if required).
Specifications for packaging and labelling requirements; specifications on carrier condition (cleanliness and construction); specified requirements for containerizing materials prior to loading. Purchasing documentation includes a provision for adherence to the written specifications and compliance with the *Food and Drug Act and Regulations.*

The operator monitors and controls incoming meat ingredients for adherence to company's specifications to control physical, chemical and biological hazards where appropriate:

(i) Visually inspects carrier vehicles for cleanliness, construction, unusual odours, incompatible products on vehicles, temperature of vehicle (if applicable).

(ii) Visually inspects meat, meat ingredients or meat products for defects (abscesses, dirt, bone, hair, deterioration, etc.), normal colour and appearance and unusual odours.

(iii) Performs temperature check to verify that the temperature of raw materials comply with company specifications and/or this Code.

Should incoming meat materials not comply with company specifications and/or this Code the operator shall make an assessment on product safety; investigate the cause, and take appropriate corrective action in order to achieve and maintain compliance with the National Meat and Poultry Regulations and Code. Findings, corrective actions shall be documented on applicable incoming material records and maintained on file by the operator for review by an inspector or auditor.

11.11.3 Specifications and Control (Non-Meat Ingredient Incoming Materials)

The operator shall develop written specification for incoming ingredient materials that shall include the following:

(i) Microbial and chemical specifications for ingredients. Specifications may vary depending upon the ingredients and the nature of the hazards (physical, chemical, biological) that may be present. Specifications for temperature control, where appropriate, i.e. starter cultures. Specifications for packaging and labelling requirements and for carrier condition (cleanliness and construction).

The operator monitors and controls incoming ingredients for adherence to company's specifications to control physical, chemical and biological hazards where appropriate:

(ii) Visually inspects carrier vehicles for cleanliness, construction, unusual odours, incompatible products on vehicles, and temperature (if applicable)

(iii) Visually inspects packaging materials or containers for evidence of damage, mice droppings, dirt, dust, etc. Inspects labels to ensure that materials received correspond with company specifications (ingredient name, code/marking/lot numbers).

(iv) May receive with shipment from supplier documentation that incoming lots meet the specifications, e.g. "Certificate of Analysis". The operator shall establish a sampling plan to verify the accuracy of the certificates of analysis at a schedule frequency agreed upon by the inspector. Records shall be maintained on file to establish a profile of adherence to specifications from suppliers.

A new profile shall be established when an operator changes suppliers, purchases ingredients from a new supplier, purchases a new ingredient from an existing supplier or when spot checks by the inspector or auditor do not agree with certificate of analysis.

(v) Purchasing documentation shall include a provision for adherence to written specifications and compliance with the *Food and Drug Act and Regulations.*

Should incoming ingredient materials not comply with company specifications, or the National Meat and Poultry Regulations and Code and/or provisions of the *Food and Drug Act and Regulations*, the operator shall make an assessment on product safety; investigate the cause, and take appropriate action in order to achieve and maintain compliance with the National Meat and Poultry Regulations and Code. Findings, corrective actions shall be documented on applicable incoming material records and maintained on file by the operator for review by an inspector or auditor.

11.11.4 Specifications and Control (Packaging Materials and Chemical Agents -Incoming Materials)

The operator shall develop written specification for packaging materials and chemical agents that shall include the following:

Identification of packaging materials that have direct contact with food products, (including gas mixtures used as a packaging technique, as well as, materials used to generate smoke), together with cleaning chemicals and agents.

The operator shall maintain on file written verification, either letters or approval numbers (dates) as listed in the "Reference Listing of Accepted Construction Materials, Packaging Materials and Non-Food Chemicals", (reference manual published by the Canadian Food Inspection Agency of approved manufacturers).

Written verification and/or documents shall be made available to an inspector or auditor upon request, to ensure that the materials have been evaluated by the appropriate Regulatory Agency and have been found acceptable for use in an establishment.

(i) Establishment of company specifications to suppliers of materials to ensure that the materials are free from contaminants (e.g. chemicals used to treat wood, foreign materials) that could be transmitted to food during manufacturing operations. In addition, gases used for packaging are controlled through establishing specifications (food grade) to ensure that the gas mixture and/or procedures do not transfer contaminants to products.

(ii) Procedures for unloading, and manufacturers recommendation for use, handling and storage instructions. Specifications for packaging and labelling requirements, together with carrier condition, (cleanliness and construction).

The operator monitors and controls incoming materials for adherence to company's specifications to control physical, chemical and biological hazards where appropriate:

(iii) Visually inspects carrier vehicles for cleanliness, construction, unusual odours, temperatures (where applicable) and compatibility of products or items being transported.

(iv) Visually inspects condition of materials for deterioration, damage, product labels, to ensure that materials are free from defects and are clearly and properly labelled as to content and directions for use.

(v) Purchasing documentation includes a provision for adherence to the written specifications and compliance with the *Food and Drug Act and Regulations,* as well as verification that the materials intended for use in an establishment has been approved for such purposes by either the Canadian Food Inspection Agency or Health Canada.

Should incoming materials not comply with company specifications and/or provisions of this Code the operator shall make an assessment on product safety; investigate the cause, and take the appropriate action in order to achieve and maintain compliance.

Findings, corrective actions shall be documented on applicable incoming material records and maintained on file by the operator for review by an inspector or auditor.

11.12 Processing and Meat Standards (Prepared Meat Products)

11.12.1 Time Temperature Control

Inadequate food temperature control is one of the most common causes of food borne illness or food spoilage.

Such controls include time and temperature of cooking, cooling, processing and storage. Effective control systems should be in place to ensure that temperature is controlled at specified points within a manufacturing process where it is critical to the safety and suitability of food products.

Temperature control systems should take into account:

(i) the nature of the meat product, e.g. its water activity, pH and likely initial level and types of microorganism;

(ii) the intended shelf-life of the product;

(iii) the method of packaging and processing; and

(iv) how the product is intended to be used e.g., further cooking/processing or ready to eat.

Temperature recording systems or devices should be checked at pre-determined frequencies and tested for accuracy (calibration frequencies and methods).

Such written control systems should also specify tolerable limits for time and temperature variations for all manufactured meat products.

11.12.2 Microbiological Cross-Contamination

Management control systems described under the control of meat hazards offer an effective way of ensuring the safety and suitability of meat products. Where microbiological, chemical or physical specifications are used in any food control system, such specifications should be based on sound scientific principles and state, where appropriate, monitoring procedures, analytical methods and action limits.

Pathogens can be transferred from one food to another, either by direct contact or by food handlers, or by contact surfaces, or by air. Raw, unprocessed meat should be effectively separated, either physically or by time, from ready to eat foods, with effective intermediate cleaning procedures and where appropriate disinfection.

Access to processing areas may need to be restricted or controlled. Where risks are particular high, access to processing areas should be via a changing facility or suitable vestibule area that can facilitate control.. Depending on the existing plant layout of rooms, it may be necessary to implement additional operational controls, such as, washing or sanitizing of footwear or changing of working apparel. Hand washing upon entering a work room, or at times when hands have been contaminated, or after handling incompatible meat products, or packaging materials, equipment, ingredients, chemicals, and/or after using a washroom facility shall be implemented and strictly monitored by all operators of an establishment.

11.12.3 Physical and Chemical Contamination

Operational systems should be in placed to prevent contamination of meat by foreign substances such as glass, metal fragments from machinery, dust, harmful fumes, unwanted chemicals, rust and flaky paint. In manufacturing and processing activities, it is recommended that suitable detection and screening devices be used in order to minimize physical and chemical contamination. In addition, operators shall develop effective preventative maintenance programs for the premises and the equipment that shall be implemented at specified frequencies in order to maintain the building and equipment in a manner that minimizes the risk of physical and/or chemical contamination to meat and meat products.

11.13 Recipes - Product Formulae

Written formulas provide a basis for assessment of food additives, nutritional requirements, where applicable, food allergens and the details (e.g., time, temperature, pH, humidity, cooling, etc.,), on the scheduled process for a particular manufacturing operation.

Meat products to which a food additive and/or an ingredient has been added to a product's formulation shall be supported with an accurate and current written recipe, for each product processed.

A written recipe or master formulae shall contain all details of the products formulation and method of preparation as follows:

(i) complete identification of specific ingredients and additives (eg., concentrations amounts and description of additive-types used) and;

(ii) a written method of preparation for each processed product, that explains the procedures or methods involved to prepare the product and/or process the product (what is done and how is it done);

(iii) accurate amounts of additives and ingredients used in the product formulae;

(iv) corresponding 'batching formulae', if used in product preparation, has been developed to meet the requirements of the master formulae;

(v) written master formulae's are available to designated employees responsible for preparing and/or processing the product, as well as, inspection staff responsible for verifying compliance;

(vi) identification and location of all corresponding and related records/documents used in the processing of meat products, e.g., incoming material records, stock rotation records, product coding systems, temperature logs, recipes, batch formulae records, monitoring/deviation/verification records, etc.).

11.13.1 Governing Legislative Requirements

Food additives are controlled in accordance with the provisions of the *Food and Drugs Act and Regulations.*

The operator must ensure that the use of food additives in each processed product manufactured at the premises is permitted for use in a particular food and meets the requirements of:

The Food and Drug Act and Regulations; and/or, *The Food Chemical Codex.*

Should there be no requirements in the *Food and Drug Act and Regulations*, the operator must maintain on file written verification that the additives used in the product are FCC (Food Chemical Codex) grade or equivalent.

11.13.2 Food Additives

PURPOSE: Misuse or inappropriate control of food additives could result in biological, chemical and/or physical hazards affecting the meat products being processed.

As a minimum, the operator should ensure that:

(1) all food additives used are permitted for use in the particular food and meet all requirements of applicable sections of the *Food and Drug Regulations* and where there are no requirements in the *Food and Drug Regulations*, the operator verifies that all food additives are *FCC (Food Chemical Codex)* grade or equivalent.

(2) written specifications for all food additives used for each processed product is maintained on file and the operator keeps on file verification from the supplier that all current food additives meet the specifications set out in the *Food and Drugs Regulations* as per B.01.045, ie., specification sheets and clear identification of the grade of the additive package.

(3) the operator can verify and demonstrated through calculations and process records that the food additives are used within the maximum levels specified in the *Food and Drug Regulations.*

11.13.3 Formulation/Label Controls

The operator shall implement and maintain formulation/label controls to prevent the presence of undeclared ingredients or additives in the product. Label information must be accurate in order to inform and protect segments of the population which may be allergic to certain ingredients or food additives.

Where nutritional claims or information are displayed on a label, the manufacturer must have control over the formulation, in order to verify that such declared claims or information on the label is accurate and complies with the applicable requirements of the *Food and Drug Act and Regulations*. Should such controls not be implemented adverse effects for individuals on special diets, (e.g. low sodium or low fat) could be affected.

An operator involved in the manufacturing of prepared products shall establish effective procedures to ensure that labels accurately represent product formulation and composition. The following are examples of such procedures:

< reviews and verifies that each label contains accurate formulation and composition and meets regulatory requirements:

< reviews and verifies that labels received (once printed) contains the accurate formulation and composition for that product being labelled;

< reviews and verifies that existing formulation and compositions have not changed and complies with applicable requirements of the *Food and Drug Act and Regulations* and the information on the label. All substitutions of ingredients/food additives shall necessitate a change in the label.

For products that display nutritional information or claims on a label, the operator must demonstrate control and verification of the following;

< the levels of the ingredients added in the product formulation to ensure they correspond to the displayed information or claims, i.e. batch formulation records;

< ingredient calculations and/or analyses that the nutrient levels present in the product meets stated nutritional information or claims declared on the label;

< nutritional information or claims on the label comply with the requirements of the *Food and Drugs Act and Regulations.*

11.13.4 Monitoring Procedures: *What is Done and How is it Done*

Meat product preparations shall be monitored at pre-determined frequencies in order to ensure that the correct ingredients and additives, ingredient percentages and method of preparation, as well as, processing procedures are being implemented correctly during the manufacturing process. Inaccurate formulations, incorrect ingredients and/or amounts used in a product, or incorrect method of preparations could lead to potential biological and/or chemical hazards.

It is of the utmost importance that the written recipe be complete, accurate, followed and maintained up to date. Documents containing master formulae shall be reviewed at pre-determined frequencies

for verification with current processes and procedures to ensure compliance with the National Meat and Poultry Regulations and Code.

The operator shall visually monitor and verify that:

< a written recipe for each prepared meat product is maintained at the premises;

< the recipe is current, contains a description of all additives and ingredients by their percentages;

< the recipe describes all methods of preparation, including time, temperature, ph, water activity, etc., where applicable;

< the recipe corresponds with batching records that identify and verify the product, the ingredients and additives;

< all additives to the products being processed are in compliance with applicable regulatory requirements;

< process controls, verification procedures and frequencies have been established at pre-determined frequencies to ensure control and safety of the products being processed. All processing and control records are maintained on file at the premises and available to an inspector or auditor upon request.

11.14 Processing and Handling Techniques

11.14.1 Comminuting

Particular attention must be paid to raw materials before commencing the comminuting process. Frozen boneless meat shall be sufficiently tempered in order to remove all packaging material, such as plastic wraps or bags. Meat products must be free of all types of foreign material prior to further processing procedures. It is recommended that the use of a metal detector be utilized for this purpose.

Non-metallic foreign material is more difficult to detect and therefore requires careful visual inspection or screening by trained plant employees.

11.14.2 Meat Grinding/Chopping

The process of grinding meat to be sold as fresh chilled ground meat, shall be performed in rooms equipped with refrigeration, capable of maintaining a temperature of 10 ° C or less during the processing activity. Internal temperature of fresh meat and meat products must not be allowed to rise above 7 °C during handling and assembling.

Grinding/chopping of chilled (4 °C) meat destined for heat processing within 2 hours may be carried out in a non refrigerated room provided the equipment meat contact surfaces do not pose a risk of product non refrigerated room provided the equipment meat contact surfaces do not pose a risk of product contamination.

Any equipment left unused for a period of two hours or more shall be completely (e.g. taken apart) cleaned and sanitized before being re used.

11.14.3 Mechanical Separation

(a) Definition

"Mechanically Separated Meat" means a finely comminuted edible meat product obtained by removing most of the bone and cartilage by a process of mechanical deboning. The resulting product must not contain any bone particle larger than 2 mm in size and no more than 0.027% of calcium for every 1% of protein.

Mechanical deboning process involves the crushing of bones and subsequently the release of bone marrow and bone particles in the final product. The meat product resulting from this process shall be labelled "mechanically separated meat" regardless of the equipment used.

A meat product obtained from a mechanical deboning process which does not involve bone crushing and bone marrow release into the final product may be labelled as "meat".

(b) Raw material

Only bones, dressed carcasses or parts of dressed carcasses from food animals which have been approved for human consumption may be used. Skulls shall not be used.

Note that, kidneys must be removed from poultry carcasses and portions prior to their use as material for mechanical separation.

(c) Treatment of bones prior to mechanical separation

Bones, carcasses or parts of a carcass shall be kept or transported at time/ temperature combinations that will ensure their hygienic acceptability when used for mechanical separation.

Bones shall be:

(i) maintained at 10°C and mechanically separated within 5 hours of boning; or

(ii) refrigerated to 4°C and mechanically separated within 72 hours of boning; or

(iii) refrigerated to -2°C and mechanically separated within 120 hours of boning; or

(iv) immediately placed in a freezer and frozen within 48 hours of boning.

(d) Sampling protocol

In order to ensure proper removal of kidneys and lungs in poultry carcasses and part of carcasses, operators shall monitor as per the following protocol which is based on ISO Table #2859-1at an inspection level of S-4, for a lot or batch size ranging from 1,201 to 10,000 units.

Upon arrival of the product received from another establishment or prior to separation of internally produced product, the operator shall perform a random selection of 20 carcasses/units per combo or a lot of similar size.

< If the number of defects found is equal to or less than 1, the lot shall be considered acceptable for mechanical separation.

< If the number of defects found is equal to or greater than 4, the lot shall be rejected.

< If the number of defects found is between 1 and 4, a second sample of 20 units shall be inspected. The number of defects in the first and second sample shall be accumulated.

< If the cumulative number of defects found is equal to or less than 4, the lot shall be considered acceptable.

< If the cumulative number of defects found is equal to or greater than 5, the lot shall be rejected.

One defect is defined as a carcass or unit with kidney and/or lung. The rejected product must be either reworked and resubmitted for sampling, or returned to the originator, or treated as inedible product.

The presence of kidney is defined as the presence of a part of a lobule or several lobules measuring at least 0.5 cm x 0.5 cm. The presence of lung is defined as apart of lung measuring a minimum of 1 cm x 1 cm or more.

The inspection staff will monitor the compliance to these administrative tolerances using the same protocol. The inspection sampling will take place as deemed necessary based on previous compliance of the operator or of the suppliance. It will also be incorporated in the inspection tasks of the plant. Any defective lots will be brought to the attention of the operator for appropriate action.

(e) Handling of mechanically separated meats

Unless mechanically separated meat is used directly after the separation process as an ingredient of a meat product, it should be:

(i) cooled to a temperature close to 0 °C in conjunction with the deboning process or immediately afterwards;

(ii) cooled to a temperature close to 0 °C in conjunction with the deboning process or immediately afterwards and cured; or

(iii) frozen immediately after the deboning process.

(f) Compositional standards

The calcium content shall not exceed 0.027% for each one percent (1%) of protein. The maximum bone particle size shall not exceed 2 mm.

11.14.4 Cutting and Boning

All carcasses or quarters entering a cutting/boning room or in other words a meat processing room, must be trimmed to remove all visible contamination and dressing defects. The carcasses shall be chilled to an internal temperature of 4 °C or less. Cutting and boning operations shall be carried out in rooms equipped with refrigeration capable of maintaining a maximum temperature of 10 °C or less, (unless otherwise exempted by the *Regulatory Authority as a result of an operator's approved HACCP or Process Control System).*

Employees shall be trained in applications and procedures for cleaning and sanitizing of equipment and rooms and in the proper sanitary maintenance of their equipment, e.g., knives, steels, gloves and aprons. Such equipment shall be stored in designated areas or in cabinets, (ie., metal cages, cabinets constructed of non-corrosive, rust-resistant metal materials) used for that purpose. It is not permitted to store this type of equipment on top of meat or boning tables at any time during operational activities.

In the case of retail cuts, conformation to definition must be monitored. The operator shall develop monitoring tasks to ensure that cutting and/or boning activities provide proper identification of meat cuts and portions in accordance with appropriate regulatory requirements and/or this Code.

11.14.5 Boneless Manufacturing Meat

Boneless manufacturing meat is boneless meat from either cattle, calf, sheep, goat, horse or swine carcasses which includes boneless cuts and trimmings. The boneless meats, should be examined by inspectors or examiners as often as necessary to verify that such meat products are meeting the requirements of this Code.

Inspection of boneless manufacturing meat is performed by inspectors or examiners by using either an acceptable "lot inspection techniques" or "on-line examination procedures".

Inspectors or examiners should determine through monitoring if an establishment's process is resulting in wholesome products. These determinations are made while performing regular inspection duties or tasks.

(1) Definitions

Lot inspection techniques. For the purposes of this section a lot is whichever is the lesser of;

< a shipment or part of a shipment of boneless manufacturing meat derived from a single species destined to a single destination; or

< 4 hours production of boneless manufacturing meat derived from a single species from a single boning line.

Lot Inspection/Examination is an inspection/examination technique in which samples are taken from the entire "lot" of product to determine the products's wholesomeness.

An *On-Line Examination* is an examination technique in which product is sampled from each production line or common source at a specified frequency to determine the ability of the process to produce wholesome product.

2. Procedures

The inspector or an examiner may evaluate, as often as he deems necessary, the records using "on-line" examination procedures for timeliness, completeness and accuracy. If there is evidence that the following actions are being taken by the operator, an inspector or an examiner should not normally require the operator to carry out lot examinations:

- determined through sampling that a rejection limit has been reached;

- initiated the necessary controls on production and shipping;

- taken corrective action on product which has failed boneless meat examination; and

- made the process adjustments necessary to ensure that future lots of such meat will be unadulterated.

3. Sampling and inspection/examination procedures

Sampling plans, methods and criteria for disposition of lots of boneless meat are given in Appendix C.

a) Lot Inspection/Examination

The operator is responsible for grouping product into coded lots acceptable to the inspector or an examiner and for adequately identifying and reconditioning rejected lots.

Each time the boneless meat reinspection task is assigned, the inspector should:

< After a lot is completely assembled, determine its size (in kg), and select indicated sampling plan;
< Randomly select required number of containers from the lot in proportion to different code marks, and remove 5.5 kg sample units from the containers;
< Examine product, classify defects using defect criteria table and determine acceptance or rejection according to sampling plan; and
< Record results.

If lot is rejected:

- After reconditioning, reinspect rejected lot using the next higher sampling plan and double the frequency of monitoring for the rest of the production shift.

b) On-line inspection/examination

The operator of the establishment shall design, document and institute an on-line sampling and examination program for boneless meat at a point close to where the product is placed into containers. Examination results must be retained for a minimum of 12 months.

The minimum sampling size and schedule per boning line should be 15 kg sample size for each 30 minutes of production (random time sampling twice hourly). Inspectors shall be made aware of the schedule on a weekly basis.

The examination program must be approved by an Auditor or an inspector and must be capable of achieving the following results.

< Assure that all boneless meat produced under the program is capable of passing the lot inspection/examination program previously described using the designated sampling plans and defect criteria.

< Reject, hold and recondition product when defects exceed limits.

Prior to approval by the inspector in charge the effectiveness of the program must be evaluated using lot examination to assure that it can meet the above-mentioned criteria.

Each time the boneless meat reinspection task is assigned, the inspector or the examiner should:

< observe carcass cleanliness before boning;
< verify that plant personnel properly judges defects;
< inspect a 15 kg sample unit four times a day or two 15 kg sample units on each visit or product available at time of visit to the establishment;
< if a rejection limit is reached, confirm that all product on hand is reconditioned and reexamined;
< if unacceptable product is passed by plant personnel, enforce product lotting and holding, and insist on lot-by-lot examination under inspectional surveillance until it is demonstrated that on-line examination may resume. A minimum lot examination of the greater of 27272 kg or 2 days' production of boneless product must be carried out before resuming online examination.

It is the responsibility of management to make sure that the inspection legend applied on cuts and carcasses is legible. However, inspectors should monitor the procedure and advise management when it is not satisfactory.

The use of two-inch needle point stamps has proven to be much more effective in reproducing the inspection legend.

11.15 Formulating

(*1) Combining with other ingredients/formulating*

Formulating should be conducted according to the operator’s written recipe and procedures established in accordance with acceptable food manufacturing practices to ensure compliance with

regulatory requirements. Species declaration on the label of the product being formulated, must not be compromised.

(2) Temperature requirements

Formulating of meat products must be carried out in rooms refrigerated to 10 °C or less unless the meat product is fully cooked within 2 hours from entering the non-refrigerated room, or the operator has received permission from the appropriate Regulatory Authority as a result of an acceptable HACCP System.

(3) Rework

This is defined as the inclusion of a prepared meat product into another meat product. It is the responsibility of an operator to ensure that all ingredients and components of the rework material are allowed into the meat product to which they are added. Special attention shall be paid to the list of ingredients of the resulting meat product; all ingredients added either directly or by means of a rework product shall be accurately declared and shall comply with the provisions of the Regulations (Schedules).

(a) Curing aids

It should be noted that the presence of some curing aids may be found in significant amounts in the final product if their presence in the rework was not taken into consideration. In that respect, the level of nitrite/nitrate salts and of phosphates must be recalculated if the amount of rework material added to the formulation is in excess of 10%.

(b) Meat products in edible artificial casings

Sausages in artificial edible casings (e.g. collagen) are allowed as rework material in the preparation of sausages wrapped in artificial edible casings or natural casings, to a limit of 3% in weight of the new meat product. The artificial edible casing does not have to be declared on the label of the product.

(c) Meat products in natural casings

Sausages in natural casings are only allowed as rework material in the preparation of equivalent meat products (i.e. also wrapped in natural casing), to a limit of 3% in weight of the new meat product. When meat products in natural casings are reworked special attention must be paid to the animal species from which the casings were derived in order to verify that labelling requirements are met.

11.16 Curing

Curing is the treatment of meat products with nitrite or nitrate salts or both, and in combination with salt (NaCl) and other curing aids to improve colour, texture and flavour and to prevent or delay undesirable microbial growth and toxin production.

Most cured meat products are subsequently heated, i.e. cooked or smoked (wieners, loaves, bologna, bacon, etc.). The heating process should be sufficient to destroy vegetative forms of pathogens. Heating to 69 ° C or maintaining temperatures above 60 ° C for an adequate period of time generally achieves this purpose. With the exception of shelf stable meat products such as commercially sterile meat products in hermetically sealed containers, fermented, acidified and dried meat products, cured meat products rely on refrigeration for preservation.

It is advisable to conduct microbiological testing of meat products of unknown quality (for example, meat product incoming material specifications), prior to subjecting them to a curing process which does not involve heating.

Use of nitrite and nitrate salts
(Sodium nitrite, potassium nitrite, sodium nitrate, potassium nitrate)

Premixed cures have directions for use listed on the bag or label which, when followed, will produce a food that will not contain nitrate or nitrite in excess of the maximum levels of use prescribed in the *Food and Drugs Act and/or the National Meat and Poultry Regulations and Code.* Premixed cures shall have nitrate/nitrite or both packaged separately from any spice or seasoning.

In the curing of meat products other than side bacon, the maximum input level of sodium nitrite salts is 20 g per l00 kg of meat product, i.e., 200 ppm. In the curing of side bacon, the maximum input level of sodium nitrite salts is l2 g per l00 kg of pork bellies, i.e., l20 ppm

In the production of slow cured meat products, sodium nitrate salt at a maximum input level of 20 g per l00 kg of meat products, i.e., 200 ppm, may be used in addition to the nitrite salts.

In the formulation of a cured meat product, the use of a previously cured meat product as ingredient in excess of 10 % will necessitate recalculation of the nitrite/nitrate input to account for the contribution from those ingredients.

In the production of dry rub cured meat products on racks, the maximum level of use is 62g of sodium nitrite salts and l86 g of nitrate salts per l00 kg of meat product.

For calculation of nitrite/nitrate salt input levels, *Refer to Appendix D.*
For information and requirements on curing aids, *Refer to Appendix D.*

11.17 Pickling

The pickling process is the preservation of meat products by the addition of ingredients and additives that reduce the water activity or lower the pH value of the meat product (e.g., salt and vinegar).

11.18 Cooking and Related Activities

11.18.1 Defrosting or Thawing

This may be performed in either air or water. When meat products are defrosted in water, packaging material shall be removed. Meat products packaged in hermetically sealed leak-proof bags may be

allowed to be defrosted in water without removing the bags. Any product in a bag found leaking shall be thoroughly rinsed with potable water after defrosting. There is often a tendency to attempt a too rapid thaw by placing frozen meat products in a very warm or hot environment. This may lead to problems in that superficial areas may obtain too high temperatures before deeper areas have thawed. As soon as thawing is complete, the product must be maintained at a temperature of 4°C or lower. A problem in this area sometimes occurs, particularly with poultry carcasses, when thawing continues overnight. here water is used, it must not be permitted to become stagnant and a regular exchange should occur. As soon as the required degree of defrosting or thawing is achieved, the water is to be drained off.

11.18.2 Cooking

Cooking temperature/time combination must be adequate for the destruction of all vegetative forms of pathogenic microorganisms and all viable forms of parasites (if alternative acceptable methods, such as Anti parasitic treatments, refer to appendix A, has not been used). All precautions must be taken to avoid recontamination of cooked meat products from any source. Cooking times and temperatures must be monitored by the operator at per-determined frequencies for compliance with regulatory requirements.

In order to achieve proper cooking, the internal temperature of a cooked meat product must be taken at the coldest spot in the cooking device and in the center of the largest piece of meat. It is the operators responsibility to ensure that the minimum internal temperature of the cooked meat product meets the applicable provisions of this Code. When steam is generated, as a result of heat processing treatments, it must be properly vented out of the area and not allowed to permeate into adjoining rooms. The operator shall document internal temperatures of cooked product (selective samples representing each batch or lot) to ensure meat products meet the requirements of this Code. Records shall be maintained on file by the operator and made available to an inspector or auditor upon request. Cooking records shall include at least; time and date, name of product, batch number (if more than one batch), quantity of product, cooking device (if more than one), required internal temperature, internal temperature measured and the responsible employees initial.

11.19 Manufacture of Cooked Corned Beef, Moist Cooked Beef and Roast Beef

(a) Definitions

(i) Roast beef or roasted beef shall be beef prepared in a manner which allows juices to drain away during the application of dry heat or steam.

(ii) Moist cooked beef or cooked corned beef shall be beef prepared in a manner in which the draining away of juices is prevented during the application of heat.

(iii) The term "cooked beef" may be used to describe beef which is cooked in any manner.

(iv) In this context "dry heat" is defined as heat transferred from the source to the product via the medium of air as opposed to a liquid.

(b) Procedures

A potential hazard associated with Salmonella and Clostridium perfringens food poisoning from consumption of pre-cooked rare beef has been identified. In order to avoid incidents of this nature, cooking procedures employed in registered establishments must ensure the destruction of all vegetative forms of these pathogens.

Beef heated to an internal temperature of less than 60°C retains a bright red internal colour (rare beef) that heated to an internal temperature of 60° - 70°C develops a pink internal colour (medium cooked beef); and that heated to an internal temperature of 70° - 80°C develops a grayish-brown colour throughout (well done beef).

The achievement of an internal temperature of 63°C in a meat product will effectively destroy Salmonella and vegetative Clostridium perfringens organisms. These pathogens will be destroyed at lower internal temperatures provided these temperatures are maintained over a longer period of time.

In establishments, pre-cooked beef shall be prepared by a procedure that achieves a minimum internal temperature of 63°C, verified by readings taken with a thermometer having a precision of plus or minus 0.6°C, or shall be prepared by one of the alternative processes detailed under (3), on condition that:

(i) Monitoring equipment capable of measuring within the following limits is provided:

-temperature plus or minus 0.6°C;
-time plus or minus one minute;
-relative humidity (where specified) plus or minus 5%.

(ii) Temperature sensing devices are so placed as to monitor the temperature of the product and the heating environment in the coldest part of the cooking unit.

(iii) Satisfactory records are maintained in regard to time, temperature and humidity for each production lot. The minimum retention time of above said records is 6 months from the date of production.

(iv) Procedures for handling, processing and storing product accompany submissions for label registration.

(v) Any process deviation be brought to the attention of an Inspector at the time of occurrence.

(vi) Establishments physically separate the handling of cooked and raw products to prevent recontamination.

(vii) Uniformity of processing is controlled by restricting the variation in size and weight of individual pieces of raw product to not more than one kilogram, and not more than 5 cm in diameter.

(viii) Chilling begins immediately after the cooking cycle is completed and the internal temperature of the product is 5°C or less within 7½ hours from the initiation of the cooling process.

(c) Cooking schedules for products heated to an internal temperature of less than 63°C.

(i) Alternative Process No. 1 (Preparation of Moist Cooked Beef or Cooked Corned Beef)

The beef is prepared by packaging in an impermeable film prior to heating. The heat treatment shall comply with one of the temperature/time relationships outlined in the following table:

Minimum Internal Temperature/Times

°C	Minutes
62.5	5
62.0	6
61.5	8
60.5	10
60.0	12
59.5	15
59.0	19
58.5	24

(ii) Alternative process No. 2 (Preparation of Roast Beef at a Specified Relative Humidity)

In this process beef is cooked, without being packaged in impermeable film, by the application of dry heat or steam at a specified relative humidity. Although the time/temperature relationships listed in Alternative No. 1 must be respected, a minimum maintenance time is required even at the higher internal temperatures. This time shall be at least one hour in an oven while maintaining a relative humidity of not less than 90%.

(iii) Alternative Process No. 3 (Preparation of Roast Beef without a Specified Relative Humidity)

Processes similar to, but not incorporating the relative humidity requirements of Alternative Process No. 2, may be used for beef cuts which have an individual weight of 4.5 kilograms or more. The time /temperature relationships outlined in Alternative No. 1 must be complied with; however, the oven temperature shall be maintained at 121°C or higher throughout the process.

(d) Cooling Procedures

To prevent growth of heat shocked Clostridium perfringens spores, the moist cooked beef and roast beef shall be cooled quickly, traversing the "danger zone" between 50° and 20°C in less than 2 hours. Cooked corned beef shall be cooled according to this Code.

(e) Dating of Containers

Manufacturers must code or calendar date all containers of cooked beef, roast beef and cooked corned beef.

11.19.1 GUIDELINES FOR COOLING OF HEAT PROCESSED MEAT PRODUCTS

This section is intended to guide both industry and inspection personnel in their evaluation of cooling procedures for heat processed meat and poultry products. It should not be interpreted as a standard but more as a guideline for companies to adopt good manufacturing practices. Its application will contribute to the microbiological safety of such products.

The processor is responsible for ensuring that all heat processed meat and poultry products are handled and chilled so the product is maintained in a wholesome and unadulterated state. A cooling schedule should be developed and filed for every type of heat processed product. Even though each lot does not necessarily have to be monitored, the chilling process shall be monitored to demonstrate that each lot complies with the established cooling schedules. Those records showing adherence to the schedule (product time/temperature) should be maintained on file for a period of at least twelve months beyond the shelf life (best before) of the product and made available to the inspector on request.

The actual section covers all heat processed red meat and poultry products (including pasteurized products) except for the following:

(1) Roast beef and moist cooked beef that should be cooled according to this Code and/or the companies approved cooling process;

(2) Pasteurized meat products/modified atmosphere packaged/refrigerated. These should be refrigerated as per the Canadian Code of Good Manufacturing Practices for Pasteurized/Modified Atmosphere Packaged/Refrigerated Products.

(3) Shelf stable products such as dried, semi-dried products or fully retorted (commercially sterilized) products;

(4) Cooked products shipped hot, i.e., products cooked at 69/C or more and shipped hot and labelled with a statement such as "This product must either be maintained at no less than 60/C up to its consumption or be discarded"; and

(5) Edible rendered/refined products.

Most common food-poisoning bacteria can grow from 0/C up to 54/C; however, their range of rapid growth is from 27/C to 54/C. Thus, it is very important to cool product effectively but it is even more important to cool it quickly through this rapid growth range.

11.19.2 COOLING OF COOKED PRODUCTS

1.1) SLOW COOLING FOR SPECIFIC HEAT PROCESSED CURED PRODUCTS:

These guidelines for slow cooling are applicable for a meat product that is formulated:

1) with a water activity ($_{aW}$) of above 0.92, no less than 120 ppm of nitrite salts and a brine concentration* of 3.5% in the finished product or more; OR

2) with a water activity ($_{aW}$) above than 0.92, no less than 40 ppm of nitrite salts and a brine concentration* of 6% or more in the finished product ; OR

3) with a water activity ($_{aW}$) that is less than or equal to 0.92 at the beginning of the cooling process, with or without nitrite (such as dried products); OR

4) with a water activity ($_{aW}$) of above 0.92, no less than 180 ppm of nitrite salts and a brine concentration* of 2.3 % in the finished product or more.

* Note: Brine concentration in the finished product = $\frac{\text{\% salt}}{\text{\% salt + \% moisture in end product}} \times 100$
Example: If 2.8% of salt in the formulation and the end product has a moisture level of 72%:
Brine concentration $= \frac{(2.8/100)}{(2.8/100)+(72/100)} \times 100 = \frac{0.028}{(0.028+0.72)} \times 100 = \frac{2.8}{0.748} = 3.74\%$

Processors may elect to use the slow cooling schedule for those heat processed cured products previously defined if the product satisfies condition 1 and one of the two choices in condition 2:

1. The internal temperature does not remain between 49/C and 4 /C for more than 20 hours;

2. The cooling process:

   a) causes a continuous drop in product's temperature;
   b) controls the product's surface temperature so that it does not stay between 49/C and 20/C for more than 2 hours.

1.2) RAPID COOLING RATE:

With the exception of those products included in section 1.1, processors should use the following rapid cooling schedule to rapidly and continuously cool all heat processed products, in order to minimize growth of pathogenic bacteria in/on their products,

To cool their products rapidly and continuously, processors should use one of the 2 following alternatives:

< During cooling, product's maximum internal temperature should not remain between 54/C and 27/C for more than 2.0 hours nor between 27/C and 4/C for more than 5 hours (i.e., from 54/C to 4/C in a total of 7.0 hours) except for products listed in paragraph ii) below.

< Products consisting of pieces of intact (not even tenderized muscle) such as turkey breast or pork loin, may be cooled according to section 11.19 b) viii) i.e. within 7.5 hours from the initiation of the cooling process.

1.3) INTERRUPTED COOLING RATE:

The following applies to heat processed product kept in intermediate storage temperatures. Products heat processed to 69/C or more and then cooled from 54/C to 18/C within 2 hours may be held for up to 4 hours if they are:

1. kept below 18/C during the 4 hours, AND
2. protected from post cooking contamination (e.g., covered, wrapped), AND
3. cooled to 4/C within 2 hours immediately at the end of the 4 hour holding period.

For any other chilling process not meeting the previous guidelines (slow, intermediate or rapid cooling rates), submit the cooling process and all relevant data for evaluation to the *Regulatory Authority* who will consult with as necessary with Health Canada, and modify the guidelines accordingly.

2) STORAGE TEMPERATURES:

2.1) COLD STORAGE

It is generally recognized that heat processed meat products should be stored at temperatures less than or equal to 4/C. Refrigerated meat products which have been previously heat processed must not be packaged until chilled to 4/C unless it can be demonstrated that packaging does not interfere with the cooling schedule. For uncured processed products, temperature between -1/C and 1.5/C s most suitable, especially if the storage period is to exceed one week.

2.2) HOT STORAGE TEMPERATURES

If kept hot, heat processed meat products should always be kept at 60/C or above. Product temperature is to be taken and recorded on a regular basis during storage to monitor compliance with these guidelines.

11.20 Smoking

This is achieved by the use of smoke generated from hardwood, hardwood sawdust, or vapourized liquid smoke derived from the aforementioned sources.

Smoke racks (trees) and the interiors of smokehouses must be adequately cleaned to prevent the contamination of meat products with soot. If wood chips or sawdust is used for smoke generation, their storage and use must not pose a sanitary hazard. Smokehouses must be adequately vented.

As smoking of pork products is used to destroy trichinae by means of heat, the temperatures maintained must be carefully monitored. Recording thermometers must be present and properly functioning. The accuracy of these must be checked periodically against a mercury thermometer. Management shall take internal temperatures from the centre of smoked pork products, at the time of removal from the smokehouse, to ensure that temperatures reached are sufficient to destroy trichinae. This procedure is monitored by the inspector who must periodically take internal temperatures for verification purposes (Refer to Appendix A- Antiparasitic Treatment)

11.21 Fermented Meat Products

11.21.1 Definitions

"pH" pH is the negative logarithm of the hydrogen ion or proton concentration. The pH measures acidity or alkalinity on a scale of 0 to 14 with 7 as the neutral point. The lower the pH the higher the acidity.

"aW" The water activity (aW) of a food is the ratio of the water vapour pressure of the food to that of pure water at the same temperature. It is measured at a scale of 0.00 to 1.00 with 0.00 indicating total dryness and 1.00 pure water.

11.21.2 Food Borne Pathogens of Special Concern

All food borne pathogens which have been linked to the consumption of a ready-to-eat meat product can affect fermented meat products. However, a number of organisms are considered to be of particular importance and establishments which manufacture dry or semi-dry fermented meat products must have corresponding controls in place to address each of these hazards. In addition, when aW or pH is a critical factor in the manufacture of a product, each production lot must be tested for these factors (refer to section 11.21.9)

Organism	**Refer to**
Trichinella spiralis	Appendix A - Anti-parasitic Treatment
Enterotoxic *Staphylococcus aureus*	Section 11.21.6 (5)
Verotoxinogenic *E. coli* (e.g., *E. coli O157:H7*) and *Salmonella* in fermented sausages	Section 11.21.7

To be assessed as complete, an operator's HACCP plan for the manufacture of dry or semi-dry fermented meat products must have Critical Control Points in place which addresses these specific organisms according to the requirements set out in this section. Other Food borne pathogens and hazards such as Salmonella and Listeria monocytogenes must also be analysed and addressed in an appropriate manner. Facility and equipment requirements for the manufacture of fermented meat products are outlined in section 11.21.5 must also be met.

11.21.3 Requirements for Shelf Stable Fermented Meat Products

Many different types of manufacturing processes exist for making fermented meat products. Not all of these processes allow the finished product to be stored at ambient temperature.

In order to be considered "shelf-stable" and not require refrigeration, fermented meat products must meet one of the following sets of specific requirements. Fermented products which do not meet these requirements must be labelled with a refrigeration statement.

a) The pH of the finished product is of 4.6 or less, regardless of its final aW
b) The aW of the finished product is 0.85 or less, regardless of its final pH.
c) The pH is 5.3 or lower at the end of the fermentation period;
Note: degree-hours requirements must be met (refer to section 11.21.6 (5) (i));
+ the product contains not less than 100 ppm nitrite or nitrate with salt as calculated at the moment of formulation; and
+ the end product has an aW of 0.90 or lower.

Note: for all fermented meat products which are treated as shelf-stable: To minimize the danger of outgrowth of Clostridium botulinum spores and development of the botulinal toxin in shelf-stable fermented product, nitrite/nitrate shall be added at a minimum level of 100 ppm along with a minimum of 2.5% of salt. The level of nitrate-nitrite should not interfere with the process of fermentation.

Operators who manufacture a fermented meat product which is sold as shelf-stable must have specific controls in place. Refer to section 11.21.9.

Please Note that, with the exception of meat products made by a retort process, non-fermented meat products must have a finished product aW of 0.85 or less in order for the product to be considered shelf-stable. If the process cannot achieve this aW of 0.85 or less, then the product must be labelled with a refrigeration statement.

Operators of establishments who wish to market a meat product without a refrigeration declaration and which does not meet the criteria set out above, must submit a request for the acceptance of their proposal to the Appropriate Regulatory Authority. The submission must be accompanied by detailed recipe, formulation and processing information for the product. Submissions will be evaluated and a letter of assessment indicating if the product can be considered shelf stable will be sent to the operator. This letter of assessment must be made available to the inspector when requested.

11.21.4 Manufacture of Dry and Semi-Dry Fermented Sausages

Dry or semi-dry fermented sausages are prepared by mixing ground meat with various combinations of spices, flavourings, salt, sugar, additives and bacterial cultures. The mixtures, in bulk or after stuffing, are allowed to ferment at different temperatures for varying periods of time. Following fermentation, the product may be smoked and/or dried under controlled conditions of temperature and relative humidity.

1) Types of sausages made with a fermentation process:

There are many ways to classify or define the various types of sausages which are manufactured using a fermentation process. We have retained the following definitions:

(i) Dry Sausages: Dry Sausages are made with chopped or ground meat products that, as a result of bacterial action, or chemical acidification, reach a pH of 5.3 or less at the end of the fermentation period. Subsequently they are dried in a drying room to reduce their aW to 0.90 or less.

(ii) Semi-Dry Sausages: Semi-Dry Sausages are made with chopped or ground meat products that, as a result of bacterial action, or chemical acidification, reach a pH of 5.3 or lower at the end of fermentation. Their aW is reduced during the process but only to values above 0.90. This means they have to be kept refrigerated. In general, the semi-dry sausages are not subsequently dried in a drying room but are packaged soon after the fermentation/heating process is completed. They are generally smoked during the fermentation cycle.

2) Importance of ingredients and raw materials

Because of the complex nature of the fermentation process, it is critical that ingredients are especially well controlled and that the microbiological load of the meat used be as low as possible. The use of mechanically separated meat, or finely textured meat or rework material in the fabrication of fermented meat products is strongly discouraged for this reason. (Refer to Section 11.11.2 for additional requirements)

3) Fermentation and Chemical acidification

(i) Fermentation

The fermentation process involves the growth of lactic acid bacteria in order to acidify the product. Providing raw materials are of excellent microbiological quality, during fermentation the combined effect of curing salts, curing aids and temperature encourages the gradual replacement of the contaminating flora including pathogens (such as *Salmonella*, *Campylobacter* and Staphylococci) by lactobacilli, pediococci and micrococci.

While it was once necessary to rely on environmental conditions for natural fermentation to occur, or to inoculate new batches with a portion of raw mixture from a previous batch (commonly referred to as "back slopping"), these methods were not always successful and represented significant risks. Commercial starter cultures are most often used today as they offer a degree of consistency and safety not found in other methods.

Contamination by pathogenic organisms at the outset of the process may have a critical effect on finished product. Bacterial competition, pH and aW values are important factors in the control of the development or die-off of pathogenic organisms.

Lactobacilli and pediococci are primarily responsible for converting sugars into lactic acid thereby lowering the pH of the meat product. Where nitrate salts are used for curing in slow cured sausages, micrococci present convert nitrate salts to nitrite salts.

Lactobacilli with or without micrococci are components of starter cultures available for use in slow fermentation (25 °C) whereas pediococci with or without micrococci are used in starter cultures for rapid fermentation at higher temperatures (25 °C to 37 °C). Pediococci do not occur in fresh meat products in numbers large enough to be a significant factor in traditional slow fermentation and therefore are only important in meat product fermentation if they are added in starter cultures.

When fermented cured sausages are subjected to an extended drying period, lactobacilli act to significantly reduce the number of undesirable microorganisms including pathogens.

The predominant type of fermenting organism combined with the formulation and process schedule will give a product its characteristic flavour.

(ii) Chemical Acidification

Chemical acidification may be used to help lowering the pH. Citric acid or glucono delta lactone are commonly used for this purpose.

4) pH Measurement

For routine monitoring and verification purposes, accurate measurement electronic pH metres should be employed for testing the pH level of a sample lot meat product during the processing stages. It is most important that the pH measurement instrument be calibrated and maintained in accordance with the manufacturer's recommendation and operational requirements. Records, documenting calibration frequencies and procedures shall be maintained on file by the operator.

5) Drying

Most fermented products are also subject to a drying process which reduces the amount of available water (aW) and thus further limits the survival or growth of pathogenic bacteria and spoilage organisms. This drying takes place during the fermentation process itself or as a separate activity after fermentation has been completed. Heat can also be used during drying.

The physical characteristics of the meat and fat particles (such as particle size, product temperature, etc...) are important in achieving a reduced aW. The meat particles must be of such size that would efficiently allow release of moisture and the cut edges must be without fat smearing. Sharp and efficient grinding or chopping equipment and mixers are necessary.

6) Water activity (aW) measurement:

The growth and metabolism of microorganisms demands the presence of water in available form. The most useful measurement of the availability of water in meat products is water activity (aW). The aW may be reduced by adding solutes (salt, sugar) or removing moisture.

Approximate minimum levels of aW (if considered alone) for growth of:

molds: 0.61 to 0.96
yeasts: 0.62 to 0.90
bacteria: 0.86 to 0.97
Clostridium botulinum: 0.95 to 0.97
Clostridium perfringens: 0.95
Enterobacteriaceae: 0.94 to 0.97
Pseudomonas fluorescens: 0.97
Salmonella: 0.92-0.95
Staphylococcus aureus: 0.86
Trichinella spiralis will survive at an aW of 0.93 but is destroyed at an aW of 0.85 or less.

The above levels are based on the absence of other inhibitory effects such as nitrite, competitive growth, sub-optimum temperatures, etc., which may be present in meat products. In normal conditions, enterotoxin formation by *Staphylococcus aureus* has not been observed at aW below 0.92.

11.21.5 Facility and Equipment Requirements

(a) The following controls shall be in place during the processing:

(1) Temperature in the fermentation, drying and smoking chambers shall be uniform and controlled to prevent any fluctuation that could impact on the safety of the final product.

(2) Fermentation, drying and smoking chambers shall be equipped with a shatter resistant indicating thermometer, (or equivalent), with graduations of 1 °C or less. If mercury thermometers are used, their mercury columns shall be free from separations. All thermometers shall be located such that they can be easily read.

(3) Indicating thermometers shall be checked for accuracy against a standard thermometer at least annually and records shall be kept.

(4) Fermentation and smoking chambers shall be equipped with a recording thermometer (or equivalent) for determining degree/hours calculations in a reliable manner. Recording thermometers are also preferable in drying and aging rooms, but in these rooms, it may be sufficient to read and record the temperature at a pre-determined frequencies.

(5) Drying and aging rooms shall be equipped with humidity recorders in order to prevent uncontrolled fluctuations of the relative humidity. The only alternative to an automatic humidity recorder in these rooms would be for the company to manually monitor and record ambient humidity at pre-determined frequencies during the operating shift with a properly calibrated portable humidity recorder.

(6) The recording thermometer shall be adjusted to agree with the indicating thermometer.

(b) The recording charts shall contain the following information:

< Date and time started - date and time concluded
< Identification of recorder (if more than one used)
< Batch number
< Processing time
< Reading of the temperature of the indicating thermometer and the relative humidity at a specific time within the processing period
< Name of product and batch size
< Record of unusual occurrences (process deviation)
< Signature or initials of operator or designated and fully trained person

Each lot of product shall be monitored during the fermentation process to ensure that a pH of 5.3 or lower is achieved within a specific time. The results of the tests made to that effect must be recorded.

If pH has not reached 5.3 or lower by the specified time, the company shall have in place a pre-established corrective action to deal with these lots.

(c) aW Measurement Devices

When the aW of product is a critical limit set out in the manufacturing process or HACCP plan for a meat product, accurate measurement devices shall be employed. It is most important that the manufacturer's instructions for use, maintenance and calibration of the instrument as well as recommended sample preparation and testing be followed.

11.21.6 Operator Controls on Ingredients and the Manufacturing Process

1) Ingredients and raw materials

The operator must have physical and microbiological specifications for ALL ingredients that may represent a hazard when used in the preparation of a fermented meat product. To ensure that the initial bacterial load is acceptable, microbiological specifications will be maintained for meat, starter culture and, where back slopping is used, the raw batter used for new batches. Records of microbiological tests performed to ensure compliance to determine specifications shall be available to the inspector on request.

2) Inoculum used to begin the fermentation process

(i) If commercial starter cultures are used, they shall have been listed in Appendix E of this chapter. There must be microbiological specifications for the cultures. Commercial cultures shall be stored according to the culture manufacturer's directions.

In order for a new commercial starter culture to be added to the list, details of commercial starter cultures for use in registered establishments must be submitted for review by the Regulatory Authority

(ii) "Back Slopping" is the process of using Inoculum from a previous batch to initiate the fermentation process of a new batch. Because of the risk of transmitting pathogens from the Inoculum to the new batch, strict controls are required when using this technique. Inoculum used for back slopping shall be carefully handled and stored to avoid any contamination. The storage temperature for that Inoculum shall be maintained at 4°C or less and a pH of 5.3 or less. Samples for microbiological analysis shall be taken to ensure that the process is in line with the specifications. The frequency of that sampling is to be adjusted according to compliance to specifications. Each batch of Inoculum which will have a pH > 5.3 shall be analysed to detect at least Staphylococcus aureus. Only on satisfactory results, will this Inoculum be allowed to be used for back slopping.

(iii) "Natural fermentation", is a process which relies on the fermentation process self-initiating without help of commercial starter culture nor Inoculum from a previous batch. Because of the high potential for process failure, this process is not considered acceptable.

3) Chemical acidification

If product is chemically acidified by addition of citric acid, glucono delta lactone or another chemical agent approved for this purpose, controls shall be in place and records kept to ensure that pH of 5.3 or lower is achieved by the conclusion of the process.

4) Controls to ensure the destruction of viable Trichinella spiralis

Refer to Appendix A of this chapter.

5) Controls to address hazards related to enterotoxic Staphylococcus aureus

Certain strains of the bacteria *Staphylococcus aureus* are capable of producing a highly heat stable toxin that causes illness in humans. Above a critical temperature of 15.6/C, *Staphylococcus aureus* multiplication and toxin production can take place. Once a pH of 5.3 is reached, Staphylococcus aureus multiplication and toxin production are stopped. Processors are required to control this hazard by verifying that their product attains a pH of 5.3 within pre-defined degree/hours limits.

As part of their control, processors shall verify the pH of each lot and record the time that it took from the moment of formulation until the pH of the sausage achieved a pH of 5.3 or less. This normally is done when each batch of product leaves the "green room".
When a process has not met degree/hours limits, the lot shall be dealt with in accordance with part (iv) of this section.

(i) Degrees/Hours Defined

A process can be judged acceptable as long as the product consistently reaches a pH of 5.3 using:

1) fewer than 665 degree/hours when the highest fermentation temperature is less than 33°C.
2) fewer than 555 degree/hours when the highest fermentation temperature is between 33°C and 37°C.
3) fewer than 500 degree/hours when the highest fermentation temperature is greater than 37°C.

Degree/Hours are the product of time as measured in hours at a particular temperature multiplied by the "degrees" measured in excess of 15.6°C (the critical temperature at which staphylococcal growth effectively begins). Degree/Hours are calculated for each temperature used in the process. The limitation of the number of degree/hours indicated in points (1), (2) and (3) above depends upon the highest temperature in the fermentation process prior to the time that a pH of 5.3 or less is attained.

Manufacturers are encouraged to measure temperatures at the surface of the product. Where this is not possible, manufacturers should utilize fermentation room temperatures. The table and examples are based on fermentation room temperatures. Temperature and humidity should be uniform throughout the fermentation room.

(ii) Fermentation done at a constant temperature (Constant Temperature Process)

When fermentation is done at a constant temperature, operators can either use the following table or the calculation method (see examples below) for determining degree-hours limits and maximum time for fermentation at a given room temperature.

Degrees-hours limit for the corresponding temperature	Fermentation Room Temperature (○ C)	Maximum Allowed Hours to Achieve a pH of 5,3 (Based on Guideline)
665	20	150
665	22	103.4
665	24	78.9
665	26	63.8
665	28	53.6
665	30	46.2
665	32	40.5
555	33	31.8
555	34	30.1
555	35	28.6
555	36	27.2
555	37	25.9
500	38	22.3
500	40	20.5
500	42	18.9
500	44	17.6
500	46	16.4
500	48	15.4
500	50	14.5

EXAMPLES OF HOW TO USE THE CALCULATION METHOD FOR CONSTANT TEMPERATURE PROCESSES:

Process A: Fermentation room temperature is a constant 26°C. It takes 55 hours for the pH to reach 5.3.

Degrees above 15.6/C: 26 - 15.6 = **10.4**

Hours to reach pH of 5.3: **55**
Degree/Hours calculation: (10.4) x (55) = **572 degree/hours**

The corresponding degree/hours limit (less than 33/C) is 665 degree/hours.

Conclusion: Process A meets the guideline because its degree/hours is less than the limit.

Process B: Fermentation Room temperature is a constant 35/C. It takes 40 hours for the pH to reach 5.3.

Degrees above 15.6/C:	35 - 15.6 =	19.4
Hours to reach pH of 5.3:		40
Degree/Hours calculation:	(19.4) x (40) =	**776 degree/hours**

The corresponding degree/hours limit (between 33 and 37/C) is 555 degree/hours.

Conclusion: Process B does not meet the guideline because its degree/hours exceeds the limit ö hold the product and refer to part (iv) of this section.

(iii) Fermentation done at different temperatures (Variable Temperature Processes)

When the fermentation takes place at various temperatures, each step in the progression is analysed for the number of degree/hours it contributes. The degree/hours limit for the entire fermentation process is based on the highest temperature reached during fermentation.

EXAMPLES OF HOW TO USE THE CALCULATION METHOD FOR VARIABLE TEMPERATURE PROCESSES:

Process C: It takes 35 hours for product to reach a pH of 5.3 or less. Fermentation room temperature is 24/C for the first 10 hours, 30/C for second 10 hours and 35/C for the final 15 hours.

Process C:

Hours	Temperature Degrees °C	Critical Temperature Adjustment °C	Hours	
10	24	24 - 15.6	8.4	84
10	30	30 - 15.6	14.4	144
15	35	35 - 15.6	19.4	291
pH = 5.3			Total	519

The highest temperature reached = 35 °C
The4 corresponding degree /hour limit = 555 (between 33 and 37 °C)

Conclusion: Process C meets the guideline because its degree/hours is less than the limit.

Process D: It takes 38 hours for product to reach a pH of 5.3 or less. Fermentation room temperature is 24 °C for the first 10 hours, 30 °Cfor second 10 hours and 37 °C for the final 18 hours.

Hours	Temperature Degrees °C	Critical Temperature Adjustment °C	Hours	
10	24	24 - 15.6	8.4	84
10	30	30 - 15.6	14.4	144
18	37	37 - 15.6	21.4	385.2
pH = 5.3		Total	613.2	

The highest temperature reached = 37 °C
The corresponding degree/hour limit =555 (between 33 and 37 °C)

Conclusion: Process D does not meet the guidelines because its degree/hours exceeds the limit. Hold the product and refer to part (iv) of this section.

(iv) Disposition of lots which have not met degree/hours limits:

The inspector must be notified of each case where degree/hours limits have been exceeded. Such lots must be held and samples of product submitted for microbiological laboratory examination after the drying period has been completed. Analyses should be done, at least for *Staphylococcus aureus* and its enterotoxin, and for principal pathogens such as *E. coli O157:H7*, *Salmonella*, *Listeria monocytogenes*, etc.

- If the bacteriological evaluation proves that there are fewer than 104 *Staph. aureus* per gram, that neither enterotoxin nor other pathogens are detected, then the product may be sold provided it is labelled as requiring refrigerated storage.

- In the case of an *Staphylococcus aureus* level higher than 104 per gram but there is no enterotoxin present, or if other pathogens are present in very low numbers, the product may be used in the production of compatible cooked product but only if the heating process destroys all of the pathogens present.

In the case where *Staphylococcus aureus* enterotoxin is detected in the product, irrespective of the level of viable *S. aureus* cells, the product shall be destroyed.

11.21.7 INTERIM GUIDELINES FOR THE CONTROL OF VEROTOXINOGENIC *ESCHERICHIA COLI* INCLUDING *E. COLI* O157:H7 IN READY TO EAT FERMENTED SAUSAGES CONTAINING BEEF OR A BEEF PRODUCT AS AN INGREDIENT

11.21.7.1 SCOPE

Raw fermented sausage has recently been implicated in several foodborne outbreaks. Verotoxigenic strains of *Escherichia coli* and in particular *E. coli* O157:H7 has been identified in finished product. Research has found that some methods used to manufacture fermented sausage do not control or eliminate this pathogen from the finished product. These products are considered ready-to-eat and

have from time to time posed a risk to the consumer. Infection with these organism has serious and sometimes fatal consequences and therefore, additional interventions are proposed to protect the public health. To date, outbreaks of *E. coli O157:H7* reported in association with dry/semi-dry fermented sausages have been linked to beef meat ingredients. This guideline describes the additional interventions that are recommended for the production of ready-to-eat fermented sausages containing beef as an ingredient or where there is a risk of cross-contamination from beef. Following appropriate consultation with the industry and consumers groups etc. these guidelines will be developed into a regulation. (Food & Drug Regulations)

In order to suitably control these hazards and prevent incidents of food borne disease, establishments which manufacture fermented sausages are required to use one of the following interventions for the control of verotoxinogenic *E. coli* including *E. coli* O157:H7 and *Salmonella* when they make this type of product.

If an establishment does not follow one of the interventions described, they are automatically considered to be using intervention 3, end product testing. Product may be detained and a Health Risk Assessment requested when an establishment following intervention 3 refuses to do the required testing on the finished product.

1. INTERVENTION 1: Include as part of the manufacture of the sausage, one of the following heat process which is recognized as controlling *E. coli* O157:H7.

Under this intervention, it is not required to test for *E. coli* O157:H7. Time and temperature controls should be documented in the same manner as is required for other similar cooking processes.

Minimum internal temperature maintained during the entire process		Minimum processing time in minutes after the minimum temperature has been reached
(/F)	(/C)	
130	54.4	121
131	55	97
132	55.6	77
133	56.1	62
134	56.7	47
135	57.2	37
136	57.8	32
137	58.4	24
138	58.9	19
139	59.5	15
140	60	12

141	60.6	10
142	61.1	8
143	61.7	6
144	62.2	5
145	62.8	4 [1]

[1] This table is identical to the roast beef cooking table with one exception: the minimum processing time for a minimum internal product temperature of 145/F/62.8/C is 4 minutes instead of "instantaneous". This difference is because the sausage product's smaller size results in a much quicker cooling and decreased cumulative lethality.

2. INTERVENTION 2: Use a manufacturing process (combination of fermentation, heating, holding and/or drying) which has already been scientifically validated to achieve a 5 D reduction of *E. coli* O157:H7.

Manufacturing processes used to make fermented sausages are only considered effective against *E. coli* O157:H7 if it is shown that they reduce the level of E.coli O157:H7 by 5 logs (for example from 100,000 cfu/g to less than 1 cfu/g). This is referred to as a 5D process or a 5 log reduction. The manufacturing process used must be evaluated in a scientific manner consistent with the challenge study recommendations (Annex 1).

Under intervention #2, it is not required to test each lot for *E. coli* O157:H7 or *Salmonella*. The operator shall nevertheless conduct some degree of testing for these organisms as a verification procedure for their process.

The operator must maintain suitable records to demonstrate that all of the critical control points (CCP) for the process have been met (for ex., casing diameter, fermentation room (green room) thermographs, pH at the end of the fermentation step of the process, $_{aW}$, etc.)

The following processes have been scientifically validated as achieving a 5D or greater reduction of *E. coli* O157:H7.

Fermentation chamber temperature		pH at the end of fermentation process	Casing diameter	Subsequent process (dry, hold or cook)	Ref.
/F	/C				
70	21	$5.0	# 55 mm	HEAT (1hr @ 110/F and 6 hrs @ 125/F)	[1]
90	32	#4.6	# 55 mm	HOLD @ 90/F for $6 days	[1]
90	32	#4.6	# 55 mm	HEAT (1hr @ 110/F then 6 hrs @ 125/F)	[1]
90	32	#4.6	56 to 105 mm	HEAT (1hr @100/, 1hr @110/F, 1hr @120/F, then 7hrs @ 125/F)	[1]
90	32	$5.0	56 to 105 mm	HEAT (1hr @100/, 1hr @110/F, 1hr @120/F, then 7hrs @ 125/F)	[1]

96	36	#5.0	# 55 mm	HEAT (128/F internal product temperature x 60 minutes) and DRY (at 55/F and 65% Relative Humidity to a Moisture Protein Ration of # 1.6:1)	[2]
110	43	#4.6	# 55 mm	HOLD @ 110/F for $ 4 days	[1]
110	43	#4.6	56 to 105 mm	HOLD @ 110/F for $ 4 days	[1]
110	43	$5.0	56 to 105 mm	HOLD @ 110/F for $ 7 days	[1]

[1]- Nicholson, R., et al, *Dry fermented sausage and Eshcerichia coli O157:H7.* National Cattlemen's Beef Association, Research Report No. 11-316, Chicago, IL, 1996.

[2]- Hinkens, J.C., et al, *Validation of Pepperoni Processes for Control of Escherichia coli O157:H7*, Journal of Food Protection, Vol. 59, No. 12, 1996, pp. 1260-1266.

3. INTERVENTION 3: Microbiological end-product testing must be done on each production lot and the lot held pending reception of results where the manufacturing process does not correspond to one of the processes set out under intervention 1, 2 , 4 or 5

(a) Definition of "lot": The definition of "lot" for purposes of sampling must be statistically sound and must correspond to product manufactured under the same conditions.

(b) Sampling plan: For each lot, the operator shall take **30** samples of finished product and submit them for analysis. The sample plan must be representative of the lot.

(c) Sample size: Each sample shall consist of at least **25 g** of product. Samples must be taken in accordance to standard microbiological techniques to avoid contamination of product and sampling of intact product packages is strongly recommended. It is unacceptable to take multiple sample from one intact package as this is not considered statistically representative of the lot.

(d) Compositing of samples by the laboratory for analysis: It is acceptable to combine a **maximum of three (3) samples** into a composite for purposes of analysis when testing is done for *E. coli* O157:H7 and *Salmonella*.

(e) Organisms to be tested: At a minimum, each composite sample shall be tested for the presence of *E. coli* O157:H7 and *Salmonella.*

(f) Laboratory requirements: **CAUTION**! - Since *E. coli O157:H7* are pathogenic to humans, the tests should be done in a laboratory that has the proper equipment for containment by personnel trained in handling level 2 pathogens.

(g) Method used: The method used to analyze the end product samples shall be one of the methods listed in Health Canada's Compendium of Analytical Methods, Vol. 3 Health Canada (ISBN 0-921317-17-4).

(h) Reporting of results: Results shall be reported in writing. Results shall be identified to the lot of product being tested and shall include individual results for each test performed, method used, minimum sensitivity of the test used, lot for which these results apply.

(i) Release of product: Product will be held under the control of the operator until the written results of analysis have been reviewed and found acceptable (i.e. negative for the presence of *E. coli* O157:H7 and *Salmonella*).

(j) In case of a positive result for either *E. coli* O157:H7 or *Salmonella*: the entire lot must be held and either submitted to process verified to achieve a minimum 5D reduction or the product must be destroyed. Possible cross-contamination of other lots shall also be assessed.

(k) Keeping of records: Records of test results shall be kept for a minimum of 24 months beyond the release date of the product

(4) INTERVENTION 4: **Implement a HACCP system at the establishment which includes testing of raw meat and batter, and use a manufacturing process (fermentation and holding, heating and/or drying) which has been scientifically validated as achieving at least 2 D reduction of *E. coli* O157:H7.**

To be eligible to use this intervention, the operator must have implemented a HACCP system which meets the requirements of the CFIA's FSEP approach (Related information could be found on CFIA's Web site at http://www.cfia-acia.agr.ca/ english/ppc/HACCP/ HACCP.html). Sampling of raw batter must be done in accordance to the requirements set out in parts (a) to (k) below.

Manufacturing processes used to make fermented sausages are considered partially effective against *E. coli* O157:H7 if they can be shown to achieve between 2D and 5D reduction of *E. coli* O157:H7. The manufacturing process used must be evaluated in a scientific manner consistent with the Challenge Protocol (see Annex 1).

(a) Definition of "lot": The definition of "lot" for purposes of sampling must be statistically sound and must correspond to like production practices. Provided that effective controls for tracing product are in place and all corresponding dry fermented sausage manufacturing processes have been validated as achieving at least a 2D reduction of *E. coli* O157:H7, it would be acceptable to conduct one single series of sampling on batter which may be used thereafter in different sausages.

(b) Sampling plan: For each lot, the operator shall take 15 samples of raw batter and submit them for analysis. The sample plan must be representative of the lot.

(c) Sample size: Each sample shall consist of at least **25 g** of product. Samples must be taken in accordance to standard microbiological techniques to avoid contamination of product. It is unacceptable to take multiple samples from one site as this is not considered statistically representative of the lot.

(d) Compositing of samples by the laboratory for analysis: It is acceptable to combine a maximum of three (3) samples into a composite for purposes of analysis when testing is done for *E. coli* O157:H7 and *Salmonella*.

(e) Organisms to be tested: At a minimum, each composite sample shall be tested for the presence of *E. coli* O157:H7 and *Salmonella.*

(f) Laboratory requirements: **CAUTION**! - Since *E. coli O157:H7* are pathogenic to humans, the tests should be done in a laboratory that has the proper equipment for containment by personnel trained in handling level 2 pathogens.

(g) Method used: The method used to analyze the end product samples shall be one of the methods listed in Health Canada's Compendium of Analytical Methods, Vol. 3, Health Canada (ISBN 0-921317-17-4).

(h) Reporting of results: Results shall be reported in writing. Results shall be identified to the lot of product being tested and shall include individual results for each test performed, method used, minimum sensitivity of the test used, lot for which these results apply.

(i) Release of product: Product will be held under the control of the operator until the written results of analysis have been reviewed and found acceptable (i.e. negative for the presence of *E. coli* O157:H7 and *Salmonella*).

(j) In case of a positive result for either *E. coli* O157:H7 or *Salmonella*: the entire lot must be held and either submitted to a 5D reduction process or be destroyed.

(k) Keeping of records: Records of test results shall be kept for a minimum of 24 months beyond the release date of the product.

(l) The following processes have been scientifically documented as achieving a minimum 2D reduction in *E. coli* O157:H7.

Fermentation chamber temperature		pH at the end of fermentation	Casing diameter	Subsequent process (dry, hold or cook)	Ref.
/F	/C				
70	21	$5.0	56 to 105 mm	HEAT (1hr @ 110/F and 6 hrs @ 125/F)	[1]
90	32	#4.6	56 to 105 mm	HOLD @ 90/F for 7 days then dry	[1]
90	32	$5.0	56 to 105 mm	HOLD @ 90/F for 7 days then dry	[1]
110	43	$5.0	# 55 mm	HOLD @ 110/F for 7 days then dry	[1]
110	43	$5.0	56 to 105 mm	HEAT (1hr @ 110/F and 6 hrs @ 125/F)	[1]

[1]- Nicholson, R., et al, *Dry fermented sausage and Escherichia coli O157:H7.* National Cattlemen's Beef Association, Research Report No. 11-316, Chicago, IL, 1996.

(5) INTERVENTION 5: Use an alternative manufacturing process which is scientifically validated against *E. coli* O157:H7.

The manufacturer may make a request for the evaluation of an alternative manufacturing process by Health Canada, Director, Bureau of Microbial Hazards, Food Directorate, HPB Ottawa (i.e. a 5 D process that differs from those outlined in Intervention 2 or a 2D process with raw batter testing that differs from intervention 4. To allow the process to be evaluated, manufacturers shall use the same challenge protocol that was developed by the USDA and described below under Annex 1 Challenge Protocol. Because of the complex nature of the protocol, it is strongly recommended that the services of an experienced food technology center be retained.

Upon completion of a successful evaluation, the establishment shall be receive a letter of no objection indicating that the process has been evaluated for its ability to control *E. coli* O157:H7 and found acceptable. Until such confirmation is received, the operator will have to manufacture product in accordance to one of the other four interventions outlined above.

Health Risk Assessment when Fermented Sausage is Found Positive for E. coli O157:H7

If fermented sausages containing beef or beef ingredients are manufactured by processes other than those specified in intervention 1, 2 or 4 above and the establishment is not in possession of a letter of no objection, final product should be considered in violation of Section 4 of the Food and Drugs Act and is considered a Health 1 concern. Finding *E. coli* O157:H7 in the final product is considered a Health 1 concern. If *E. coli* O157:H7 is found in raw batter, any ready-to-eat sausages manufactured from this batter must receive a minimum 5D process or the entire batch of batter represented by the testing must be destroyed.

The following is a characterize of a Health 1 health risk:

Health 1

The health hazard identified represents a situation that could cause serious adverse health consequences or death. Appropriate action should be taken against the product to limit or prevent exposure in the population to the product. Such action should ensure that the product is no longer sold and the population does not consume what they have at home (eg. action at the consumer level if the product has been distributed). Follow-up action should ensure that the cause has been determined and appropriate corrective action has been taken to correct the problem.

11.21.8 ANNEX 1

Challenge Protocol for the Evaluation of a Fermented Sausage Manufacturing Process for the Ability to Control *E. coli* O157:H7

1. Biosafety requirements: **CAUTION! - This protocol is a laboratory-based validation procedure that employs cultures that are pathogenic to humans. THE VALIDATION SHOULD NOT BE CONDUCTED WITHIN AN ACTUAL FOOD MANUFACTURING FACILITY.** Work should be conducted in a biosafety level II facility by appropriately trained personnel. Following use, autoclave all inoculated product and sanitize processing equipment. Follow appropriate procedures for the disposal of waste.

2. Types and numbers of strains of *E. coli* O157:H7 to use as an inoculum: at least five (5) strains of *E. coli* O157:H7 should be used including representatives of strains associated with

human illness and strains isolated from meat and poultry products. One isolate from an outbreak associated with a dry fermented sausage product must be included.[i]

3. Methods of production, enumeration and standardization of Inoculum: Individual cultures of each strain should be prepared by inoculating an appropriate growth media, such as Tryptic Soy or
Trypticase Soy broth, supplemented with 1% glucose and incubating for 18 to 24 hours at 37/C to obtain stationary phase cells. The additional glucose is added to ensure that the inoculum is pre-adapted for acid tolerance. Cultures should be grown the day prior to product inoculation with a minimum holding period prior to actual use. Each strain should be centrifuged, washed and resuspended in 0.1% peptone broth. Dilutions of each strain should be made to yield approximately equal numbers of each of the five strains. The five strains should be thoroughly mixed prior to being used as an inoculum. After the mixed working inoculum is prepared, the viable count of the mixture should be determined by direct surface plating on MacConkey sorbitol agar (MSA). Each of the individual strains in the inoculum should contribute about 20 percent of the total inoculum.

4. Size of inoculum to be used: the final concentration of *E. coli* O157:H7 in the meat mixture should be no less than 2.0×10^7 cfu/g of meat mixture. The actual inoculum level in the meat mixture should be confirmed by sampling the inoculated meat mixture immediately after the inoculation using the above media. At this concentration, product can be serially diluted and direct plated without the need for enrichment to recover low levels of inoculum. The initial inoculum level was chosen to allow direct enumeration of at lest a 5 log reduction in the level of the inoculum between the initial count in the meat mixture and the finished product.

5. Method of inoculation to be used: the inoculum must be added to the meat and mixed prior to the addition of the other ingredients or a starter culture to the meat mixture. The use of a non-inhibitory, food grade, green dye added to the inoculum may aid in determining the uniform distribution of inoculum. The following procedure is recommended:

   i. Add inoculum to meats while grinding or chopping the meats to the desired consistency
   ii. Mix in cure (if used), salt and spices.
   iii. Blend in starter culture (if used) near end of mixing cycle.
   iv. Stuff batter into casings.

6. Stuffing product into casings: Inoculated product should be stuffed into casing as usual to approximate normal production procedures. A shorter length may be used as long as the length is approximately twice the diameter of the stuffed casing.

7. Sample size, sampling time, sampling location and number of samples to test: Select two sausage sticks at the end of the drying period (finished product). From each stick selected, cut multiple cross-sectional slices from multiple locations on each stick to a final analytical sample weight of 25 g per stick.

8. Methods of microbial analysis: Blend each of the two 25 gram samples (one per stick) in separate 225 ml portions of buffered peptone water. Serially dilute the homogenates in buffered peptone water and surface plat 0.1ml portions from the dilutions onto MSA plates in duplicate. Count plates after incubation at 42/C overnight. Confirm 5-10 randomly selected colonies by serological and biochemical methods as necessary. Report count per gram of finished product. Report initial inoculum level.

9. Number of replicates: a minimum of three replicates of the study should be performed. Three separate formulation batches can, however, be processed concurrently following stuffing.

Therefore, total number of samples for microbiological analysis =

Time zero (0)	=	2
After fermentation	=	0
During drying	=	0
End drying	=	2
		4
Number of replicates	x	3
Total samples		12

10. Measurement of process parameters used to determine when a product is finished at each stage of production (process control criteria): Duplicate uninoculated samples of the product which are collected after stuffing and at each production stage should be assayed for moisture, fat, protein, salt content, pH, $_{aW}$, and titratable acidity.

Therefore, total number of samples for additional analysis =

Time zero (0)	=	2
After fermentation	=	2
During drying	=	2
End drying	=	2
		8
Number of replicates	x	3
Total samples		24

[i.] Hinkens, J.C., et al, *Validation of Pepperoni Processes for Control of Escherichia coli O157:H7*, Journal of Food Protection, Vol. 59, No. 12, 1996, pp. 1260-1266.

11.21.9 Controls for the aW and pH of Product

aW and pH values are critical for processes used to ensure the control of pathogens in all semi-dry and dry fermented meat products as well as to ensure shelf-stability of certain of these products. aW and pH values may vary greatly between individual production lots. Consequently, if aW or pH value is a identified as a critical factor in the manufacture of dry fermented meat products, each production lot must be tested for aW and/or pH in order to verify that the critical limits are met.

With the exception of products with a pH of 4.6 or less, fermented dry sausages and fermented meat products sold as shelf-stable must have an aW value of 0.90 or less before release. Even though aW measurement is mandatory only for shelf stable products, it is strongly recommended that plant management determine the norm for aW values achieved for each product type they manufacture and for each production line (room). Once this has been established, frequent regular checks should be made.

11.21.10 Inspectional Control

The inspector should regularly review plant management's controls and testing activities, and the results obtained. The inspector should verify if all applicable controls are in place. Plant managements' determination of pH and aW values should be verified, periodically, by observing the operator doing actual aW and pH measurements and by observing the operators calibration activities for aW and pH measuring equipment. Any discrepancy should be checked by repeating the sampling and testing procedures. Any product found in non compliance shall be held pending further evaluation.

When a company is submitting a sample for laboratory examination due to product not meeting pH and aW requirements, the inspector should take a paired sample and submit it to departmental laboratory for bacteriological evaluation. In order to minimize disruption to scheduled monitoring programs, the inspector shall consult with his regional office before the submission of those samples.

11.21.11 Summary of the Control Points Applicable to Dry/Semi-Dry Fermented Meat Products

- Meat Quality
- Microbial specification for ingredients/Regular testing
- Acidification
- Commercial starter cultures/back sloping
- Time/temperature control (degree/hours)
- Indicating thermometer
- Thermometer, verifications
- Recording thermometer, correlation
- Recording charts (temperature - relative humidity)
- Relative humidity control
- Relative humidity recorder in greenrooms and smokehouses (recommended in drying rooms)
- pH monitoring
- Process deviation/ planned corrective action
- aW monitoring
- Nitrate/Nitrite salt levels
- Trichinosis control
- Controls for E. coli O157:H7 and Salmonella in dry and semi-dry fermented sausage

11.21.12 Pasteurization

Food products that are pasteurized prior to or immediately after packaging under modified atmosphere (vacuum packaging, gas flushing) in hermetically sealed containers such as flexible pouches/ plastic trays/bowls/cups and require refrigeration throughout their shelf-life, shall be prepared under strict rules. The
most important groups of products processed in this way are "cooked and assembled" and "sous vide" products.

The requirements applicable to the preparation of this type of product are provided in the "CANADIAN CODE OF RECOMMENDED MANUFACTURING PRACTICES FOR PASTEURISED/MODIFIED ATMOSPHERE PACKAGED/REFRIGERATED FOOD" - March, 1990, produced by the Agrifood Safety Division of the Canadian Food Inspection Agency.

N.B. This code is not intended for the preparation of pasteurized products to which preservatives are added. It is intended only for foods that rely only on refrigeration to ensure their quality and safety.

11.22 Handling of Meat Products Which Have Fallen on the Floor

It is not economically acceptable to trim the entire surface of a beef carcass which has fallen on the floor. At the same time, to merely rinse the carcass off without inspectional control is equally unacceptable from an hygienic viewpoint. Therefore, when designing recommendations which consider both economics and principles of good hygiene, certain assumptions must be made.

These include:

(1) In most cases it is impossible to determine which surfaces of a carcass (or portion) have come into contact with the floor during the fall. Therefore, it is insufficient to trim only that surface which is visibly in contact with the floor.

(2) The majority of non-visible contamination will likely be concentrated in the same area as the visible contamination. Trimming of visible contamination will therefore remove a large amount of the non-visible contamination.

(3) Residual non-visible contamination will be easily removed with water providing that action is taken promptly after the carcass(or portion) has fallen. It is the judgement of the inspector that is required to determine if indeed there are contaminants present at the site of the fall that do not meet this assumption.

(4) The trimming and rinsing procedures will be performed in such a manner that the probability of spreading contamination to underlying tissues, internal structures or non exposed cut surfaces is minimized.

It must be stressed that the following are guidelines produced with the above in mind. The majority of carcasses (or portions) will fall in areas of the plant considered to be a relatively "clean" environment. There remains an obvious need for professional judgement regarding the disposition of carcasses (or portions) falling into grossly contaminated areas or areas where abnormal types of

contaminants exist, e.g. oils, greases, etc. The disposition of these carcasses (or portions) must be left to the discretion of the veterinarian in charge. If salvage of the carcass is not considered practicable, then condemnation may be considered.

The procedure used to handle carcasses or portions which have fallen on the floor should be designed to:
a) remove the visible contamination in an efficient yet sanitary fashion;
b) prevent the spread of contamination to other areas of the carcass or portion;
c) address the problem of non-visible contamination; and
d) take corrective action to prevent further recurrences.

To achieve these objectives, the following general procedure, to be carried out under the supervision of an inspector, has been developed.

(1) The carcass or portion shall be immediately removed from contact with the floor to reduce the potential for further contamination. Dragging of the carcass to the site of rehanging is not acceptable.

(2) All visible contamination shall be removed by trimming. This may necessitate the removal of certain exposed bony portions, e.g. contaminated vertebrae.

(3) After satisfactory removal of visible contamination, the carcass or portion shall be thoroughly rinsed with water.

(4) The site of the fall, the frequency of falls, and the reasons for the falls should be noted. Corrective action, if required should be incorporated as quickly as possible.

It will be permissable to handle carcasses with intact skin, e.g. pork or poultry carcasses, simply by thoroughly rinsing the skin surface with water. Skin contamination which is not removed by rinsing shall be removed by trimming. However, if these carcasses have been opened, e.g. for evisceration and/or splitting, it will be necessary to trim those cut surfaces which are visibly contaminated, followed by a thorough rinsing of both the skin and the cut surfaces. Care should be taken when rinsing the skin that further contamination of the cut surfaces does not occur. Further trimming of the skin may be required to remove any contamination remaining.

11.22.1 Handling of Ready to Eat Meat Products Which Have Fallen on the Floor

The handling of ready-to-eat meat products is very critical because these meats will be eaten by consumers without further cooking, or any other antibacterial treatment. The following general procedure should be followed when dealing with ready-to-eat meat products which have fallen on the floor:

1. In the case of ready-to-eat meats covered by skin:

< wash skin covered surfaces thoroughly with potable water;
< trim all other surfaces completely;

< fully recook the product before allowing it to be sold or reworked.

2. In the case of ready-to-eat meats in casings:

   < if casing is intact and ends sealed - wash and dry;
   < if casing is not intact - wash the casing covered surfaces thoroughly with potable water, remove casing, trim exposed surfaces and fully recook before allowing the product to be sold or reworked.

3. In the case of ready-to-eat meats not covered by skin or a casing:
   < trim all the surfaces completely;
   < fully recook the product or use it for rework in a meat product that will be fully cooked.

A suitable work surface, different from other meat handling surfaces should be used for the above procedure and be sanitized after each use.

If the management decides not to follow the above procedure, product is to be treated as condemned

11.23 Canning

Please refer to Appendix F for section on Canning Process.

DRAFT

INTERIM GUIDELINES FOR THE CONTROL OF VEROTOXINOGENIC ESCHERICHIA COLI INCLUDING *E. COLI* O157:H7 IN READY TO EAT FERMENTED SAUSAGES CONTAINING BEEF OR A BEEF PRODUCT AS AN INGREDIENT

Guideline no. 12
Issued by Food Directorate
Health Protection Branch
Health Canada
February 24, 2000

1 SCOPE

Raw fermented sausage has recently been implicated in several food borne outbreaks. Verotoxigenic strains of *Escherichia coli* and in particular *E. coli* O157:H7 has been identified in finished product. Research has found that some methods used to manufacture fermented sausage do not control or eliminate this pathogen from the finished product. These products are considered ready-to-eat and have from time to time posed a risk to the consumer. Infection with these organism has serious and sometimes fatal consequences and therefore, additional interventions are proposed to protect the public health. To date, outbreaks of *E. coli O157:H7* reported in association with dry/semi-dry fermented sausages have been linked to beef meat ingredients. This guideline describes the additional interventions that are recommended for the production of ready-to-eat fermented sausages containing beef as an ingredient or where there is a risk of cross-contamination from beef. Following appropriate consolation with the industry and consumers groups etc. these guidelines will be developed into a regulation.

2 INTRODUCTION

Raw fermented sausage was found to be the cause of an outbreak of *E. coli* O157:H7 in the US in 1994. In October 1995, it became clear that the *E. coli* strain that was isolated could survive the acidic conditions required for manufacturing of raw fermented sausage. Health Canada took steps to notify the Meat Industry, Agriculture Canada and Regional Directors of Health Protection Branch of this new potential hazard.

In December 1996 and again in September 1998 the Canadian Food Inspection Agency notified dry and semi-dry fermented sausage manufacturers of the results of a US Blue Ribbon Task Force on Raw Fermented Sausage and recommended that establishments adopt one of five interventions proposed by the USDA to address the *E. coli* O157:H7 concern in these types of products.

However, in the spring of 1998, another *Escherichia coli* O157:H7 outbreak was traced to a naturally fermented Genoa Salami product manufactured by a registered establishment in Ontario. As part of the follow-up to this outbreak the natural fermentation process was identified as a “high risk” process and a survey was proposed to identify other manufacturers that were using similar high risk processes. The survey was to include a thorough review of the manufacturing process and were appropriate samples of the final product were to be taken for microbial analysis.

Due to resource limitations higher priority activities the survey was never completed. Again in November 1999, another *E. c*oli O157:H7 outbreak in Western Canada was traced to a similar type of raw, fermented, Hungarian-style sausage. Over 150 people became sick and at least five developed hemolytic uremic syndrom. In the investigation that followed this outbreak it became clear that the interventions previously recommended to improve

the safety of dry and semi-dry fermented sausages were not being followed in some establishments. As a result regulatory action is being taken to address these concerns. It is our hope that this action will result in an improvement of the safety of these types of products and that it will establish equivalent requirements for registered and non-registered establishments.

3 Guidance for the Safe Manufacturing of Fermented meat products

3.1 Introduction

The Canadian Food Inspection Agency's Meat Hygiene Manual of Procedures (Chapter 4 section 10) provides a summary of pertinent information for the safe manufacturing of fermented meat products. This section includes a discussion of the criteria used to assess different types of sausage (i.e. dry, semi-dry, shelf-stable) based pH and the water activity levels in the final product and pathogens of concern. The need for quality raw materials and ingredients (i.e. by continuous monitoring) is stressed as well as the need to demonstrate control over the fermentation production process such as degree-hour measurements. This document spells out the requirements for facility and equipment, and the manufacturing controls and specifications for ingredients that are required for federally registered establishments (Chapter 4.10.c and d). These sections are useful in for the inspection of registered and non-registered manufactures of ready-to-eat fermented meat.

3.2 Requirements for Non Fermented Sausage

Please note that, with the exception of meat products made by a retort process, shelf-stable <u>non-fermented</u> meat products must have a finished product water activity (a_w) of 0.85 or less or a pH of 4.6 or less. If the final water activity of a non-fermented sausage product exceed 0.85 or the pH is higher than 4.6, it should be stored under refrigeration and be labelled appropriately (i.e. "Keep Refrigerated")

4.0 Controls to address hazards related to verotoxinogenic *E. coli* (e.g., *E. coli* O157:H7) and Salmonella in fermented sausages

In order to suitably control these hazards and prevent incidents of food borne disease, establishments which manufacture fermented sausages are required to use one of the following interventions for the control of verotoxinogenic *E. coli* including *E. coli* O157:H7 and Salmonella when they make this type of product.

If an establishment does not follow one of the interventions described, they are automatically considered to be using intervention 3, end product testing. Product may be detained and a Health Risk Assessment requested when an establishment following intervention 3 refuses to do the required testing on the finished product.

4.1 Intervention 1: **Include as part of the manufacture of the sausage, one of the following heat process which is recognized as controlling *E. coli* O157:H7.**

Under this intervention, it is not required to test for *E. coli* O157:H7. Time and temperature controls should be documented in the same manner as is required for other similar cooking processes.

Minimum internal temperature maintained during the entire process		Minimum processing time in minutes after the minimum temperature has been reached
(/F)	(/C)	
130	54.4	121
131	55	97
132	55.6	77
133	56.1	62
134	56.7	47
135	57.2	37
136	57.8	32
137	58.4	24
138	58.9	19
139	59.5	15
140	60	12
141	60.6	10
142	61.1	8
143	61.7	6
144	62.2	5
145	62.8	4 [1]

[1] This table is identical to the roast beef cooking table with one exception: the minimum processing time for a minimum internal product temperature of 145/F/62.8/C is 4 minutes instead of “instantaneous”. This difference is because the sausage product’s smaller size results in a much quicker cooling and decreased cumulative lethality.

4.2 Intervention 2: **Use a manufacturing process (combination of fermentation, heating, holding and/or drying) which has already been scientifically validated to achieve a 5 D reduction of *E. coli* O157:H7.**

Manufacturing processes used to make fermented sausages are only considered effective against *E. coli* O157:H7 if it is shown that they reduce the level of E. coli O157:H7 by 5 logs (for example from 100,000 cfu/g to less than 1 cfu/g). This is referred to as a 5D process or a 5 log reduction. The manufacturing process used must be evaluated in a scientific manner consistent with the challenge study recommendations (Annex 1).

Under intervention #2, it is not required to test each lot for *E. coli* O157:H7 or Salmonella. The operator shall nevertheless conduct some degree of testing for these organisms as a verification procedure for their process.

The operator must maintain suitable records to demonstrate that all of the critical control points (CCP) for the process have been met (for ex., casing diameter, fermentation room (green room) thermographs, pH at the end of the fermentation step of the process, a_w, etc.)

The following processes have been scientifically validated as achieving a 5D or greater reduction of *E. coli* O157:H7.

Ferment-ation chamber temper ature		pH at the end of fermentatio n process	Casing diameter	Subsequent process (dry, hold or cook)	Ref.
/F	/C				
70	21	$5.0	# 55 mm	HEAT (1hr @ 110/F and 6 hrs @ 125/F)	[1]
90	32	#4.6	# 55 mm	HOLD @ 90/F for $6 days	[1]
90	32	#4.6	# 55 mm	HEAT (1hr @ 110/F then 6 hrs @ 125/F)	[1]
90	32	#4.6	56 to 105 mm	HEAT (1hr @100/, 1hr @110/F, 1hr @120/F, then 7hrs @ 125/F)	[1]
90	32	$5.0	56 to 105 mm	HEAT (1hr @100/, 1hr @110/F, 1hr @120/F, then 7hrs @ 125/F)	[1]
96	36	#5.0	# 55 mm	HEAT (128/F internal product temperature x 60 minutes) and DRY (at 55/F and 65% Relative Humidity to a Moisture Protein Ration of # 1.6:1)	[2]
110	43	#4.6	# 55 mm	HOLD @ 110/F for $ 4 days	[1]
110	43	#4.6	56 to 105 mm	HOLD @ 110/F for $ 4 days	[1]
110	43	$5.0	56 to 105 mm	HOLD @ 110/F for $ 7 days	[1]

[1]- Nicholson, R., et al, *Dry fermented sausage and Escherichia coli O157:H7.* National Cattlemen's Beef Association, Research Report No. 11-316, Chicago, IL, 1996.
[2]- Hinkens, J.C., et al, *Validation of Pepperoni Processes for Control of Escherichia coli O157:H7*, Journal of Food Protection, Vol. 59, No. 12, 1996, pp. 1260-1266.

4.3 Intervention 3: Microbiological end-product testing must be done on each production lot and the lot held pending reception of results where the manufacturing process does not correspond to one of the processes set out under intervention 1, 2 , 4 or 5

(a) Definition of "lot": The definition of "lot" for purposes of sampling must be statistically sound and must correspond to product manufactured under the same conditions.

(b) Sampling plan: For each lot, the operator shall take **30** samples of finished product and submit them for analysis. The sample plan must be representative of the lot.

(c) Sample size: Each sample shall consist of at least **25 g** of product. Samples must be taken in accordance to standard microbiological techniques to avoid contamination of product and sampling of intact product packages is strongly recommended. It is unacceptable to take multiple sample from one intact package as this is not considered statistically representative of the lot.

(d) Compositing of samples by the laboratory for analysis: It is acceptable to combine a **maximum of three (3) samples** into a composite for purposes of analysis when testing is done for *E. coli* O157:H7 and *Salmonella*.

(e) Organisms to be tested: At a minimum, each composite sample shall be tested for the presence of *E. coli* O157:H7 and *Salmonella.*

(f) Laboratory requirements: **CAUTION**! - Since *E. coli O157:H7* are pathogenic to humans, the tests should be done in a laboratory that has the proper equipment for containment by personnel trained in handling level 2 pathogens.

(g) Method used: The method used to analyze the end product samples shall be one of the methods listed in Health Canada's Compendium of Analytical Methods, Vol. 3 Health Canada (ISBN 0-921317-17-4).

(h) Reporting of results: Results shall be reported in writing. Results shall be identified to the lot of product being tested and shall include individual results for each test performed, method used, minimum sensitivity of the test used, lot for which these results apply.

(i) Release of product: Product will be held under the control of the operator until the written results of analysis have been reviewed and found acceptable (i.e. negative for the presence of *E. coli* O157:H7 and *Salmonella*).

(j) In case of a positive result for either *E. coli* O157:H7 or *Salmonella*: the entire lot must be held and either submitted to process verified to achieve a minimum 5D reduction or the product must be destroyed. Possible cross-contamination of other lots shall also be assessed.

(k) Keeping of records: Records of test results shall be kept for a minimum of 24 months beyond the release date of the product.

4.4 Intervention 4: **Implement a HACCP system at the establishment which includes testing of raw meat and batter, and use a**

manufacturing process (fermentation and holding, heating and/or drying) which has been scientifically validated as achieving at least 2 D reduction of *E. coli* O157:H7.

To be eligible to use this intervention, the operator must have implemented a HACCP system which meets the requirements of the CFIA's FSEP approach (Related information could be found on CFIA's Web site at http://www.cfia-acia.agr.ca/ english/ppc/haccp/ haccp.html). Sampling of raw batter must be done in accordance to the requirements set out in parts (a) to (k) below.

Manufacturing processes used to make fermented sausages are considered partially effective against *E. coli* O157:H7 if they can be shown to achieve between 2D and 5D reduction of *E. coli* O157:H7. The manufacturing process used must be evaluated in a scientific manner consistent with the Challenge Protocol (see section Annex 1).

(a) Definition of "lot": The definition of "lot" for purposes of sampling must be statistically sound and must correspond to like production practices. Provided that effective controls for tracing product are in place and all corresponding dry fermented sausage manufacturing processes have been validated as achieving at least a 2D reduction of *E. coli* O157:H7, it would be acceptable to conduct one single series of sampling on batter which may be used thereafter in different sausages.

(b) Sampling plan: For each lot, the operator shall take 15 samples of raw batter and submit them for analysis. The sample plan must be representative of the lot.

(c) Sample size: Each sample shall consist of at least **25 g** of product. Samples must be taken in accordance to standard microbiological techniques to avoid contamination of product. It is unacceptable to take multiple samples from one site as this is not considered statistically representative of the lot.

(d) Compositing of samples by the laboratory for analysis: It is acceptable to combine a **maximum of three (3) samples** into a composite for purposes of analysis when testing is done for *E. coli* O157:H7 and *Salmonella*.

(e) Organisms to be tested: At a minimum, each composite sample shall be tested for the presence of *E. coli* O157:H7 and *Salmonella.*

(f) Laboratory requirements: **CAUTION**! - Since *E. coli O157:H7* are pathogenic to humans, the tests should be done in a laboratory that has the proper equipment for containment by personnel trained in handling level 2 pathogens.

(g) Method used: The method used to analyze the end product samples shall be one of the methods listed in Health Canada's Compendium of Analytical Methods, Vol. 3, Health Canada (ISBN 0-921317-17-4).

(h) Reporting of results: Results shall be reported in writing. Results shall be identified to the lot of product being tested and shall include individual results for each test performed, method used, minimum sensitivity of the test used, lot for which these results apply.

(i) Release of product: Product will be held under the control of the operator until the written results of analysis have been reviewed and found acceptable (i.e. negative for the presence of *E. coli* O157:H7 and *Salmonella*).

(j) In case of a positive result for either *E. coli* O157:H7 or *Salmonella*: the entire lot must be held and either submitted to a 5D reduction process or be destroyed.

(k) Keeping of records: Records of test results shall be kept for a minimum of 24 months beyond the release date of the product.

(l) The following processes have been scientifically documented as achieving a minimum 2D reduction in *E. coli* O157:H7.

Fermentation chamber temperature		pH at the end of fermentation	Casing diameter	Subsequent process (dry, hold or cook)	Ref.
/F	/C				
70	21	$5.0	56 to 105 mm	HEAT (1hr @ 110/F and 6 hrs @ 125/F)	[1]
90	32	#4.6	56 to 105 mm	HOLD @ 90/F for 7 days then dry	[1]
90	32	$5.0	56 to 105 mm	HOLD @ 90/F for 7 days then dry	[1]
110	43	$5.0	# 55 mm	HOLD @ 110/F for 7 days then dry	[1]
110	43	$5.0	56 to 105 mm	HEAT (1hr @ 110/F and 6 hrs @ 125/F)	[1]

[1]- Nicholson, R., et al, *Dry fermented sausage and Escherichia coli O157:H7.* National Cattlemen's Beef Association, Research Report No. 11-316, Chicago, IL, 1996.

4.5 Intervention 5: Use an alternative manufacturing process which is scientifically validated against *E. coli* O157:H7.

The manufacturer may make a request for the evaluation of an alternative manufacturing process by Health Canada, Director, Bureau of Microbial Hazards, Food Directorate, HPB Ottawa (i.e. a 5 D process that differs from those outlined in Intervention 2 or a 2D process with raw batter testing that differs from intervention 4. To allow the process to be evaluated, manufacturers shall use the same challenge protocol that was developed by the USDA and described below under Annex 1 Challenge Protocol. Because of the complex nature of the protocol, it is strongly recommended that the services of an experienced food technology center be retained.

Upon completion of a successful evaluation, the establishment shall be receive a letter of no objection indicating that the process has been evaluated for its ability to control *E. coli* O157:H7 and found acceptable. Until such confirmation is received, the operator will have to manufacture product in accordance to one of the other four interventions outlined above.

Health Risk Assessment when Fermented Sausage is Found Positive for E. coli O157:H7

If fermented sausages containing beef or beef ingredients are manufactured by processes other than those specified in intervention 1, 2 or 4 above and the establishment is not in possession of a letter of no objection, final product should be considered in violation of Section 4 of the Food and Drugs Act and is considered a Health 1 concern. Finding *E. coli* O157:H7 in the final product is considered a Health 1 concern. If *E. coli* O157:H7 is found in raw batter, any ready-to-eat sausages manufactured from this batter must receive a minimum 5D process or the entire batch of batter represented by the testing must be destroyed.

The following is a characterize of a Health 1 health risk:

Health 1 The health hazard identified represents a situation that could cause serious adverse health consequences or death. Appropriate action should be taken against the product to limit or prevent exposure in the population to the product. Such action should ensure that the product is no longer sold and the population does not consume what they have @ home (eg. action @ the consumer level if the product has been distributed). Follow-up action should ensure that the cause has been determined and appropriate corrective action has been taken to correct the problem.

Annex 1

Challenge Protocol for the Evaluation of a Fermented Sausage Manufacturing Process for the Ability to Control *E. coli* O157:H7

1. Biosafety requirements: **CAUTION! - This protocol is a laboratory-based validation procedure that employs cultures that are pathogenic to humans. THE VALIDATION SHOULD NOT BE CONDUCTED WITHIN AN ACTUAL FOOD MANUFACTURING FACILITY.** Work should be conducted in a biosafety level II facility by appropriately trained personnel. Following use, autoclave all inoculated product and sanitize processing equipment. Follow appropriate procedures for the disposal of waste.

2. Types and numbers of strains of *E. coli* O157:H7 to use as an inoculum: at least five (5) strains of *E. coli* O157:H7 should be used including representatives of strains associated with human illness and strains isolated

from meat and poultry products. One isolate from an outbreak associated with a dry fermented sausage product must be included.[1]

3. Methods of production, enumeration and standardization of inoculum: Individual cultures of each strain should be prepared by inoculating an appropriate growth media, such as Tryptic Soy or Trypticase Soy broth, supplemented with 1% glucose and incubating for 18 to 24 hours at 37/C to obtain stationary phase cells. The additional glucose is added to ensure that the inoculum is pre-adapted for acid tolerance. Cultures should be grown the day prior to product inoculation with a minimum holding period prior to actual use. Each strain should be centrifuged, washed and resuspended in 0.1% peptone broth. Dilutions of each strain should be made to yield approximately equal numbers of each of the five strains. The five strains should be thoroughly mixed prior to being used as an inoculum. After the mixed working inoculum is prepared, the viable count of the mixture should be determined by direct surface plating on MacConkey sorbitol agar (MSA). Each of the individual strains in the inoculum should contribute about 20 percent of the total inoculum.

4. Size of inoculum to be used: the final concentration of *E. coli* O157:H7 in the meat mixture should be no less than 2.0×10^7 cfu/g of meat mixture. The actual inoculum level in the meat mixture should be confirmed by sampling the inoculated meat mixture immediately after the inoculation using the above media. At this concentration, product can be serially diluted and direct plated without the need for enrichment to recover low levels of inoculum. The initial inoculum level was chosen to allow direct enumeration of at lest a 5 log reduction in the level of the inoculum between the initial count in the meat mixture and the finished product.

5. Method of inoculation to be used: the inoculum must be added to the meat and mixed prior to the addition of the other ingredients or a starter culture to the meat mixture. The use of a non-inhibitory, food grade, green dye added to the inoculum may aid in determining the uniform distribution of inoculum. The following procedure is recommended:

i. Add inoculum to meats while grinding or chopping the meats to the desired consistency

ii. Mix in cure (if used), salt and spices.

iii. Blend in starter culture (if used) near end of mixing cycle.

iv. Stuff batter into casings.

6.Stuffing product into casings: Inoculated product should be stuffed into casing as usual to approximate normal production procedures. A shorter length may be used as long as the length is approximately twice the diameter of the stuffed casing.

7.Sample size, sampling time, sampling location and number of samples to test: Select two sausage sticks at the end of the drying period (finished product). From each stick selected, cut multiple cross-sectional slices from multiple locations on each stick to a final analytical sample weight of 25 g per stick.

8. Methods of microbial analysis: Blend each of the two 25 gram samples (one per stick) in separate 225 ml portions of buffered peptone water. Serially dilute the homogenates in buffered peptone water and surface plat 0.1ml portions from the dilutions onto MSA plates in duplicate. Count plates after incubation at 42/C overnight. Confirm 5-10 randomly selected colonies by serological and biochemical methods as necessary. Report count per gram of finished product. Report initial inoculum level.

9.Number of replicates: a minimum of three replicates of the study should be performed. Three separate formulation batches can, however, be processed concurrently following stuffing.

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[1] Hinkens, J.C., et al, *Validation of Pepperoni Processes for Control of Escherichia coli O157:H7*, Journal of Food Protection, Vol. 59, No. 12, 1996, pp. 1260-1266.

Therefore, total number of samples for microbiological analysis =

Time zero (0)	=		2
After fermentation	=		0
During drying	=		0
End drying	=		2
			4
Number of replicates		x	3
Total samples			12

10.Measurement of process parameters used to determine when a product is finished at each stage of production (process control criteria): Duplicate uninoculated samples of the product which are collected after stuffing and at each production stage should be assayed for moisture, fat, protein, salt content, pH, a_w, and titratable acidity.

Therefore, total number of samples for additional analysis =

Time zero (0)	=		2
After fermentation	=		2
During drying	=		2
End drying	=		2
			8
Number of replicates		x	3
Total samples			24

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March 3, 2000

Le 3 mars 2000

To: Federal Provincial Territorial Committee on Food Safety Policy

À: Comité fédéral provincial territorial des politiques sur l'innocuité des aliments

Subject:

Interim Guidelines for the Control of Verotoxinogenic *Escherichia coli* including *E. coli* O157:H7 in Ready-to-eat Fermented Sausages containing Beef or a Beef Product as an Ingredient

Objet:

Lignes directrices provisoires sur le contrôle d'*Escherichia coli* vérotoxinogène, y compris *E. coli* O157:H7 dans le saucisson fermenté et prêt à manger contenant du boeuf ou des produits du boeuf comme ingrédients

Raw fermented sausage has recently been implicated in several foodborne outbreaks. Verotoxigenic strains of *Escherichia coli* and in particular *E. coli* O157:H7 has been identified in finished product. Due to these findings, Health Canada is proposing to take steps to prepare a regulation that would require raw fermented meat manufacturers who use beef or beef products as an ingredient to take additional steps to assure the safety of the final product. However, given the significant public health concern regarding the safety of raw fermented sausage in the Canadian marketplace, Health Canada has proposed an "Interim Guideline for the Manufacturing of Fermented Sausages where Beef or Beef Products are used as Ingredients" to address the safe

On a mis en cause récemment du saucisson fermenté cru dans plusieurs éclosions d'intoxication alimentaire. On a repéré des souches vérotoxinogène d'*Escherichia coli* et en particulier de *E. coli* O157:H7 dans des produits finis. C'est pourquoi Santé Canada propose des mesures afin de produire un règlement qui obligerait les producteurs de viande fermentée crue qui utilisent du bœuf ou des produits du bœuf comme ingrédients à prendre des mesures supplémentaires pour assurer la salubrité du produit final. Compte tenu toutefois des préoccupations soulevées à l'égard de la santé publique par la salubrité du saucisson fermeté cru sur le marché canadien, Santé Canada propose des Lignes directrices provisoires sur la fabrication de saucisson fermenté contenant du bœuf ou

production of these products during the period of the development of the regulatory proposal. This interim guideline will serve to provide guidance to manufacturers and the Canadian Food Inspection Agency (for compliance and enforcement purposes). I am therefore seeking comments from stakeholders regarding the adequacy and appropriateness of the interventions proposed in the interim guideline and whether there is support for formalizing these requirements or some modification of them in a new regulation under Section B of the Food and Drugs Regulations

des produits du bœuf afin d'assurer la salubrité de la production de ces produits pendant la période d'élaboration du projet de règlement. Ces lignes directrices intérimaires guideront les fabricants et l'Agence canadienne d'inspection des aliments (aux fins de la conformité et de l'application de la loi). C'est pourquoi je demande aux intervenants de nous faire-part de leurs commentaires sur les interventions proposées dans les lignes directrices provisoires et d'indiquer si ces mesures sont suffisantes et appropriées. Egalement je vous demande de nous indiquer si vous appuyer l'incorporation des exigences décrites dans un nouveau règlement pris en vertu de la section B du Règlement sur les aliments et drogues.

You will find attached the draft "Interim Guideline for the Manufacturing of Fermented Sausages where Beef or Beef Products are used as Ingredients." Five interventions are outlined in the interim guideline for your review. Please provide your comments to the Bureau of Microbial Hazards of my Directorate at the address listed below by April 5, 2000.

Vous trouverez ci-joint le projet de Lignes directrices provisoires sur la fabrication de saucisson fermenté contenant du bœuf ou des produits du bœuf . Cinq interventions sont décrites en détail dans le projet que vous étudierez. Veuillez faire parvenir vos commentaires au Bureau des dangers microbiens de ma direction, à l'adresse indiquée ci-dessous, au plus tard le 5 avril 2000.

The guideline will be revised and updated as necessary based on comments received. If and when regulatory action is undertaken stakeholders will again be consulted, as required.

À la suite d'une étude des commentaires, les lignes directrices provisoires seront réviser au besoin. Si nous décidons de procéder à l'élaboration d'un règlement, nous consulterons au besoin avec les intervenants.

I look forward to your input and continued participation in our efforts to address this important public health issue.

J'attends avec impatience votre contribution et votre participation continue aux efforts que nous déployons pour régler cet important problème de santé publique.

(original signed by / signé originalement par)
Marc Le Maguer, Ph.D., P.Eng
Director General/Directeur général
Food Directorate/Direction des aliments

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APPENDIX A

ANTI-PARASITIC TREATMENT

APPENDIX - A
ANTI-PARASITIC TREATMENT

Part 11 - PROCESSING AND MEAT STANDARDS

Section 11.4 - Of the National Meat & Poultry Code - Anti Parasitic Treatments

11.4 Anti Parasitic Treatments

Trichinella spiralis (parasite)

Pork products or pork meat products containing striated muscle, (excluding exempted products), which are customarily eaten without further cooking or which have the appearance of a cooked meat product, shall be subject to cooking, freezing, curing or another approved procedure in order to destroy all live *Trichinella.*

11.4.1 General Requirements and Information

(1) Carcasses Affected with *Cysticercus* (parasite)

Carcasses of cattle and sheep showing a slight infestation, as a result of post mortem procedures may be
passed for food, providing the following is completed:

(a) the lesions of Cysticercus bovis (beef) and Cysticercus ovis (sheep) and the surrounding tissues are removed and condemned; and

(b) the carcass or meat derived from the carcass affected by Cysticercus bovis is held in a freezer under inspectional control. The temperature shall not exceed -10 °C and be maintained for not less that 10 days; or

(c) the meat products mentioned in item (B) are heated throughout to a temperature of at least 60 °C. The heat processing of the affected products shall be monitored by an inspector and corresponding records shall be completed and maintained by the operator.

(2) Carcasses Affected with *Trichinella Spiralis* (parasite)

Products to be treated

Pork products (striated muscle) or meat products containing striated muscle, which are customarily Eaten without further cooking or which have the appearance of a cooked meat product, shall be subjected to the following treatments to ensure the destruction of all live *Trichinella*:

< cooking process,
< freezing process (activity),
< curing process,
< or another regulatory approved process procedure(s) to ensure the destruction of all live *Trichinella*.

Exempted products

All forms of fresh pork containing striated muscle, including fresh unsmoked sausage containing pork muscle tissue, and pork products designated as side bacon, Wiltshire bacon or smoked pork jowls are exempted from the above mentioned treatment processes.

Freezer rooms, smokehouses or other cooking vessels, and any other room or device that is used for the purpose of destroying live *Trichinella* in pork or pork products, shall be equipped with accurate automatic devices that continuously record time and temperature.

Time/temperature recorders and thermometers shall be tested for accuracy against a known standard thermometer and clock. The tests shall be performed prior to installation and at least once a year or more frequently as may be necessary to ensure their accuracy. The operator shall maintain a dated record of such tests, together with the person or company performing the calibration test.

In addition, the operator shall maintain current and accurate records which documents all parameters required for process control as a result of heating or curing methods for the destruction of *Trichinella*, for example:

< identify process treatment (heating, curing)
< processing date
< lot identification
< time/temperature records
< % of salt
< casing diameter
< critical limits (refer to Tables located within this section)
< identification of measurement used to confirm critical limit
< deviations
< corrective actions (include disposition of product)
< verification
< signature of person monitoring and verifying process treatment

All control records shall be verified at pre-determined frequencies and maintained at the establishment for at *least one year or for the duration of the shelf life of the product if the latter is greater than one year.* In the case of freezing method being used, the inspector shall maintain freezing log books. Curing and heating records shall be available to the inspector or auditor upon request.

11.4.2 (A) Heating Method

All parts of the pork muscle tissue shall be heated according to one of the time/temperature combinations listed in table 11.4.2 (A).

Table 11.4.2 (A)
Thermal treatments to ensure the destruction of *Trichinella in Pork Meat*

Minimal Internal Temperature (°C)	Minimum Time [1]
49	21 Hours
50	9.5 Hours
52	4.5 Hours
53	2.0 Hours
54	1.0 Hours
55	30 Minutes
56	15 Minutes
57	6 Minutes
58	3 Minutes
59	2 Minutes
60	1 Minute [2]
62	1 Minute [2]
63	Instant [2]

1 - The time to raise internal product temperature from 15 ° C to 59 ° C shall not exceed 2 hours unless the product is cured or fermented.

2 - Time, when in combination with internal product Temperatures of 59 °C to 62 °C, does not need to be monitored if the product's minimum thickness exceeds 5.1 cm and refrigeration of the product does not begin within 5 minutes of attaining 59 °C.

All parts of the pork product shall be properly heated. It is important that each piece of sausage, ham, and other product tested by heating in water be kept entirely submerged throughout the heating period; and that the largest pieces in a lot, the innermost links of bunched sausage or other massed articles, and those pieces in the coolest part of a heating vessel, compartment or cooking vat be included in the temperature test.

Temperature monitoring shall be conducted at the centre of the largest pieces and at the coldest spot of the vat, heating cabinet or smokehouse.

The operator shall complete and maintain accurate records of their monitoring procedures, including results, process deviations and corrective actions. Records shall be verified at pre-determined frequencies by both the company and the inspector or auditor.

11.4.3 (B) Freezing Method(s)

All parts of the pork muscle tissue shall receive freezing treatment in accordance with one of the time/temperature combinations listed in tables 11.4.3 (B) Tables 1 to 3.

Freezing Method # 1

When this method is used, pork striated muscle or products containing striated muscle tissue, after preparatory chilling to a temperature of 4 °C or less, shall be kept frozen at the indicated temperature for an uninterrupted length of time equal to the one specified in the following table:

Table 11.4.3 (B) #1
Freezing method #1 to ensure the destruction of *Trichinella* (Temperature -25 °C)

Group 1 Pork products with a maximum thickness of 25 cm	10 days
Group 2 Pork products with thickness between 25 - 50 cm	20 days

Prior to commencement of freezing process, all insulating packaging materials shall be removed. Boxes shall be stacked in a manner that facilitates air circulation and that permits product to reach the freezing room temperature as quickly as possible.

Freezing time calculation begins only from the moment the freezer's temperature reaches the specified value. In cases where the freezer temperature exceeds the specified maximum temperature indicated in the Table, the operator shall either use a different time-temperature Table which allows for the higher temperature or shall restart the counting of the number of uninterrupted freezing days from the moment that the freezer temperature returns below the specified maximum.

Freezing Method # 2

When this method is used, pork striated muscle or products containing striated muscle tissue, after preparatory chilling to a temperature of 4 °C or less, shall be kept frozen at the indicated temperature for an uninterrupted length of time equal to the one specified in the following table:

Table 11.4.3. (B) #2
Freezing Method #2 to ensure destruction of *Trichinella*

Freezer Temperature	Minimum Number of Days - ---	(Uninterrupted)
(°C)	Group 1	Group 2
-15	20	30
-23	10	-
-25	-	20
-29	6	12

group 1: 15 cm thickness or less
group 2: 15 to 50 cm thickness

Prior to commencement of freezing process, all insulating packaging materials shall be removed. Boxes shall be stacked in a manner that facilitates air circulation and that permits product to reach the freezing room temperature as quickly as possible.

Freezing time calculation begins only from the moment the freezer's temperature reaches the specified value. In cases where the freezer temperature exceeds the specified maximum temperature indicated in the Table, the operator shall either use a different time-temperature Table which allows for the higher temperature or shall restart the counting of the number of uninterrupted freezing days from the moment that the freezer temperature returns below the specified maximum.

Freezing Method # 3:

Freezing method #3 provides requirements for products containing pork striated muscle treated to destroy *Trichinella* by means of commercial freeze drying or controlled freezing.

Product brought in already frozen shall be treated with one of the time/product internal temperature combinations specified in the following Table (Table # 3). The internal temperature for each lot shall be monitored by a thermocouple placed in the centre of the thickest piece of meat and in the warmest location of the freezer (not close to cooling equipment). The temperature shall be measured with properly calibrated thermoelectric instruments (recording thermometers) and continuously recorded. The recording charts shall include all pertinent information:

< date of process method
< description of processing method (freezing method #3)
< the lot number
< description of product
< number of boxes
< date in and date out
< signature of inspector

Table 11.4.3 (B) #3
Freezing Method #3 to ensure destruction of *Trichinella*

Product Internal Temperature (°C)	Minimum Time (hours)
-18	106
-21	82
-23.5	63
-26	48
-29	35
-32	22
-35	8
-37	½

Temperature when measured in degrees Celsius, shall be measured to the next lowest tenth of a degree °C or, in the case of temperature measuring devices unable to attain such a degree of accuracy, to the next lowest degree °C. For example, if a thermometer is not accurate enough to read - 23.5 °C, the meat shall be frozen to - 24°C.

Freezing Method # 4

For methods #1 and # 2, the control of the freezing temperature is accomplished by monitoring the freezer's ambient temperature. For method #3, the same control is exerted through the use of a thermocouple in the centre of the warmest piece of meat.

A fourth method has been found acceptable. This method is based on both types of controls to ensure the destruction of trichina.

This method is done in two steps:

1. *First step:*

The purpose of the first step is to ensure that the temperature of all products of the lot to be treated has attained a temperature equilibrium with the freezer temperature. For each lot, the internal temperature is to be monitored by a thermocouple placed in the centre of the thickest piece of meat and in the warmest location of the freezer. As soon as the product is brought into the freezer, a thermocouple is placed at the centre of the warmest box of the lot. This box is then placed at the centre of the largest pallet. The temperature shall then be measured with properly calibrated thermoelectric instruments (recording thermometers) and continuously recorded until product temperature at the centre of this box is the same as the freezer's ambient temperature.

2. *Second step:*

At this time, the thermocouple may be removed. The freezing time calculation may begin. The treated products shall be kept frozen at the indicated temperature for an uninterrupted length of time equal or longer to the one specified in Tables # 1 and # 2.

For each lot treated, the operator shall keep the charts of the two steps to clearly demonstrate the control that is exerted. Records for the two charts shall be kept on file for each lot. The charts shall include all pertinent information and, at least, the lot number, its description, the number of boxes, date in, date out, the freezing method used and the signature of the inspector.

APPENDIX B

MOISTURE PICK-UP AND RETENTION

APPENDIX B

MOISTURE PICK-UP AND RETENTION

Part 11 - PROCESSING AND MEAT STANDARDS

Section 11.6 - Of the National Meat & Poultry Code - Moisture Pick-up and Retention

11.6.1 Standards for Permissible Levels of Moisture Pick-Up and Retention

(i) Applicable Requirements

The absorption and retention of moisture as a result of washing, chilling or other contact with water necessitates the establishment of definite limits for weight increases for different classes and weights of poultry. The absorption and retention of moisture in excess of these limits constitutes adulteration of the product.

Moisture pick-up percentages apply to all poultry carcasses that are prepackaged or cut-up in an establishment. Percentages are based on drained weight, as observed in the following chart:

Species and Weight of Dressed Poultry Carcass	Maximum Weight Increase
Turkeys	
a) under 4.5 kg	8%
b) 4.5 kg to under 9 kg	6%
c) 9 kg and over	5.5%
Chickens	
a) under 2.3 kg	8%
b) 2.3 kg and over	6%
All other species, irrespective of weight	6%

When refrigerated poultry carcasses are bulk-packed, an additional 4% moisture pick-up and retention is permissible for all classes of poultry. The operator must determine prior to the establishment of a particular chill procedure whether or not he is entitled to the additional 4% pick-up.

For the purpose of this section, chicken includes cornish hens, broilers, roasters and fowls (light and heavy).

It is the responsibility of the operator to establish systems for washing, chilling, and draining that will consistently result in compliance of the regulatory limits. It is also the responsibility of the operator to provide all equipment necessary to conduct moisture tests.

It is the responsibility of the inspection staff to monitor that the operator carries out his responsibilities to ensure that products are in compliance with the applicable requirements.

The moisture pick-up and retention control program is process control oriented versus the former carcass oriented process and it is the operator's responsibility to establish procedures using a 50 carcass test for each chilling system for each category and size of carcasses that will consistently produce product that is within the limits prescribed.

Since under the "dry tare" approach as requested by the industry, the moisture absorbed during the chill process will be considered at retail as an intrinsic part of the product, enhanced controls and monitoring must take place at the slaughter level. Instead of the group average used in the definition of the chill procedures, the following procedure was adopted for chicken to ensure that a minimum portion of the production is over the regulatory tolerances.

Until further notice, i.e., until the turkey processors accept enhanced controls for moisture absorption, turkeys and turkey products will not be covered by the dry tare approach when net weight verifications will be performed at retail.

For this reason, the turkey processors will only be subject, for the time being, to the provisions of this section regarding the establishment of their approved chilling procedure(s) and routine moisture tests using the 10 bird average method as described further in this section.

Furthermore, for identified chill lines from which no poultry products (parts or whole carcasses) will be packaged as retail ready within the establishment, such lines will not be subject to the enhanced moisture controls, i.e., the 12 individual carcass tests since they are not covered, for weight verification purposes by the *Consumer Packaging & Labelling Act.* These chilling procedures will continue to be monitored using the 10 carcass average testing protocol. In such cases, carcasses do not have to be individually weighed but could be weighed as a group.

(ii) Approved chilling procedures (all classes of poultry)

The operator must inform the inspection staff of his intention to establish or modify the procedure. Then, the operator must conduct a 50-carcass moisture pick-up and retention test to confirm that the procedure will produce product within the limits.

Fifty (50) Grade A poultry carcasses are to be randomly selected, identified and weighed individually. These carcasses shall be weighed twice, the first weighing prior to the first inside-outside carcass washer after inspection, and the second weighing after the normal chilling and drainage time. The average moisture absorption for the group should be within limits.

The results of this test along with a completed moisture retention form are given to the resident inspection staff for evaluation and acceptance if satisfactory.

If accepted, this becomes the approved chilling procedure and no deviations are permitted except that the chill-media temperature may be lower than that recorded on the form; the drip line or drain times may be extended; and/or the system may be speeded up at the end of the day to empty the chiller.

In the definition of the chill procedure, if the transit time includes stoppage periods for either the breaks or meal periods, the chill system could be stopped during these periods. But if the chill procedures do not take into consideration the breaks and/or meal periods, then the chill process line shall be kept operating allowing the tanks to be normally emptied during these periods.

Management may establish or change a plant specific approved chilling procedure at any time provided it results in the production of a product in compliance with the above requirement.

Chilling procedures shall be monitored on an on-going basis and the settings of the key points shall be recorded on an hourly basis by a designated plant employee. Key points refer to those settings which could be modified during a work shift. Other settings may only be checked once at the beginning of each shift. The operator and the inspection staff shall each maintain a complete file of all approved chilling procedures (completed forms) for each category and size of carcasses processed in the plant.

(iii) Procedure for testing moisture pick-up and retention per chill line

At randomly selected times, twelve (12) Grade A poultry carcasses are to be randomly selected for moisture pick-up and retention tests. For turkeys, the same selection principle applies but only ten carcasses should be selected. Selected carcasses shall be identified and weighed twice individually. The initial weighing must be done prior to the first inside-outside carcass washer after inspection, and the second weighing after normal chilling and drainage. Carcasses shall not be accumulated until all identified carcasses exit the tank; selected carcasses shall be weighed individually after the normal drainage time.

In order to make provision for the inherent biological variability of chicken carcasses, the carcasses showing the smallest and the largest percentage of absorption within the sample should then be eliminated from the test. No more than two carcasses exceeding the regulatory tolerances must be present in the remaining 10 identified carcasses. The absorption of the remaining 10 carcasses must meet the regulatory limits.

In the cases where one or more carcasses of the 10 or 12 selected carcasses are missing at the second weighing, the average of the remaining carcasses is to be calculated and in compliance with the tolerances set out in this section. Moisture verification should resume at the next randomly selected

time. If the average is not in compliance, adequate corrective actions should be taken as described in (v) of this section.

The inspector will monitor the chilling procedure by conducting a similar 10 or 12 carcass moisture test or closely monitoring a test made by the operator once during each shift per chill line at times randomly selected at the beginning of the week for all work shifts whenever possible. He will also monitor the process by frequently checking the chiller settings to verify compliance with the approved chilling procedure.

An operator shall carry out, at times randomly selected at pre-determined frequencies or whenever possible, at least two tests per shift of every weight class slaughtered on a particular shift for more than 4 continuous hours for each chill line. Any other weight classes should be tested at least once per shift. The operator shall ensure at all times that chiller settings are in compliance with the approved procedure. Operators with all their 10 or 12 carcass moisture tests in full compliance for 20 consecutive working shifts for a particular weight class could be allowed to reduce their testing frequency to once a shift as a first step.

In cases where an operator has established an approved chilling procedure using the 50 carcass average method and has met the regulatory average for the remaining 10 carcasses but would have found more than 2 carcasses exceeding the regulatory average within the 10 remaining carcasses in more than 50% of the last 5 working days, then it indicates that an unacceptable number of carcasses exceed the regulatory tolerances.
In such cases, in order for these operators to be eligible to tray pack product, they will be required to develop and implement a secondary moisture sampling protocol to ensure the cut-up product destined for tray pack does not retain, on average, more than 5% of added moisture before packaging. For this purpose, the cut parts of the 10 remaining carcasses shall be weighed on an individual or batch basis and compared to the first weighing results. Plant specific protocol(s) must be developed.

Operators unable to meet the individual sampling protocol and desiring to package whole carcasses, are permitted to do so provided a secondary sampling protocol will ensure no more, on average, than 7% moisture pick-up is present in the carcasses before packaging. Once on this protocol, the type and frequency of tests must be performed to the satisfaction of the inspection staff to verify the plant compliance to the 5% (portions) and the 7% (carcass) limits.

At point of pack, an operator exceeding the 5-7% moisture absorption limits must determine how long the product would have to be held while draining in order to comply with the 5-7% retention levels or hold the product for not less than 24 hours to allow automatic release.

Percentages shall be calculated based on the first weighing of all the carcasses.

Example: Broiler chicken

first weighing of 12 individual carcasses (individual weights on the form.) 1,500 g

second weighing of indiv. carcasses 1,600 g

(individual weights on form.)

individual moisture retention 1,500
(1,600-1,500) X 100 = 6.7%

.after elimination of the smallest and of the largest individual moisture retention results, the remaining 10 carcasses must meet the regulatory average and no more than 2 carcasses in the remaining 10 shall be above the prescribed limit eg. 8% or 12%.

.if more than 2 carcasses in the remaining 10 are above the prescribed limit in more than 50% of the weekly tests, the parts from the 10 carcasses should be weighed a third time after cut-up.

.average moisture pick-up compared to the first weighing
(18,700-18,000) X 100 = # 5%
18,000

Example: Broiler Turkey

.first weighing 64,300 g
(sum of the 10 individual weights)

.second weighing 67,450 g
(sum of the 10 individual weights)

.moisture pick-up 3,150 g

67,450-64,300 X 100 = 4.9%
64,300 moisture retention

(iv) Procedure for recording test results

The results of tests shall be maintained by plant management and be made available to an inspector, upon request. All tests results shall be recorded on the moisture pick -up form kept for a six month period.

Approved chill procedures should be kept by the operator and made available upon request to the inspector as long as these procedures are current. All test results shall be recorded on the form.

(v) Corrective actions

Moisture test results for 12 carcass or 50 carcass sub-groups fall into one of two categories. Sub-group test results that are within compliance for species, weight and intended use, indicate that the operator has control of its washing, chilling, and draining procedures. Test results that exceed maximum weight increases indicate that the operator has lost control of his washing, chilling, and draining procedures.

For any incidence of non-compliance of the regulatory tolerances either during the establishment of an approved chilling procedure or during routine tests, the operator must automatically initiate immediate corrective actions.

These corrective measures should be maintained until the chill settings meet the approved chilling method and/or moisture pick-up falls to within regulatory limits (eg. temperature increase in the chill-media corrected by the addition of ice in the tank) and the operator must initiate, under the supervision of the inspection staff, a routine 10 or 12 carcass moisture test within 10 minutes to confirm that the corrective measures taken will produce product within the regulatory limits. If not, a 50 carcass test should be conducted to re-establish an approved chilling procedure while the entire production of the identified chill process will be held until it has drained to an acceptable limit as stipulated later on.

In cases of non-compliance to the 12 carcass monitoring test, the comments section on the form shall be completed indicating the measures taken. In the cases where the secondary protocol is used, the results of the secondary sampling protocol and the corrective actions taken by the operator to ensure compliance at the next test for this particular weight class should be indicated.

Any deviations mentioned earlier or any utilization of the secondary sampling protocol will automatically bring back the frequency of testing for the operator to the initial level for that weight class category and for that chiller system. In such situations, the initial frequency of testing for the inspector shall be re-instituted.

Whenever a 50-carcass test must be conducted by the operator, the inspection staff must be given advance notification and have the opportunity to observe the test being made. Testing procedures are to be carried out as set forth in this standard.

In cases where an operator has failed to establish an adequate chilling procedure using 50 carcasses or has not been able to meet the average tolerances after the second routine test or as set out in the secondary protocol for chicken parts or carcasses to be pre-packaged, the operator will be requested to hold in the establishment, the entire production of the identified chilling process until it has drained to the acceptable limit by:

a) either continuous drainage (bulk packed) for not less than 24 hours for automatic release;

b) continuous drainage (bulk packed) for a period of time necessary to satisfy the inspector in charge that the excess moisture has been removed. This may be achieved by either bulk weighing (prior and after drainage) or by weighing pre-selected carcasses at regular time intervals; or

c) mechanical (tumbled, squeezed) or manual drainage (by removing the trapped water) to the satisfaction of the inspection staff.

(vi) Responsibilities

The operator's responsibilities are:

1. providing scales, weights, identification devices, measuring or monitoring devices, and other supplies to monitor the program;

   Note: The scale increment should not exceed 10 grams. For example, for a carcass weighing one kg, the maximum error should not exceed 0.5%.

2. establishing approved procedures of washing, chilling, draining, and freezing (if applicable) that consistently result in no gain beyond the regulatory limits;

3. changing approved chilling procedures only after

   < notifying the appropriate Regulatory Authority in writing of his intention,

   < conducting a 50-carcass moisture test and providing the results to the veterinarian in charge;

4. following the newly approved procedure through all its steps and by monitoring the procedure on an ongoing basis and recording the settings of the key points on an hourly basis by a designated plant employee;

5. testing twice 10-12 carcasses/category of birds slaughtered/shift except when testing frequency has been reduced; and

6. maintaining all records for 6 months.

The inspector's responsibilities are:

1. verifying the chilling procedures and testing procedures to ensure that the operator carries out his responsibility;

2. conducting or closely supervising one 12-carcass moisture test per shift as directed except when testing frequency has been reduced;

3. allowing procedure changes provided the guidelines are followed;

4. monitoring management's 50-bird moisture tests;

5. ensure adequate corrective actions and/or initiation of a 50 carcass test when:

   < a test shows non-compliance, or
   < an unapproved change in procedures is detected

6. maintaining a complete file showing:

   < results of the inspector's tests,
   < changes in chilling procedures, and
   < current approved chilling procedures for a 6 month period;

7. monitoring the net weight statement on consumer pre-packaged poultry products to meet the requirements under the *Consumer Packaging and Labelling Act.*

(vii) Alternate chilling operations

Plants equipped with alternate chilling methods with or without water sprays and with or without a water pre-chiller or chiller(s) must conduct one initial 50 bird carcass moisture pick-up and retention test per weight class slaughtered and then they may be exempted from further moisture retention tests provided:

< test results indicate moisture retention at less than 50% of that permitted and

< the form is kept on file for as long as the procedure is current. Any change in the approved chilling procedures requires a retest of a 50 bird test per weight class of birds as in any other operation

(d) Measures that prevent excess moisture pick-up and retention in poultry:

(i) minimum exposure of flesh (small cuts, prevention of cutting or tearing of skin between thighs and abdominal wall, complete trussing);
(ii) separation of neck skin from necks or removal of necks prior to washing and chilling of carcasses to promote drainage;
(iii) drain chill tanks or vats at least ½ hour before unloading;
(iv) drain carcasses on drip line and manually drain subcutaneous water accumulations, as required;
(v) use of automated equipment eg. tumblers, shaker tables etc.;
(vi) careful control over water pressure within the inside/outside carcass washer(s).

APPENDIX C

BONELESS MANUFACTURING MEAT

APPENDIX C

BONELESS MANUFACTURING MEAT

Part 11 - PROCESSING AND MEAT STANDARDS

Section 11.14.5 - Of the National Meat & Poultry Code - Boneless Manufacturing Meat

Lot sampling and inspection/examination procedures for fresh meat other than poultry meat, packed in cartons or combos

(1) Sampling

The number of sample units required is determined using the sampling plans provided. These sampling plans are based on 5.5 kg units.

Once the number of sample units has been determined, a random selection of the samples is made by the inspector or plant employee.

Only 1 sample per box should be selected. When dealing with product in combo bins, the required number of 5.5 kg sample units are to be withdrawn from at least 25% of the total number of combo bins in the shipment.

It should be noted that some of the sampling plans indicate steps A and B. In making the initial sample selection, step A is used.

The inspection findings will determine if step B is to be used.

(2) Inspection Procedures

< boneless meat, should be carefully examined for the presence of pathological conditions such as abscesses, etc., spoilage,
< contamination with ingesta, faecal material, hair, grease, rail dirt, foreign material, presence of spear-grass, blood clots, pieces of hide, and bone or cartilage (gristle) pieces. Cuts should be checked for correct stamping, if appropriate.

The plant employee or inspector will examine/inspect the product thoroughly and classify defects found according to the appropriate defect criteria table.

3) Disposition

A decision to accept or reject is made on the defects found. One or more critical defects means the shipment is rejected. With respect to major and minor defects, the decision criteria given in the sample tables are to be used.

If upon completing inspection on the basis of Step A, the lot can be clearly accepted or rejected no further sampling and examination/inspection is required. If the number of major defects or the total number of defects (minor alone or combination of major and minor) falls between the accept and reject numbers, a second sampling and examination/inspection as per step B is done. The defects found are added to those found at Step A and the total numbers are then used to accept or reject the lot.

Note: Total defects are only used if the reject level for major defects has not been exceeded.

Sampling plan and decision criteria

PLAN NO.	SHIPMENT SIZE (kilos)	STEP NO.	NO. SAMPLE UNITS SELECTED AND EXAMINED	DEFECTS FOUND AND ACTION TO BE TAKEN			
				MAJOR		TOTAL (major & minor)	
				ACCEPT	REJECT	ACCEPT	REJECT
1	454 or less	A	3	0	1	1	2
2	3629 or less	A	6	0	1	5	6
3	3630 to 10885	A	9	0	2	4	8
		B	3				
	Total of A + B		12	1	2	8	9
4	10886 to 27271	A	15	0	3	6	12
		B	15				
	Total of A + B		30	2	3	18	19
5	27272 to 108861	A	22	0	4	9	16
		B	25				
	Total of A + B		47	3	4	26	27
6	108862 and over	A	27	0	4	10	19
			40				
	Total of A + B		67	4	5	35	36

EXAMPLES

(a) Lot weighing 18,144 kg, packed in 27 kg boxes.
Sampling plan 4 is selected, which means that 15 boxes are to be randomly chosen and a 5.5 kg sample examined from each box.
Findings are as follows:

Critical = 0
Major = 3
Minor = 3
Total = 6

The lot is rejected on the basis of 3 major defects, even though the total number of defects is acceptable.

(b) Lot weighing 9,999 kg, packed in 9kg. Boxes.
Sampling plan 3 is selected which means that 9 – 5.5 kg sample units are required from 9 different boxes.
Findings are as follows:

Critical = 0
Major = 1
Minor = 3
Total = 4

The lot can not therefore be accepted or rejected at this point since the number of major defects lies between 0 and 2. Step B is therefore followed, which means that another 3 units must be selected.

Findings are as follows:

Critical = 0
Major = 0
Minor = 4
Total = 4

These defects are added to those found at step A giving totals as follows:

Critical = 0
Major = 1
Minor = 7
Total = 8

The lot is accepted.

DEFECT CRITERIA FOR MEAT FROM CATTLE AND CALVES

DEFECT	MINOR	MAJOR	CRITICAL
BLOOD CLOTS	40 – 150 mm (GD)	>150 mm (GD); or >5 minor clots *	Any clot(s) that would seriously affect product use
BRUISES	25 – 60 mm (GD) or 13 – 25 mm deep	>60 mm (GD); or >25 mm deep; or >5 minor bruises	Any bruises that would seriously affect product use
BONE FRAGMENTS	Hard bone <40 mm (GD); Bone slivers (from rib) <75 mm x 6 mm	>40 mm (GD); or > 5 minor fragments *	Any fragment(s) that would seriously affect product use
DETACHED CARTILAGE LIGAMENTS	>25 mm long and free from muscle tissue	>5 minor defects that would not seriously affect product use	Any cartilage or ligament that would seriously affect product use
INGESTA			Any amount
FAECAL MATERIAL			Any amount
HARMFUL EXTRANEOUS MATERIAL		Any substance that would cause minor tissue irritation	Any substance that would cause injury or illness
HARMLESS EXTRANEOUS MATERIAL	Paper or plastic <45 cm 2; specks of rail dust covering an area <10 mm (GD); or single grass seeds (not associated with inflammation)	Blunt wood >24 mm (GD); paper or plastic >45 cm2; or specks of rail dust covering an area >10 mm (GD); small insect; >5 minor defects that would not seriously affect product use	Large insect; insect associated with unsanitary conditions; any substance that would seriously affect product use
HAIR, WOOL, HIDE	Hide <10 mm (GD); 5 – 10 strands of hair or wool. The number of minor defects is derived by dividing the number of hairs by 10. Hair cluster in single area	Hide >10 mm (GD); or >25 strands of hair or wool; or >5 clusters of hair provided not affecting product usability*	Hair, hide or wool that seriously affect product use -100 single strands of hair in one sample unit
OFF CONDITION (sour)			Any amount of off condition meat
PATHOLOGICAL LESIONS		Any lesion which would not have been evident at PM inspection that would not seriously affect product use	Any other lesion(s)
STAINS, DISCOLOURED AREAS	10 – 40 mm (GD)	>40 mm (GD) >5 minor stains*	Stains that would seriously affect product use
OTHER i.e. Freezer burn	Defect(s) that would affect product appearance but not use	Defect(s) that would materially affect product use	Defect(s) that would seriously affect product use

(GD means Greatest Dimension: > means Greater Than; <means Less Than)
*Where minor defects are numerous enough to classify as major, do not score as minor also.

DEFECT CRITERIA FOR MEAT FROM SHEEP, LAMB, GOAT AND EQUINE

DEFECT	MINOR	MAJOR	CRITICAL
BLOOD CLOTS	40 – 150 mm (GD)	>150 mm (GD); or >5 minor clots *	Any clot(s) that would seriously affect product use
BRUISES	25 – 60 mm (GD) or 13 – 25 mm deep	>60 mm (GD); or >25 mm deep; or >5 minor bruises	Any bruises that would seriously affect product use
BONE FRAGMENTS	Hard bone <40 mm (GD); Bone slivers (from rib) <75 mm x 6 mm	>40 mm (GD); or > 5 minor fragments *	Any fragment(s) that would seriously affect product use
DETACHED CARTILAGE LIGAMENTS	>25 mm long and free from muscle tissue	>5 minor defects that would not seriously affect product use	Any cartilage or ligament that would seriously affect product use
INGESTA		<10 mm (GD)	>10 mm (GD)
FAECAL MATERIAL			Any amount
HARMFUL EXTRANEOUS MATERIAL		Any substance that would cause minor tissue irritation	Any substance that would cause injury or illness
HARMLESS EXTRANEOUS MATERIAL	Paper or plastic <45 cm 2; specks of rail dust covering an area <10 mm (GD); or single grass seeds (not associated with inflammation)	Blunt wood >24 mm (GD); paper or plastic >45 cm2; or specks of rail dust covering an area >10 mm (GD); small insect; >5 minor defects that would not seriously affect product use	Large insect; insect associated with unsanitary conditions; any substance that would seriously affect product use
HAIR, WOOL, HIDE	Hide <10 mm (GD); 5 – 10 strands of hair or wool. The number of minor defects is derived by dividing the number of hairs by 10. Hair cluster in single area	Hide >10 mm (GD); or >25 strands of hair or wool; or >5 clusters of hair provided not affecting product usability*	Hair, hide or wool that seriously affect product use -100 single strands of hair in one sample unit
OFF CONDITION (sour)			Any amount of off condition meat
PATHOLOGICAL LESIONS		Any lesion which would not have been evident at PM inspection that would not seriously affect product use	Any other lesion(s)
STAINS, DISCOLOURED AREAS	10 – 40 mm (GD)	>40 mm (GD) >5 minor stains*	Stains that would seriously affect product use
OTHER i.e. Freezer burn	Defect(s) that would affect product appearance but not use	Defect(s) that would materially affect product use	Defect(s) that would seriously affect product use

(GD means Greatest Dimension: > means Greater Than; <means Less Than)
*Where minor defects are numerous enough to classify as major, do not score as minor also

DEFECT CRITERIA FOR MEAT FROM SWINE

DEFECT	MINOR	MAJOR	CRITICAL
BLOOD CLOTS	40 – 150 mm (GD) 25 – 60 mm (GD) or	>150 mm (GD); or >5 minor clots * >60 mm (GD); or	Any clot(s) that would seriously affect product use Any bruises that would seriously

BRUISES	13 – 25 mm deep	>25 mm deep; or >5 minor bruises	affect product use
BONE FRAGMENTS	Hard bone <40 mm (GD); Bone slivers (from rib) <75 mm x 6 mm	>40 mm (GD); or > 5 minor fragments *	Any fragment(s) that would seriously affect product use
DETACHED CARTILAGE LIGAMENTS	>25 mm long and free from muscle tissue	>5 minor defects that would not seriously affect product use	Any cartilage or ligament that would seriously affect product use
INGESTA		>10 MM (GD)	>10 MM (GD)
FAECAL MATERIAL			Any amount
HARMFUL EXTRANEOUS MATERIAL		Any substance that would cause minor tissue irritation	Any substance that would cause injury or illness
HARMLESS EXTRANEOUS MATERIAL	Paper or plastic <45 cm 2; specks of rail dust covering an area <10 mm (GD); or single grass seeds (not associated with inflammation)	Blunt wood >24 mm (GD); paper or plastic >45 cm2; or specks of rail dust covering an area >10 mm (GD); small insect; >5 minor defects that would not seriously affect product use	Large insect; insect associated with unsanitary conditions; any substance that would seriously affect product use
SKIN (ON SKINLESS CUTS), HAIR, HAIR ROOTS	Skin (on skinless cuts) <10 mm (GD); Skin (on skinless cuts) with hair or visible hair roots <20 cm 2, 1 defect = -If <13 (strands of hair), Total # of hairs + 3 and/or -Total # of hair roots + 1 and/or -Clusters of hairs in single area	Skin (on skinless cuts) >10mm (GD); Skin (on skinles cuts) with -hair or visible hair roots >20cm2; or ->13 but >100 single strands of hair in one sample unit	Skinless or skin on cuts: -skin, hair or hair roots seriously affecting product usability - 100 single strands of hair in one sample unit
LIPS, EAR CANALS, TEETH, KIDNEYS, LIVER		Any amount for each sample unit	
LUNG TISSUE			Any amount
OFF CONDITION (sour)			Any amount of off condition meat
PATHOLOGICAL LESIONS		Any lesion which would not have been evident at PM inspection that would not seriously affect product use	Any other lesion(s)
STAINS, DISCOLOURED AREAS	10 – 40 mm (GD)	>40 mm (GD) >5 minor stains*	Stains that would seriously affect product use
OTHER i.e. Freezer burn	Defect(s) that would affect product appearance but not use	Defect(s) that would materially affect product use	Defect(s) that would seriously affect product use

(GD means Greatest Dimension: > means Greater Than; <means Less Than)
*Where minor defects are numerous enough to classify as major, do not score as minor also.

APPENDIX D

CALCULATION OF NITRITE / NITRATE SALTS INPUT LEVELS

APPENDIX D
CALCULATION OF NITRITE/NITRATE SALTS INPUT LEVELS

Part 11 - PROCESSING AND MEAT STANDARDS

Section 11.16 - Of the National Meat & Poultry Code - Curing

11.16 Curing

Calculation of nitrite/nitrate salts input levels.

Examples of salt calculations:

1) Calculation of nitrite in sausage emulsion

Example A:

Formulation: 114 kg sausage mix
23 g sodium nitrite (bulk)
114.023 kg emulsion

Formula 1: ppm nitrite = $\frac{\text{sodium nitrite (g) x 1000 mg/g}}{\text{wt of emulsion (kg)}}$

Calculation: = $\frac{\text{23 g x 1000 mg/g}}{\text{114.023 kg}}$

= $\frac{\text{23,000 mg}}{\text{114.023 kg}}$

= 201.71 mg/kg

= 201.71 ppm

Formula 2: ppm nitrite = $\frac{\text{sodium nitrite (kg)} \times 10^6}{\text{wt of emulsion (kg)}}$

Calculation: $= \frac{.023 \text{ kg} \times 10^6}{114.023 \text{ kg}}$

$= \frac{23{,}000 \text{ kg}}{114.023 \text{ kg}}$

= 01.71 ppm

Example B:

Formulation: 114 kg sausage mix
350 g Prague Powder
114.35kg emulsion

NB Prague Powder = 6.25% sodium nitrite
ˆ 350 g Prague Powder = 21.875 g sodium nitrite

Formula 2 : ppm nitrite $= \frac{\text{Sodium nitrite (kg)} \times 10^6}{\text{wt of emulsion (kg)}}$

Calculation: $= \frac{.021875 \text{ kg} \times 10^6}{114.35 \text{ kg}}$

$= \frac{21875 \text{ kg}}{114.35 \text{ kg}}$

= 191.30 ppm

2) Calculation of nitrite in injected product

Example C:

Formulation:

Cure unit:		
Sodium tripolyphosphate:	6.41 kg	
Sodium nitrite:	0.28 kg	
Sodium erythorbate:	0.84 kg	
Spices	0.70 kg	
Total	8.23 kg	Cure unit

Cure Unit		8.23 kg
Water		134.00 kg
Salt		40.00 kg
	Total	182.23 kg Brine

% Pump (gain) = 15

Formula 1: ppm nitrite = $\frac{\text{wt of nitrite (kg)}}{\text{wt of brine (kg)}} \times \frac{\text{gain}}{\text{gain} + 100} \times 10^6$

Calculation: $= \frac{0.28 \text{ kg}}{182.23 \text{ kg}} \times \frac{15}{115} \times 10^6$

$= 0.0015365 \times 0.130 \times 10^6$

$= 200$ ppm

Formula 2: ppm nitrite = $\frac{\text{wt of nitrite (g)} \times \text{gain (kg)}}{\text{wt of brine (kg)}}$

$\frac{}{100 \text{ (kg)} + \text{gain (kg)}}$

NB Assume weight before injection = 100 kg

gain = 15 kg

weight after injection = 115 kg

Calculation: $= \frac{280 \text{ g} \times 15 \text{ kg}}{182.23 \text{ kg}}$

$\frac{}{115 \text{ kg}}$

$= \frac{23.047 \text{ g}}{115 \text{ kg}}$

$= .200$ g/kg

$= 200$ mg/kg

$= 200$ ppm

11.16 *Curing aids*

A number of curing aids are used in the curing process. Salt (NaCl) must be used. Other curing aids permitted are phosphates, class l preservatives, gluconodelta-lactone, citric acid, sodium citrate, vinegar, sweetening agents, sodium bicarbonate, sodium hydroxide, potassium hydroxide, seasoning and spices

(see Bl4.009 of the Food and Drug Regulations).

11.16 Forms of phosphate for use in meat products

Form	Chemical formula	Mol. wt	* Factor
Disodium phosphate	Na_2HPO_4	141.98	1
Monosodium phosphate	NaH_2PO_4	119.98	1.18
Sodium hexametaphosphate	$(NaPO_3)X$	611.17	1.39
Sodium tripolyphosphate	$Na_5P_3O_{10}$	367.85	1.16
Tetrasodium pyrophosphate	$Na_4P_2O_7$	265.94	1.07
Sodium acid pyrophosphate	$Na_2H_2P_2O_7$	221.97	1.28
*The factor converts other chemical forms of phosphate into disodium phosphate.			

Calculation of phosphate salts input levels

Example D:

Cure unit:
Sodium tripolyphosphate 6.41 kg
Sodium nitrite 0.28 kg
Sodium erythorbate 0.84 kg
Spices 0.70 kg
Total 8.23 kg Cure unit

Cure unit: 8.23 kg
Water 134.00 kg
Salt 40.00 kg
Total 182.23 kg Brine

% Pump (gain) = 15

Formula 1: % added disodium phosphate = wt of phosphate (kg) (in disodium phosphate equivalent) / wt of brine(kg) x 100 x gain / gain x 100

Calculation: = 7.43 kg

$$\frac{(6.41 \text{ kg} \times 1.16)}{182.23 \text{ kg}} \times 100 \times \frac{15}{115}$$

= .53 % added disodium phosphate

Formula 2:

1. Determine initial % phosphate in brine (in disodium phosphate equivalent)

   $$= \frac{(\text{wt phosphate} \times \text{conversion factor})}{\text{wt of brine}} \times 100$$

2. % of phosphate based on initial wt of product:

   $$= \frac{100 \times \% \text{ pump} \times \% \text{ phosphate}}{100 \times 100}$$

3. % Yield:

   $$= \frac{(\text{wt final prod.} - \text{wt initial prod.}) \times 100}{\text{wt of initial product}}$$

4. % added disodium phosphate in final product

   $$= \frac{\% \text{ phosphate based on initial wt of product}}{\text{wt of initial product} + \% \text{ yield}} \times 100$$

Calculation

1. $\frac{6.41 \text{ kg} \times 1.16 \times 100}{182.23 \text{ kg}} = 4.08\%$ disodium phosphate in brine

2. $\frac{100 \times 15 \times 4.08}{100 \times 100} = 0.612\%$

3. $\frac{(115 - 100)100}{100} = 15\%$

4. $\frac{0.612\% \times 100}{100 + 15} = 0.53\%$ added disodium phosphate

Note, that, establishments that store bulk nitrite or nitrate salts rather than premixes shall keep those salts under lock and key or some other suitable method found acceptable by the Regulatory

Authority. The operator shall maintain records that account for their use to prevent an accidental misuse of those potentially dangerous compounds. Binder units must have curing salts packaged separately in a coloured bag.

It is not necessary to make adjustments for the addition of rework, provided the quantity of "rework" material is not more than 10% of the batch weight.

In the case of bone-in meat cuts, the pumping percentage will be calculated on a boneless basis. The amount of bone in a bone-in ham is approximately 15% by weight.

In the case of injected products with rind on (ham, bacon, etc.), no consideration is necessary for the weight of the rind. Rind may be considered as meat.

APPENDIX E

LIST OF ACCEPTED STARTER CULTURES

APPENDIX - E

LIST OF ACCEPTABLE STARTER CULTURES

Part 11 - PROCESSING AND MEAT STANDARDS

Section 11.21.6 - Of the National Meat & Poultry Code - List of Accepted Starter Cultures

TRADE NAME	MANUFACTURER
Biobak N 6810 Biobak K 6820 Biobak SAL 6830 Biobak P 6840 Biobak S 6850Biobak Contra 6864 Biobak Ultra 6862 Biobak Classic No. 6860	Wiberg Export Ges. Adolf-Schemel-Straße P.O. Box 24A-5O33 Salzburg, Austria
Bitec LS-25 Bitec LK-30 **BITEC LM-1**	Gewürzmüller GmbH Klagenfurter StraBe 1-3 D-70469 Stuttgart Germany
Custom Cultures Custom Cultures TM Blend PC, PP, 18, M and PC/M	ABC Research Corp. 5301 Monona Drive Monona, Wi 53716
Diversitech HP Diversitech LP Diversitech LL Diversitech CS Diversitech CSL Diversitech LHP	Diversitech Progress Centre 1 Progress Blvd, B-28 Alachua, Fl. 32615

Baktoferment 61 Duploferment 66 Duploferment 66 Spezial Duploferment 77 STM Duploferment 78 P Duploferment 90 Edelschimmel Kulmback 72 Fermentang Pokelferment 77 RM 2000 RM 7 RM 10	Rudolph Muller & Co., GMBH Giessener Strasse 94 D-W-6301 Pohlheim 1 Germany
Germet Germet GT Germet X	Hermann Laue 950 Denison Street, Unit 22 Markham, Ont. L3R 3K5
Lyoflore	Lacto-Labo 23, rue du Collège 86620 Dangé-St-Romain France
Lactacel 68 Lactacel 110 Lactacel 331 Lactacel 804 Lactacel Plus Lactacel 95 Red	Quest International 2610 J.B. Deschamps Blvd. Lachine, Québec H8T 1C9
Lacto-Set PC Lacto-Set L Lacto-Set M	Auro Tech Inc. N92W144224 Anthony Ave. P.O. Box 774 Menomonee Falls Wi 53052-0774
FloraCarn LC200	Chr. Hansen Laboratories 10-12 Bøge Allé DK-2970 Høsholm Denmark
Redi-Set PC-1 meat cult. Redi-Set CP	CHR. Hansen Lab. Inc. 9015 West Maple Street Milwaukee, Wi 53214
Roger Cultures SausageMATE Cultures	Systems Bio-Industries, Inc. 620 Progress Avenue P.O. Box 1609 Waukesha, Wisconsin USA
Roselae A Roselae B Roselae C	Rosell Inst. 8480 St-Laurent Montréal, Québec. H2P 2M6

SAGA 448 SAGA 115 SAGA 75 SAGA 444 SAGA 200	Quest International Canada Inc. 2610 J.B. Deschamps Blvd. Lachine, Québec H8T 1C9
Trumark Formula 150Trumark Formula LT-1 Trumark Formula LT-11 Trumark Formula 100 Trumark Formula 101 Trumark Formula 102 Trumark Formula 103 Trumark Formula 105	Trumark Inc. 443 East First Ave. Roselle, N.J. 07203

APPENDIX F

CANNING

APPENDIX F - CANNING

APPENDIX F
CANNING

Part 11 - PROCESSING AND MEAT STANDARDS

Section 11.23 - Of the National Meat & Poultry Code - Canning

Please note Canning section numbering system begins at 1 and ends at 4.8.4

This includes the use of glass jars and retortable pouches.

INTRODUCTION

This chapter has been adapted directly from the Codex Alimentarius Recommended International Code of Hygienic Practice for Low-Acid and Acidified Low-Acid Canned Foods CAC/RCP 23-1979, the Canadian Food Industry Code of Practice for Heat Processing of Low-Acid and Acidified Low-Acid Foods in Hermetically Sealed Containers.

This chapter is intended as a reference source for operators and inspectors concerned with heat processing low-acid and acidified low-acid foods packed in hermetically sealed containers. It is not intended to stand alone, but rather to be used in conjunction with relevant legislation, textbooks and other appropriate source materials to provide an extensive information base to assist operators and inspection personnel in the performance of their duties. It is the responsibility of the operator to be familiar with all pertinent regulations, and to understand how they apply to their products, processing operations and equipment.

1.0 SCOPE

This Chapter is concerned with the critical control points and hygienic factors involved in the thermal processing and packaging of low-acid and acidified low-acid foods in hermetically sealed containers.

2.0 DEFINITIONS

For the purpose of this code:

Acidified low-acid food means a low-acid food which has been treated in a manner so that all components have attained an equilibrium pH of 4.6 or below by the time thermal processing and cooling is completed.

Aseptic processing and packaging mean the filling of a commercially sterile product into commercially sterile containers followed by hermetic sealing in a commercially sterile atmosphere.

Bleeder means a small orifice through which steam and other gases are permitted to escape from a retort throughout the entire thermal process and may also serve as a means of removing condensate.

Canned food, means commercially sterile low-acid or acidified low-acid food packed in hermetically sealed containers.

Cleaning means the removal of food residues, dirt, grease or other objectionable material.

Code lot means all product having an identical code. Code lots should be restricted to the same product type (formulation), container type and size and processed in the same establishment during a period not to exceed twenty-four hours.

Come-up-time means the time, including venting time, which elapses between the introduction of the heating medium into the closed retort and the time when the temperature in the retort reaches the required sterilization temperature.

Commercially sterile

Food means the condition obtained in a food which has been processed by the application of heat, alone or in combination with other treatments, to render the food free from viable forms of microorganisms, including spores, capable of growing in the food at temperatures at which the food is designed normally to be held during distribution and storage.

Equipment and containers used in aseptic processing means the condition obtained by the application of heat or other appropriate treatments which render the product contact surfaces of such equipment and containers free from viable forms of microorganisms capable of growing in a food, at temperatures at which the food is designed normally to be held during distribution and storage.

Atmosphere means the condition obtained by the application of heat, or other appropriate treatments, which render the atmosphere free from viable forms of microorganisms capable of growing in a low-acid food packed in hermetically sealed containers at temperatures at which the food is designed normally to be held during distribution and storage.

Critical factor means any characteristic, property, condition, aspect or other parameter, variation of which may affect the attainment of commercial sterility.

Disinfection means the reduction, of the number of microorganisms (to a level that will not lead to harmful contamination of food) by means of chemical agents and/or physical methods without adversely affecting the food.

Equilibrium pH means the condition attained in an acidified low-acid food product in which there is no further change in the pH of any of the components.

Flame sterilizer means an apparatus in which food in hermetically sealed containers is agitated at atmospheric pressure, by either continuous, discontinuous or reciprocating movement, over gas flames to achieve commercial sterility of the food. (A holding period may follow the initial heating period.)

Heating curve means a graphical representation of the temperature change in the food with time throughout the thermal process. (This is usually plotted on semi-log graph paper so that the temperature on an inverted log scale is plotted against time on a linear scale.)

Broken heating curve means a heating curve which shows a distinct change in the rate of heat transfer such that the curve may be represented by two or more distinct straight lines after the retort has attained the sterilization temperature when plotted on semi-log paper.

Simple heating curve means a heating curve which approximates a straight line after the retort has attained the sterilization temperature when plotted on semi-log paper.

Head space means the volume in a container not occupied by the food.

Gross head space is the vertical distance between the level of the product (generally the liquid surface) in an upright and rigid container and the top edge of the container (the top of the double seam of a can or the top edge of a glass jar).

Net head space of a container is the vertical distance between the level of the product (generally the liquid surface) in an upright rigid container and the inside surface of the lid.

Hermetically sealed container means a container, designed and intended to be secure against the entry of microorganisms including spores.

Rigid container means that the shape or contours of a filled and sealed container are neither affected by the enclosed product nor deformed by an external mechanical pressure of up to 70 KPa (10 p.s.i.g., i.e., normal firm finger pressure.)

Semi-rigid container means that the shape or contour of a filled, sealed container is not affected by the enclosed product under normal atmospheric temperature and pressure but can be deformed by an external mechanical pressure of less than 70 kPa (10 p.s.i.g., i.e., normal firm finger pressure.)

Flexible container means that the shape or contours of a filled, sealed container are affected by the enclosed product.

Holding time: see sterilization time.

Incubation tests means tests in which thermally processed product is kept at a specific temperature for a specified period of time in order to determine if the outgrowths of microorganisms or other problems occur under these conditions.

Initial temperature means the product temperature of the coldest container to be processed at the time the sterilization cycle begins.

Low-acid food means a food, other than an alcoholic beverage, where any component of that food has a pH greater than 4.6 and a water activity (a_w) above 0.85.

Potable water means water fit for human consumption. (Standards of potability should be no less strict than those contained in the "Guidelines for Canadian Drinking Water," 1987, published by Health and Welfare, Canada.)

Retort means a pressure vessel designed for thermal processing of food, packed in hermetically sealed containers, by an appropriate heating medium and where necessary with superimposed pressure.

Scheduled process means the thermal process either alone or in combination with critical factors chosen by the processor for a given product formulation, container type and size and thermal processing system to achieve at least commercial sterility of the product.

Seals means those parts of a container or container material that are joined or fused to form a hermetic closure.

Sterilization temperature means the temperature maintained throughout the thermal process which is at least equal to that specified in the scheduled process.

Sterilization time means the time between the moment sterilization temperature is achieved and the moment cooling is started.

Thermal process means the thermal treatment required to achieve commercial sterility and is quantified in terms of time and temperature.

Vents means openings in the retort shell controlled by a gate, plug cock, or other adequate valves and are used for the elimination of air from the retort during the venting period.

Venting means the thorough removal of air from steam retorts through the vents by introduction of steam or other appropriate methods prior to attainment of the sterilization temperature.

Water activity (a_w) means the ratio of the water vapour pressure of a food to the vapour pressure of pure water at the same temperature and pressure.

3.0 Background

In order to understand why certain procedures have been developed for the canning of foodstuffs, it is necessary to have some knowledge of the spoilage organisms themselves, in particular bacteria, yeasts and moulds.
These organisms, by nature of their small size, are referred to as microorganisms.

Microorganisms are ubiquitous, occurring wherever conditions are favourable to them. It must not be assumed that all microorganisms are harmful. In fact the vast majority do not fall into this category and most are essential or actively beneficial to life in general. Those microorganisms which are capable of causing disease are referred to as pathogens.

3.1 Important General Characteristics of Microorganisms

Many microorganisms are capable of extremely rapid multiplication under favourable conditions. For example, some species of bacteria can pass through a generation within 20 minutes under optimal conditions. Since each generation potentially doubles the number of bacteria, it can be seen that enormous numbers of bacteria can be attained within a period of a few hours.

When conditions for growth or survival become unfavourable, many microorganisms have the ability to develop resistant structures known as spores, which can, if necessary, remain dormant for prolonged periods of time (several years in some instances) until conditions become favourable to support the growth of the species. At this time, the spore reverts to the growth or vegetative form.

Certain microorganisms in the vegetative form have the ability to produce toxins and these toxins may be extremely harmful to man. If such microorganisms are present in large numbers in foodstuffs, not only the microorganisms themselves, but also the toxins produced by them, make the foodstuffs unsafe for human consumption.

3.2 Environmental Characteristics Affecting Growth

3.2.1 Nutritional Requirements

Unless the microorganisms possess chlorophyll and can therefore synthesize their food requirements from water and carbon dioxide, they are dependent on an external source of food such as carbohydrates, fats and oils. In addition, they have specific requirements for minerals and vitamins. Because of the wide range of requirements by different microorganisms, any foodstuff is capable of supporting growth of one kind or another.

3.2.2 Moisture Requirements

Microorganisms, particularly bacteria, require water for growth. The water which is present in cells of plants or animals and hence, in a foodstuff, is largely bound within the cells and as such, is not available to microorganisms. However, free or available water is in and around tissues in a foodstuff, and it is this water on which the growth of microorganisms depends. The amount of free or available water in a foodstuff is often expressed in terms of the water activity (a_w) value. If methods are employed to reduce the a_w of a foodstuff, it will render it less suitable for bacterial growth. It should be noted that freezing is an effective method for preserving foodstuffs, because the tissue water is converted into ice and as such, is no longer available to microorganisms.

3.2.3 Environmental pH

Most foods are acidic, but to different degrees. The pH value is used to represent the degree of acidity or alkalinity of a substance. The pH scale runs from 0 to 14, with 7 being the neutral point, and any value below 7 is acid.

In general, bacteria are less tolerant than yeasts or moulds, and not only is their growth affected by the pH, but also their rates of survival during storage, heating, drying and other forms of processing.

3.2.4 Temperature Requirements

Each microorganism has an optimum temperature range for growth and on the basis of the temperature requirements and is classified into four groups:

Psychrophilic . . . . . 14-20°C
Mesophyllic . . . . . 30-37°C
Facultative thermophilic . . . . . 38-46°C
Obligatory thermophilic . . . . . 50-66°C

3.2.5 Oxygen Requirements

All microorganisms require oxygen to carry on their metabolic process. Free oxygen exists in the air, and those microorganisms which can grow in the presence of this free oxygen are described as aerobes.

Some microorganisms however exist in the absence of atmospheric oxygen and are described as anaerobes.

Most bacteria fall into a category known as facultative anaerobes, which can tolerate to some degree either the presence or absence of atmospheric oxygen. In sealed containers, anaerobic conditions exist and bacterial decomposition of the foodstuff tends to be of a putrefactive nature, sometimes leading to the formation of foul gases.

3.3 Clostridium Botulinum

Of all the microorganisms concerned with the spoilage of food, there is one species of bacteria with which we are concerned above all others. This is Clostridium botulinum, an anaerobe, spore former and toxin producer. This bacterium produces a toxin which is the strongest biological toxin affecting man and animals. It has been calculated that 1 gram of toxin, properly diluted, could kill more than 500 million people. The food poisoning syndrome associated with the bacterium is known as botulism.

3.4 Low Acid Foods

Low acid foods are defined as those having a pH of 4.6 or more. Included in this category are meat products and vegetable products. The reason for selecting this value is that Clostridium botulinum will not grow at a pH of 4.8 or less. (A safety factor of 0.2 is allowed). This bacterium also requires an a_w of 0.93 or greater for growth. In this instance a safety factor of 0.08 is allowed, giving a critical a_w of 0.85. The definition of a low acid food is often modified to include this factor and reads "a food, other than an alcoholic beverage, where any component of that food has a pH value greater than 4.6 and a water activity (a_w) greater than 0.85".

A low acid food when canned, must be subject to a thermal process incorporating a sufficiently high temperature maintained for a long enough time to ensure the destruction of Clostridium botulinum and its toxins.

4. ESTABLISHMENT: HYGIENIC PROCESSING REQUIREMENTS

4.1 Raw Material Requirements

One of the factors which influences the effectiveness of a thermal process in destroying spoilage organisms, is the number of bacteria present in the product before heat treatment commences. It is therefore extremely important that good sanitary practices prevail during product preparation to minimize bacterial loads. The attitude that contamination, poor sanitation, etc., does not matter, as the product is going to be heat treated eventually, must be strongly resisted.

Incoming raw materials, ingredients, and packaging materials should be inspected upon receipt to ensure that they are suitable for processing. Materials must be received in an area separate from the processing areas. Prior to being placed in inventory, ingredients susceptible to microbiological contamination either should be examined for microbiological quality or should be received under a supplier's guarantee that they are of a microbiological quality suitable for use in processing low acid foods. Products must be held prior to processing in such a manner as to prevent significant growth of microorganisms.

Blanching by heat, when required in the preparation of food for canning, should be affected by heating the food to the required temperature, holding it at this temperature for the required time, and then either rapidly cooling the food or passing it to subsequent processing without delay. Thermophilic growth and contamination in blanchers should be minimized by good equipment design, the use of adequate operating temperatures and routine cleaning and disinfection.
Where the blanched food product is washed prior to filling, potable water shall be used.

All steps in the production process, which includes acidification when required or used, filling, closing, thermal processing and cooling, should be performed as rapidly and as soon as possible and under conditions which will prevent contamination and growth of microorganisms of public health significance in the food.

4.2 Prevention of Cross-Contamination

Effective measures should be taken to prevent contamination of food material by direct or indirect contact with material at an earlier stage of the process.

Persons handling raw materials or semi-processed products capable of contaminating the end-product should not come into direct contact with any end-product unless and until they discard all protective clothing worn by them during the handling of raw materials or semi-processed products and they have changed into clean protective clothing.

If there is a likelihood of contamination, hands should be washed thoroughly between handling products at different stages of processing.

All equipment which has been in contact with raw material or contaminated material should be thoroughly cleaned and disinfected prior to being used for contact with end-products.

4.3 Filling and Sealing Operations

4.3.1 Empty Product Containers

The material should be appropriate for the product to be packed and for the expected conditions of storage and should not transmit to the product objectionable substances beyond the limits contained in the Food and Drugs Act and Regulations. The packaging material should be sound and should provide appropriate protection from contamination. The product containers should be sufficiently durable to withstand the mechanical, chemical and thermal stresses encountered during thermal processing and normal distribution. (An overwrap may be necessary for flexible and semi-rigid containers).

With laminates particular attention should be paid to ensure that the combination of processing requirements and product characteristics does not cause delamination as this may result in loss of integrity. The sealant material chosen must be compatible with the product as well as the container and closure systems. The closures for glass containers are particularly susceptible to mechanical damage which may result in a temporary or permanent loss of a hermetic seal. The closures of sealed jars should be contained within the diameter of the glass body to avoid closure to closure contact of the sealed jars.

All packaging material should be stored in a clean and sanitary manner.

4.3.2 Examination of Empty Product Containers

When containers are received from the manufacturer or the container manufacturing section of the company, they should have already received extensive checks. However, it is important that they be reinspected by plant quality control personnel before use, for signs of damage incurred during transportation and storage and for compliance with the manufacturer's specifications. Empty containers are particularly subject to damage by faulty operation of depalletizers and by badly designed or poorly controlled conveyors to filling and seaming machines.

Immediately prior to filling, rigid containers should be cleaned in an inverted position by suitable air or water jet appliances.

Glass containers may also be cleaned by suction (vacuum). Containers intended for use on aseptic filling lines should not be cleaned with water unless they are thoroughly dried prior to sterilization. Examination is particularly important in the case of glass containers which may contain fragments of glass or glass defects which are difficult to see.

Dirty containers shall not be filled. Faulty rigid containers, e.g., those that have been dented or pierced, having defective seams, with deformed flanges, with abnormal levels of scratches or flaws in the plating or enamel (lacquer) and covers with defective sealing compound or gaskets, etc. shall not be used. Care should be taken to avoid damage to empty containers, closures and container materials which can result from faulty handling prior to closure.

The processor should ensure that the container and closure specifications are such that the container is capable of withstanding the processing and subsequent handling strains to which the containers are normally subjected. Since such specifications may vary depending upon the canning operation and

subsequent handling, they should be established in consultation with the container or closure manufacturer.

4.3.3 Proper Use of Product Containers

Product containers must never be used within the cannery for any purpose other than packing food. They must never be used as ash trays, waste containers, receptacles for small machine parts or any other similar purposes. Such practices must be avoided because there is a considerable risk that such containers may accidentally find their way back onto the production line and result in the packing of food in the same container with very objectionable or possible dangerous material.

4.3.4 Protection of Empty Product Containers During Plant Cleaning

Empty containers should be removed from the packing room and from the conveyors which lead to the filling machines before production lines are washed down. If this is not practicable, they must be shielded or located so that they will not become contaminated or obstruct the clean up operations.

4.3.5 Filling of Product Containers

The filling of containers is of prime importance. Overfilling or careless filling procedures may result in product being forced out of the container during closure and becoming trapped in the seams or seals, possibly leading to leakers, or in product contaminating the seal area of flexible pouches, thus endangering the closure.

The filling of containers also has a direct bearing on the resulting head space. Insufficient head space will not allow for sufficient expansion during the thermal process and in the case of glass containers, this may lead to deformation of the closure. In the case of double seamed containers, excessive pressure may result in distortion of the ends of the container.

Controlled filling, whether by mechanical or manual means, is also important in respect to heat penetration. In agitating retorts, it is the movement of the head space bubble through the product which ensures the mixing of the contents and even heat distribution throughout the product. In the case of flexible pouches, variations in filling may lead to variations in the filled pouch thickness which will affect heat penetration rates. In systems employing conduction heating, too large a head space (the air acting as an insulator) retards the rate of heat transfer.

4.3.6 Vacuum Production

(a) Thermal exhaust or hot fillings

This entails heating the contents of the container at least 71-82^{o}C prior to sealing. The contraction of the contents after closing produces the vacuum.

(b) Mechanical vacuum

In this case the seaming chucks operate in a vacuumized environment, thereby creating the same vacuum in the sealed container. It should be noted that the temperature and the head space volume have little effect on the vacuum produced by this method.

(c) Steam displacement

This is a process in which steam is injected into the head space, displacing the air, followed by immediate closure. The vacuum is caused by steam condensing.

The exhausting of containers for the removal of air shall be controlled as to meet the conditions for which the process was designed.

An increase in the amount of oxygen in the head space can accelerate the corrosion of the container, leading to detinning or even pin holing of the container.
Insufficient vacuum may also lead to discolouration of the contents from oxidation.

Too high a vacuum may lead to paneling (distortion inwards) of the container, whereas too low a vacuum can cause bulging of the containers (distortion outwards) if the outside atmospheric pressure is lowered, as is the case at higher altitudes.

An adequate vacuum combined with a head space provides a reservoir for any hydrogen gas which might be produced during a reaction between the contents and the container. In large flat containers the vacuum serves to hold the product against the sides of the container, promoting heat transfer.

4.3.7 Closing Operations

Particular attention should be given to the operation, maintenance, routine checking and adjustment of closing equipment. Sealing and closing machines shall be fitted and adjusted for each type of container and cover used. Seams and other closures shall be tight and secure and meet all application. The equipment manufacturer's or supplier's instructions and specification should be followed meticulously.

Critical factors such as sealing vacuum, head space, etc., should be measured and recorded at intervals of sufficient frequency to ensure compliance with that specified in the scheduled process.

4.3.8 Inspection of Closures

The hermetic sealing of cans depends on the formation of what is termed a double seam, formed by the mechanically interlocking and ironing the curl of the can end and the flange of the can body. To form a hermetic seal, any voids that exist in the mechanical seal must be filled with some form of gasket material. A double seam is formed in two operations, details of which may be found by consulting Chapters 2, 3 and 4 of the Metal Can Defects Identification and Classification Manual of Fisheries and Oceans.

4.3.8.1 Non-Destructive (visual) Inspection for External Defects

The closing machine operator, (includes seaming and sealing), closure supervisor or other competent person shall visually examine at least one container from each seaming, sealing, turret feed or closure head after closure has been completed at intervals not to exceed 30 minutes during operation of the closure machines. Each container shall be examined for the presence of externally visible defects, particularly at the seams, seals or closures. All observations shall be recorded.

When defects which may affect the integrity of the container or measurements outside of those specified for the closure are observed, immediate corrective action should be taken and recorded.

All products from the time of the last inspection should be subjected to an evaluation to ensure that the integrity of the containers has not been compromised. Suspect containers should be set aside for further evaluation.

Additional visual examinations and non-destructive measurements shall be made and recorded following a jam, an adjustment to or start up following a prolonged shut-down of a closure operation.

Visual examination should be carried out using the hand as well as the eye. Sometimes it is easier to feel a defect rather than see it. By running the fingers around the seam both on the inside and the outside, it is possible to detect any roughness, unevenness or sharpness. A description of visual inspection of the can and the commonly observed defects in metal containers as well as the most probable causes can be found in Chapters 4 to 7 inclusive of The Metal Can Defects Identification and Classification Manual published by the Department of Fisheries and Oceans, Government of Canada and in various manuals published by the can manufacturers, closure machine manufacturers and manufacturers of sealing compounds. Processors are advised to consult these manuals and become familiar with their contents.

4.3.8.2 Destructive Examination of Closures

In addition to regular observations for container external defects by visual examinations tear-down or destructive examinations and evaluations of the closures from at least one container from each seaming, sealing, turret feed or closure head shall be performed and recorded by a competent individual at the start-up of the closure operation and at intervals of sufficient frequency not to exceed 4 hours to ensure that the closure specifications are attained and maintained. Additional destructive examinations of closures shall be made immediately following a jam in a closure machine, after adjustment or after shut-down due to faulty seams or mechanical problems. Generally the closure performed by the canner is subject to the closest examination at this stage, however it is advisable to similarly examine and evaluate any closures made by the container manufacturer of at least one of the containers taken at any examination period.

Corrective action shall be taken when the inspection and evaluation reveals closures are not in compliance with the required specifications. All corrective actions shall be recorded.

More frequent visual examination and destructive evaluations of the closures should be carried out and recorded after corrective actions have been taken to ensure that the abnormalities or irregularities observed have been corrected.

The measurements and evaluations as well as their trends are important in the assessment of the closure integrity for control purposes. The recording of measurements and observations should permit the evaluation of trends, i.e., quality control charts.

4.3.8.2.1 Tear-Down Evaluation of Rigid Metal Can Double Seams

4.3.8.2.1.1 Round Cans

If the overlap is to be calculated using one of the formulas given below (I or ii), the double seam length (height or width) (w) should be measured prior to commencing the tear-down procedures. This should be measured at three points approximately 120° apart around the double seam, excluding the point of juncture with the side seam.

Other double seam measurements which can be made at the same time are used in the assessment of the seam quality:

(a) countersink depth (A)
(b) double seam thickness (S)

These should be made at the same points used for the double seam length.

All measurements should be recorded.

In the tear-down inspection of a double seam the following measurements should be made:

(c) overlap
(d) tightness rating
(e) juncture rating for soldered side seam cans

Visual observation of the pressure ridge, where applicable, is useful in evaluation of double seam tightness.

In addition to these, specially when the overlap is to be calculated using one of the formulas, the following measurements should be made:

(f) body hook length (BH)
(g) cover hook length (CH)
(h) end plate thickness (Te)
(i) body plate thickness (Tb)
(j) seam length (W)

In some instances the body hook and cover hook lengths are useful measurements in control of double seam quality and should be measured at least three separate points about the torn-down seam as described for the double seam length above.

Overlap

The overlap can be determined directly from a suitable cross-section cut of the double seam or by calculation.

The following formulas are used to calculate the overlap.

(i) Overlap = O = (CH + BH + Te) - W

(ii) Percent Overlap = %O = $\frac{(BH + CH + Te - W)}{(W - (2Te + Tb)}$ x 100

The overlap, body hook and cover hook lengths can be measured direct from a magnified cross-section image of a double seam with a seam scope and appropriate callipers or micrometers. The cross-section segments to be examined should be taken at least two or more places equally spaced around the double seam, excluding the juncture with the side seam.

In routine tear-down examination of a double seam both methods may be used, in that, a single cross-section is taken and the appropriate measurements made optically with the remainder of the double seam being torn down for further measurements and evaluations.

Juncture and tightness ratings

For the evaluation of both tightness and juncture ratings it is preferable that either ten point or percentage rating system be used. All measurements and evaluations should be recorded.

The instructions and specifications of both the container and the sealing machine manufacturers should be accurately and continuously followed in the assessment of the measurements, their trends and evaluations as well as those of the appropriate agency having jurisdiction.

Guidance in the tear-down of a double seam is given in Chapter 4 of the Metal Can Defects Identification and Classification Manual published by the Department of Fisheries and Oceans Canada.

4.3.8.2.1.2 Non-Round Cans

Such cans require special consideration. Container manufacturers' specifications should be consulted and followed to ensure that the appropriate measurements and evaluations are made at the critical locations.

4.3.8.2.2 Two-Piece Cans

The development of the two-piece can offers a number of advantages over the standard three-piece can. By eliminating the side seam and bottom double seam the possibility of leakers is diminished considerably. Another advantage of this two-piece can is the elimination of lead solder. The shallow drawn can is made by a single draw action and used for canned meats, and other products.

The taller drawn two-piece (DRD) can development is more recent than the shallow drawn. This can is made by multiple draw-redraw press actions and allows for the manufacture of standard sized food cans. There is no doubt that this container will make it easier for the food canner to achieve the hermetic seal; however can seam inspection and tear-down is still required on the packer's end. Therefore, those defects attributed to the double seams in three-piece cans will be the same for two-piece cans.

4.3.8.2.3 Identification of Can Defects

See Chapter 7 of the "Metal Can Defects Identification and Classification Manual" published by the Department of Fisheries and Oceans Canada.

4.3.8.2.4 Classification of Can Defects

See Chapter 5 of the "Metal Can Defects Identification and Classification Manual" published by the Department of Fisheries and Oceans Canada.

4.3.8.3 Glass Containers

There are innumerable glass containers used in the food industry, however relatively few of these containers are used for products which require sterilization. There are three types that are suitable for the high temperature sterilization: lug, side seal and push on, twist off (PT). Glass containers, in addition to being subject to breakage due to impact or other mechanical reasons, are also subject to thermal shock.

4.3.8.3.1 Thermal Shock

Thermal shock is caused by temperature differences between the inside and outside of the wall of the jar, which results in different expansion rates of the glass in the wall, causing an internal stress. This stress can open up minute or even microscopic cracks or checks resulting in larger cracks and container failure. It is ironic that while thick-walled glass containers, such as milk and pop bottles are more resistant to impact breakage, they are less resistant to thermal shock. Due to the extra thickness of the glass in the walls, there is more temperature differential between the inside and outside of the wall, causing greater internal stress. For this reason, glass containers to be used for heat processing should have relatively thin walls, and the walls and bottom of the container should be as close as possible to a uniform thickness.

Certain shapes of glass containers are more resistant to thermal shock than others. Generally, sharp contours and flat surfaces should be avoided in glass containers to be subjected to heat, since more failure occurs in these areas. There are also glass surface treatments such as stippling and knurling, which can, if incorporated into the design, help reduce failure due to thermal shock.

Chemical surface coatings which are often applied to glass containers to make them more resistant to brushing, also help resist thermal shock, since scratches and bruises on a glass container reduce its resistance to thermal shock.

4.3.8.3.2 Classification of Glass Container Defects

(1) Serious defects

(a) Any glass protrusions on either the inside or outside of the container. These could cause physical harm to people, but fortunately they occur very rarely in wide-mouthed food containers.

(b) Fire checks, including finish splits (an imperfection; crack or check going from surface to surface of glass container) and checks (an imperfection; a surface crack) in other parts of the container which will result in container failure during processing or loss of vacuum after processing.

(c) Out of round finish (an imperfection of non-roundness in glass containers), especially on side seal (pry-off) closures.

(d) Finish defects, including uneven or tilted finish, crizzles (an imperfection in the form of a multitude of fine surface fractures), chipped or damaged finish.

(e) Blowouts or thin area of side panel due to uneven distribution of glass in side walls.

(f) Variation in height or shape, which are outside of specifications and which will cause failure of the closure.

(2) Minor defects

(a) Variation in height or shape which will not necessarily cause failure of closure.

(b) Swab marks (black smears) in glass (carry over from mold lubrication) - particularly noticeable in clear (flint or colourless) glass.

(c) Air bubbles, rattails or foreign material (such as unmelted silica) in glass.

(d) Slight variations in wall thickness.

(e) Deep baffle marks (mark or seam on the container resulting from a mold joint between blank mold and baffle plate) on the bottom of jars.

(f) Line overs on the finish which could result in a slow loss of vacuum.

(g) Scratched, bruised or scuffed containers.

(h) Dust or other foreign material which can be cleaned out by a jet of dry air (otherwise is a serious defect).

4.3.8.3.3 Identifying Problems in Glass Containers

On the bottom of each glass container there is a code put there by the glass manufacturer. This code is helpful in identifying problems.

For example, defects such as "checks" in glass may occur only in one mold and vice versa, glass container failure occurring predominantly on one mold number indicates a manufacturing defect, whereas, if failure is distributed over all mold numbers, the problem is most likely due to handling or thermal shock.

Glass breakage due to impact or rough handling can usually be identified from that caused by thermal shock by the nature of the cracks. Impact will exhibit a cone-shaped break at point of impact with cracks radiating outwards. Thermal shock breakage usually results in a long curving crack with a mirror-like surface under reflected light. A small roundish hole near the bottom of the container holding viscous liquids is likely due to a "water hammer" action of the liquid on the container when it received a sharp knock. This occurs after processing, often during palletizing, or shipping, and can be corrected by gentler handling, better packaging, or by packing container's neck down.

4.3.8.3.4 Types of Closures for Glass Containers

(1) Twist off

This is probably the most commonly used closure for glass food containers. The hermetic seal is formed between the top of the container finish and the ring of compound around the inside circumference of the cap. The cap is held in place by the internal vacuum in the container, and by metal lugs on the cap and corresponding thread on the container.

There are several variations in shape of "Twist-off" caps, and each designed for a specific need. However, the basic principles of each remain the same. The number of lugs varies to some extent depending on the size of the container "mouth." In most caps for sterilizing, there are four lugs, but on some larger containers there may be six lugs.

(2) Side seal or pry off closures

Once widely used, this style of cap is now seen less and less. The hermetic seal is made by a gasket between the skirt of the cap and the side surface of the container finish. The cap is applied by pressure and held in place by internal vacuum.

(3) P T Caps

P T caps are so called because they are applied by downward pressure, yet are removed by twisting off. The hermetic seal in these caps is between the top and side surface of the container finish, and the gasket in the cap which is both in a ring around the inside circumference of the cap, and down the inside of the skirts of the cap.

There are fine threads in the glass on the finish which embed in the compound of the skirt, together with internal vacuum hold the cover in place. Often P T caps are designed with a "pop up" centre which indicates that the jar has a proper vacuum by popping when opened.

4.3.8.3.5 Examination of Closures

Appropriate detailed examinations and tests shall be conducted by qualified personnel at intervals of sufficient frequency to ensure proper closing machine performance and consistently reliable hermetic seal production.
In addition to routine inspection, a mechanical or electronic "dud detector" may be installed in the line, either before or after processing and cooling (preferable in both places). These machines work by removing any containers which have off-level caps, and those caps which do not have the proper concave inflection indicating the proper vacuum level in the container.

(1) Frequency of Examination

(a) External examination at Capper:
Straight Line Machines - six samples at random each 30 minutes. Rotary capper - one sample from each head each 30 minutes.

(b) Cap removal examination at capper:
Straight Line Machines - three samples taken consecutively every 4 hours. Rotary capper - one sample per head every 4 hours.

(c) External examination after processing and cooling: 6 samples taken at random each 30 minutes.

(d) Cap removal examination after processing and cooling: 6 samples taken at random every 4 hours.

(2) External inspection

Check external appearance of the cap for scratches, discolouration, and similar defects, and to be sure the cap is level, not cocked or tilted. There should be sufficient vacuum in the container to give the cap a concave appearance (more pronounced on processed, cooled containers). For "twist-off" caps, check for crushed lugs. A crushed lug occurs when the lug of the cap has been forced over the thread, and while the cap often appears to be sealed normally, looking under the skirt will reveal the actual position of the lugs.

A measurement which can be made at this point, without destroying the seal is called the pull-up. This is defined as the distance between the leading edge of the cap lug, and the parting line (where finish moulds separate) in the jar finish, measured in 1/16 inch (1.6 mm). If the leading edge of the lug has not reached the parting line, the measurement is recorded in +1/16" (1.6 mm) while, if it has passed the parting line, it is recorded as - 1/16" (-1.6 mm). The pull-up value for each container and cover must be determined as different finishes, and different design of caps will give different desired values. Once the pull-up value desired is determined, a tolerance must be allowed to account for variation in caps and container finish.

For PT caps check to make sure that the buttons of the "pop-up" feature are down indicating good vacuum.

(3) Cap removal inspection

The checks done are as follows:

(a) Visual inspection same as for external inspection

(b) Cap security on twist-off caps

(c) Removal torque on twist-off and P T caps, using torque meter (this test is optional).

(d) Determination of vacuum and head space.

(e) Inspection of impression in gasket.

(4) Cap security - twist-off caps

(a) With a felt marking pen, make a vertical line along the parting line of the finish and into the cap.

(b) Take vacuum - using a vacuum gauge, or simply loosen cap by hand until vacuum is broken.

(c) Re-seal the closure until cap is finger tight - do not tighten with any force. Mark a line on container corresponding to line on cap.

(d) Cap security is the distance between the line indicating original position and the one showing new position recorded in 1/16" (1.6 mm).

Record measurement as plus if new line does not come up to original, and minus if it passes original line. Proper security should be between +2/16" and +5/16". (3.2 mm and 8 mm)

(5) Removal torque

This is defined as the foot-pounds (Joules) of torque required to remove either a Twist-off or P T cap and its use as a quality control procedure is optional. If used, there are torque-meters available especially designed for this purpose, and the acceptable torque range will be determined by each company, after consultation with the cap and glass suppliers.

Removal torque can be affected by the presence of product in the hermetic seal (between the finish and the gasket of the cap) which can effectively cement the cap on. Too low a torque reading could be a result of poor security, loss of vacuum or where excessive tightening of cap has resulted in stripped lugs.

(6) Vacuum and head space

The low acid foods packed in glass containers, are sealed with vacuum type closures. The resultant vacuum within the container plays a most important role in forming and maintaining the hermetic seal. Since head space is closely related to vacuum formation, its measurement is also taken during examination. There are three general methods of obtaining vacuum in glass containers:

(a) hot fill

(b) mechanical means
(c) steam displacement

(See section 4.3.6 on methods of providing a vacuum in food container)

It should be noted that mechanical vacuum cappers are used primarily on dry products. With cappers using steam displacement (steam flow type), the container is subjected to superheated steam which displaces the head space gases by a flushing action and becomes entrapped under the cap. Either straight line or rotary cappers are used with steam injection. Once the steam condenses, a partial vacuum begins to develop immediately after capping. The steam also softens the plastisol gasket within the closure which aids in good seal formation. In this respect, the formation of the hermetic seal on a glass container is perhaps less complicated than double seaming. Factors affecting vacuum formation will be noted in the following.

(7) Capper efficiency

The most convenient, routine check on the vacuum efficiency of a steam flow capper is called the cold water vacuum check. The advantages of this simple test is, no special equipment is required, can be run prior to actual filling operations and also serves as a check on proper setting of the capper. To perform the cold water vacuum check, a jar to each rotary capper head or six jars from a straight line capper are filled with cold tap water to approximate head space which will be used with the product to be run. The capper is then allowed to warm up for approximately 5 to 10 minutes to the operating temperature and the normal steam setting followed by sealing of the jars. The jars are then opened and re-run through the capper and then checked for vacuum. The function of the initial run through the capper is to deaerate the water thereby providing a truer vacuum reading. The measured vacuum in most cases should be 22" Hg (-67.8 kPA) or more as recommended by the closure supplier. This cold water vacuum check shall be performed at the start up of a line, after a prolonged shutdown, at change-over from one container size to another, after a major jam and whenever significant vacuum fluctuations occur.

(8) Inspection of impression in gasket of cap

Probably more than any other single examination the impression of the container finish into the gasket of the cap tells us the quality of the closure. The impression should be moderately deep, and uniform in both depth and width. Variations in depth can indicate a tilted or off-level finish, or dips in the finish of the container. Variations in width of the impression besides the above can indicate that the cover has been subjected to impact while the compound was soft. One should also check for cut-through of the gasket which could be a result of excessive tightening or pressure when applying the cover, or impact to the container or cap. Some gasket materials discolour during processing and discolouration may be more intense around a problem area such as a line or split in the finish, often helping locate potential container failure problems.

(9) Auxiliary equipment

The function of auxiliary equipment, such as the head spacers, cocked-cap detectors and ejectors, and dud detectors, which may directly or indirectly affect the sealing of the container should be considered and reviewed by those individuals responsible for closure inspection.

4.3.8.3.6 Classification of Glass Closure Defects

(1) Serious defects

(a) Enamel failure on inside of cap, including no enamel, pinholes in enamel, scratches or poor adherence of enamel to cap.

(b) Gasket failure - poor distribution, overlapping, pinholes, no gasket or wrong gasket material.

(c) Lacquer failure on outside of caps when subjected to heat treatment as used in process.

(d) In coloured caps, failure of the colour to withstand the heat process, including blushing, fading, etc.

(e) Improper formation or depth of lugs on push on caps.

(2) Minor defects

(a) Scratched or scuffed outside surface.

(b) Minor changes in lacquer or colour during processing.

(c) Colour variation in coloured caps.

(d) Discolouration of gasket during processing.

(e) Error in printing if lithographed.

(f) Smears, dirt or foreign material on caps which can be cleaned in normal processing operation (otherwise is a serious defect).

4.3.8.4 Flexible Packages

Flexible packages for low acid foods provide a viable alternative to metal and glass containers. Commercial sterility is obtained by retorting using:

(a) water and superimposed air pressure processes,

(b) steam-air processes, or

(c) a continuous non-agitating process.

This section gives some general information on pouches and testing procedures. More specific information is given in the National Standard of Canada - Use of Flexible Laminated Pouches for Thermally Processed Foods prepared by the Canadian General Standards Board (Nov.87). -

CAN/C6SB-32.302-M87. The basic construction of the retortable flexible package (pouch) consists of a three ply lamination.

(1) Inner layer

A modified polyolefin (medium to high density polyethylene modified with polyisobutylene) or polypropylene (or ethylene-propylene blends) of 3 mil (76 micron) thickness is the inner heat sealant ply. Functions of this ply include heat sealability, compatibility (non reactive) with foods packed therein and strength.

(2) Middle layer

Aluminum foil with a thickness of 1/3 mil(8.5 micron) is used as the primary barrier material. This ply possesses excellent vapour, gas and light barrier properties as well as superb heat transfer characteristics. The shape of the retortable pouch, i.e. high surface area to volume ratio and the aluminum foil are the two main reasons for reduced thermal processes when compared to those of foods packed in cans and glass containers.

(3) Outer layer

The ½ mil (13 micron) of polyester (mylar) as the outer ply provides strength, printability and scuff resistance.

4.3.8.4.1 Package Integrity

Since the successful achievement of commercial sterility of foods, packed in flexible packages, is a function of heat application and prevention of re-infection by microorganisms in the package, its integrity must be carefully monitored. Leakers may result through inadequate seals or defective pouch body material. If flexible packages are to be accepted, they must give the same degree of protection as metal and glass containers. Therefore, the failure or defect rate of not more than 0.01% should be applied to this type of package.
To date, experience has indicated that this relatively low defect rate can be achieved if package, product and production is closely monitored.

4.3.8.4.2 Flexible Package Inspection

(1) Fusion

The highest seal quality will always be obtained if the sealing surfaces are flat, clean and without creases or overlap of material. The package presently in use is a pouch with seals on all four sides, three of which are produced by the pouch manufacturer before the food product comes in contact with it. When filling the pouch, care must be exercised to avoid contaminating that area of the pouch which will subsequently form the closing seal. The sealing of the open side, after filling, is accomplished by a double-impulse sealing technique. To determine if the heat seal is satisfactory, the weld character is assessed using various tensile tests. Pouches destined for conventional handling should feature seals with 7 psi (48.3 kPa) or higher tensile strength values.

(2) Internal burst test

This test for seal integrity has been generally accepted as a good overall measure of the ability of a package to withstand handling. The internal burst test has the advantage of detecting the weakest point of the seal within the unsealed or cut and emptied pouch.

An accepted or commercial internal burst criterion is 20 psig (138 kPa) for 30 seconds; however, variations of the burst test exist which are also utilized.

(3) Visual examinations

The visual examination of pouches provides valuable information with regard to the package integrity. Not only is this test non-destructive but expensive equipment is not necessary. Defects, which can be identified with this examination include, heat creep, significant wrinkles, surface irregularities and entrapped matter in the seal area.

(4) Wrinkles

Wrinkles may result in package leakers or allow the entry of spoilage organisms and thereby adversely affect package performance. Generally, true wrinkles are defined as a material fold on one seal surface, entrapped matter within the seal or an embossed surface. True wrinkles are not to be tolerated and are unacceptable. Minor wrinkles are acceptable, but if they are large enough to suspect contamination rejection is the alternative.

(5) Frequency of inspection

Detailed inspections and tests shall be conducted by qualified persons at intervals of sufficient frequency to ensure proper closing machine performance and to assess the hermetic seal as per the following plan.

Sampling Site

Test

No. of Samples per lot

Reject Criteria

In-Process After Pouch Formation
Air Burst Bottom & Side Seal 6 consecutive per 30 minutes
1

In-Process-After Closure Seal Air Burst Top Seal Visual for Defects 6 consecutive per 30 minutes 100%
1

All Defective pkgs. removed

Final Package-After Retorting
Air Burst

Visual for Defects

13 random (6 bottom & Side) (7 - Top Seal) 100%
1

All Defective pkgs. removed

4.3.8.4.3 Action Required When Serious Defects are Found

Defects observed in incoming containers should result in a more widespread inspection of the received material before making a decision on acceptance or rejection of the lot.

If serious defects are found at any time after processing, the lots involved are to be placed under detention and the Regulatory Authority office informed by telephone. The Regulatory Authority office shall initiate a detailed investigation in consultation with headquarters, when required.

4.3.8.5 Product Retention for Closure Defects

If a seam or closure defect, which may result in a loss of hermetic integrity, is found upon routine examination (4.3.8), all containers sealed or closed between the discovery of the fault and the last satisfactory check should be identified and assessed.

4.3.9 Handling of Containers after Closure

At all times containers should be handled in a manner that protects the container and its closure from damage which may cause defects and subsequent microbial contamination. Design, operation and maintenance of container handling methods should be appropriate for the types of containers and materials used. Poorly designed or incorrectly operated container conveying and loading systems are known to cause damage. For example, cans which are scramble packed may suffer damage, even when water cushioned, when the level of the cans in a crate or the crateless retort reduces the efficiency of the cushion. Additionally, damage which may adversely affect integrity may be caused by poor alignment of the can feed mechanism or by the presence of floaters.

Care should also be taken with semi and fully automatic crate loading systems as well as in-feed conveyor systems to continuous sterilizers. The accumulation of stationary containers on moving conveyors should be avoided or kept to a minimum number as this can result in damage to the containers.

Semi-rigid and flexible containers may be prone to certain types of damage, e.g., snagging, tearing, cutting and flex-cracking. Containers having sharp edges should be avoided as they may cause damage to neighbouring containers. Semi-rigid and flexible containers should be handled with special care (see section 5).

4.3.10 Coding

Each container shall be labeled in a legible and permanent manner to identify the registered establishment, the meat product and the date on which the meat product is thermally processed or be marked with an identifying alphanumeric code which is permanent, legible and does not adversely affect the container integrity. (The code should be embossed or marked with indelible ink)

The code mark shall identify the establishment in which the product was thermally processed, the product, the year and the day of the year when thermally processed. A key to the code marks employed must be made available to the inspector upon request. Further, when the establishment is not identified with its registration number, the operator must forward to the Chief, Food Preservation Systems, Science and Technology Services, through the inspector in charge the information that is used in the code mark to identify the establishment.

The code mark permits the identification and isolation of code lots during production, distribution and sale.

Processors may find it useful to have a coding system which identifies production periods of less than 24 hours, say 8 hours or less and the particular line and/or sealing machine. The coding of containers in the manner described, supported by adequate processor records, can be very helpful in any investigation and may minimize the quantity of product subject to recall.

The outside of each shipping carton should indicate the code or codes of the canned food contained therein.

4.3.11 Washing

Where necessary, filled and sealed containers should be thoroughly washed before sterilization to remove grease, dirt and product from the outside of the container.

Not only is it more difficult to wash containers after sterilization, but it can also increase the risk of post-processing contamination.

4.4 Thermal Processing

4.4.1 General Considerations

4.4.1.1 Low-Acid Foods

Scheduled processes for low-acid foods must be established by competent persons having an expert knowledge of thermal processing and having adequate facilities for making such determinations. It is absolutely necessary to establish the required thermal process with accepted scientific methods. The type, range, and combination of variations encountered in commercial production shall be adequately provided for in establishing the scheduled process.

4.4.1.2 Acidified Low-Acid Foods

Scheduled processes for acidified low-acid foods must be established by competent persons having expert knowledge of acidification and thermal processing and having adequate facilities for making

such determinations. It is absolutely necessary to establish the required acidification and thermal process with accepted scientific methods. The type, range, and combination of variations encountered in commercial production shall be adequately provided for in establishing the scheduled process.

The microbiological safety of acidified low-acid canned foods depends primarily upon the care and accuracy with which the entire process is carried out. Low-acid foods acidified to an equilibrium pH of greater than 4.6 must be processed to commercial sterility.

It must be realized that the thermal processing of low-acid canned foods as well as the acidification and thermal processing of acidified low-acid canned foods are very critical operations involving public health risks and appreciable losses of finished products if inadequately processed.

Instances have been known where improperly processed or sealed acidified low-acid canned foods have supported mould or other microbial growth which raised the product pH to above 4.6 and allowed the growth of Clostridium botulinum.

4.4.2 Establishing Scheduled Processes

4.4.2.1 Low Acid-Foods

The thermal process is established on that which is required to achieve at least a commercially sterile food product.

Due to the nature of the packaging materials used, flexible, and to some extent semi-rigid containers will change dimensions when exposed to applied physical stress. It is extremely important that the package dimensions, particularly the depth or thickness, be determined and controlled within specified limits. The dimensions and variations must be taken into account when determining the thermal process.

The thermal process shall be determined by carrying out heat penetration tests or other equivalent procedures. Acceptable scientific methods of establishing thermal processes shall include, where necessary, but not be limited to, microbial thermal death time (TDT) data, process calculations based on product heat penetration data, inoculated packs and incubation tests. The tests must be carried out under the most adverse conditions which are likely to be met under production conditions.

For accurate determination of the heat penetration it is essential that the temperature at the slowest heating point in the container contents be monitored during the test. A sufficient number of trials must be carried out to ensure that all possible variations have been taken into account in establishing the required thermal process.

Because of the nature of the packaging materials used in flexible and semi-rigid containers, the container alone cannot generally be used to fix the heat sensing element at the desired point in the container contents. Therefore, other means may be required to ensure that the temperature sensing device is maintained at the desired point in the container contents during the entire test and without altering the heat penetration characteristics. During such testing the container dimensions, specially the thickness, must be controlled and known.

Because there may be unexpected deviations in heat transfer and product cooling characteristics, only persons having expert knowledge and experience in thermal processing, should use laboratory simulators to develop scheduled processes. Results should, wherever possible, be verified in a production retort under normal conditions.

If accurate heat penetration data cannot be obtained, alternate methods (based on accepted scientific methods), may be used.

While compensations for moderate changes in container size for products showing simple heating curves (2.13.2) can be derived by calculation, the effect of such changes, specially for products having broken heating curves (2.13.1) should be verified by heat penetration test or other equivalent methods.

The results of all tests and calculations used to determine the thermal process as well as those to establish the critical factors and their variation shall be incorporated into the scheduled process. For conventionally sterilized canned low-acid foods such a scheduled process shall include as a minimum the following data:

-Levels and types of preservatives, where applicable;

-Product and filling specifications, including any restrictions on ingredient changes or formulation including dimensional tolerances of solid ingredients;

-Container size (dimensions) and type;

-Container orientation and spacing in retort where appropriate;

-Ingoing weight of products including liquid where appropriate;

-Residual air content in the sealed container (flexible and semi-rigid containers);

-pH of the product, where applicable;

-Minimum initial temperature;

-Water activity of the product, where applicable;

-Venting procedures, where applicable. (These should be determined on fully loaded retorts only);

-Type and characteristics of the thermal processing system(s);

-Sterilization temperature;

-Sterilization time;

-Overpressure, where applicable;

-Cooling method, where applicable;

-Date determined and source or processing authority.

Any changes in the product specifications, for example storage temperature of the finished product, must be evaluated as to their effect on the adequacy of the process. If the thermal process is found to be inadequate it must be reestablished.

The residual air content of filled and sealed flexible and semi-rigid containers shall be kept to within specified limits to prevent excessive stressing of the seals during thermal processing and altering the container dimensions which can adversely affect the heat penetration.

Complete records concerning all aspects of the establishment of the scheduled process, including any associated incubation tests, shall be returned and readily available upon formal request by the inspector.

4.4.2.2 Acidified Low-Acid Foods

In addition to those factors specified in 4.4.2.1, the acidification and thermal processes required to achieve commercial sterility shall include the type of acidification process and equipment available as well as the time and conditions required to attain the desired equilibrium pH of all components of the product.

The process used to acidify the product must be determined by accurate pH measurements of all components to ensure that the desired equilibrium pH is achieved, if not prior to, at least at the end of the thermal treatment including cooling. Tests of the acidification procedure must be carried out under the most adverse conditions which are likely to be met in production. It is essential to carry out a sufficient number of tests to determine the effect of all possible variations.

Although the thermal treatment necessary to achieve commercial sterility of low-acid foods acidified to an equilibrium pH of 4.6 or less is considerably less severe than that for low-acid foods, the same principles as described for low-acid foods for determining an adequate thermal process shall be applied. Generally bacterial spores will not outgrow in foods having an equilibrium pH below 4.6, hence the thermal treatment may only be required to kill mould, yeasts, vegetative bacterial cells and inactivate enzymes.

The results of the acidification and thermal process determinations together with established critical factors shall be incorporated into the scheduled process.

In addition to those factors given in 4.4.2.1, pertinent details of the acidification process should be included.

A similar list of critical factors shall also be made for aseptically processed and packaged products. Such a list shall include the equipment and container sterilization requirements.

Product and filling specifications shall contain at least the following, where applicable: full recipe and preparation procedures; filling weights, head space, drained weight, temperature of product components at filling and consistency. Small deviations from the product and filling specifications which may seem negligible can cause serious deviations in the heat penetration characteristics of the product. For rotational sterilization, viscosity rather than the consistency can be an important factor and shall not only be specified but also controlled at the specified level.

The product code shall correspond clearly to a complete and accurate product specification containing, where applicable, at least the following:

-full recipe and preparation procedures;

-equilibrium pH of final product;

-ingoing weight of product(s), including liquid where appropriate;

-head space;

-drained weight;

-maximum dimensions of product components;

-temperature of products at filling;

-initial temperature;

-consistency or viscosity;

-thermal process parameters.

Complete records concerning all aspects of the establishment of the scheduled process, including any associated incubation tests, shall be retained and readily available upon formal request by the inspector.

4.4.3 Acidification and Thermal Processing Conditions

Only properly determined scheduled processes must be used.

Scheduled processes including venting and acidification procedures, where appropriate, to be used for all products and container sizes being packed shall be posted in a conspicuous place near the processing equipment, so that it is readily available to the retort or processing system operator and to the inspector.

Acidification, thermal processing and associated processing operations shall be performed and supervised only by properly trained personnel. It is extremely important that both the acidification and thermal processing operations be carried out by operators under the supervision of personnel who understand the principles of acidification and thermal processing and who realize the need to follow

instructions closely. Such personnel are required to have obtained a certificate of competency, having completed a thermal processing course approved by the Regulatory Authority.

It is essential that all heat processing equipment shall be properly designed, correctly installed and carefully maintained.

4.4.3.1 Acidification

Acidified, fermented and pickled foods shall be so manufactured, processed and packaged that an equilibrium pH of 4.6 or lower is achieved within the time designated in the scheduled process and maintained.

Pertinent tests to monitor the acidification process at critical control points shall be carried out with sufficient frequency to ensure that the process is under control, i.e., as specified in the scheduled process.

Acidified low-acid foods which do not attain an equilibrium pH of 4.6 or lower shall be given a thermal process equivalent to that for low-acid foods.

4.4.3.2 Thermal Processing

Commercial sterility must be accomplished using such equipment and instruments as are needed to ensure that the scheduled process is achieved and to provide proper records.

Thermal processing shall be commenced as soon as possible after closing to avoid microbial growth or changes in heat transfer characteristics of the products. (As a general rule, the time between sealing the filled container and thermal processing should not exceed 60 minutes.) During breakdowns or when production is low, product may have to be processed in partially loaded retorts or pasteurizers in order to comply with the time limitation. In such instances, changes to the thermal processing parameters including venting procedures, where applicable, may be required.

The initial temperature of the contents of the coldest containers to be processed shall be determined and recorded with sufficient frequency to ensure that the temperature of the product is no lower than the minimum initial temperature specified in the scheduled process. In the case of hot fill operations, this would be one of the first containers to go into the retort, in the case of cold fill operations, one of the last to go into the retort. An appropriate sample container is selected, the contents are stirred and the temperature recorded using a thermometer. This is done at the time the retort is being closed for batch systems.

The thermal status of all containers shall be so indicated to avoid filled sealed containers bypassing the thermal process. This is particularly important in batch operations in which there is an ever present risk of large quantities of containers, i.e., in baskets, trucks, cars, crates, etc., by-passing the retorts or pasteurizers.

Therefore, all retort baskets, etc., containing product for thermal processing or at least one of the containers on the top shall be plainly and conspicuously marked with a heat sensitive indicator, or

by other effective means to provide visual evidence whether or not each unit has been thermally processed.

When such heat indicators are attached to baskets, crates, etc., previously exposed indicators must be removed before refilling with unprocessed products.

The thermal process must be continuously monitored using the instruments as described in 4.5.2. Accurate records shall be made and maintained.

An accurate, clearly visible clock or other suitable timing device shall be installed in the thermal processing room and times should be read from this instrument and not from wristwatches, etc. Where two or more clocks or other timing devices are used in a thermal processing room they shall be synchronized. Temperature/time recording devices are not satisfactory for measuring the sterilization or thermal process times.

Commercial sterility of low-acid products acidified to a pH of 4.6 or less when thermally processed at atmospheric pressure, (hot-fill and hold), shall be accomplished using suitable equipment and the necessary instruments (see 4.5.2) to ensure that the scheduled process is achieved and to provide the proper records. Both temperature distribution and rates of heat transfer are important. Because of the variety of equipment available, reference should be made to the manufacturer of the equipment for details of installation, operation and control. Where the hot-fill and hold technique is used, it is important that all inner surfaces of the container reach the scheduled container sterilization temperature.

4.4.4 Critical Factors and the Application of the Scheduled Process

In addition to the minimum initial temperature of the product, sterilization or thermal process times and temperatures as well as overpressure, where applicable, other critical factors as specified by the process authority in the scheduled process shall be measured, controlled and recorded at intervals of sufficient frequency to ensure that these factors remain within the limits specified. Examples of these additional critical factors is given in 4.4.2.1 and 4.4.2.2.

Venting for steam retorting is critical, therefore time and temperature for venting operations as detailed in the vent schedule must be meticulously followed.

4.5 Equipment and Procedures for Acidification and Thermal Processing

4.5.1 Acidification Systems

For products that are to be acidified to an equilibrium pH at or below 4.6, it is essential that the manufacturer shall employ appropriate control procedures to ensure that the finished goods do not present a health hazard. Sufficient control, including frequent testing and records of results, shall be exercised so that the equilibrium pH values for acidified, fermented and pickled foods do not exceed 4.6. Such foods whose equilibrium pH is greater than 4.6 shall be treated as a low-acid food and shall be processed accordingly. Measurements of acidity of foods in-process may be made by potentiometric methods, titratable acidity, or in certain instances colourimetric methods.

In-process measurements by titration or colourimetry shall be related to the finished equilibrium pH. If the finished equilibrium pH is 4.0, or below, the acidity of the final product may be determined by any suitable method. If the finished equilibrium pH of the food is above 4.0 the measurement of the finished equilibrium pH shall be by a potentiometric method.

4.5.1.1 Direct Acidification

Procedures for acidification to attain acceptable pH levels in the food include, but are not limited to the following:

(1) blanching of the food ingredients in acidified aqueous solutions;

(2) immersion of the blanched food in acid solutions. Although immersion of food in an acid solution is a satisfactory method for acidification, care should be taken to assure that the acid concentration is properly maintained;

(3) direct batch acidification which is generally achieved by adding a known amount of an acid solution to a specified amount of food during acidification;

(4) direct addition of a predetermined amount of acid to individual containers during production; for this, liquid acids are generally more effective than solid or pelleted acids. Care should be taken to ensure that the proper amount of acid is added to each container and distributed uniformly;

(5) addition of acid foods to low-acid foods in controlled proportions to conform to specific formulations; and

(6) the time for equilibrium and buffering effects should always be taken into account. In all cases, equilibration should be completed by the termination of the thermal processing.

4.5.1.2 Acidification by Fermentation and Salt Curing

Temperature, salt concentration and acidity are important factors in controlling the fermentation and salt curing of foods. The progress and control of the fermentation shall be monitored by appropriate tests. The concentration of salt in the brine shall be determined by a chemical or physical test, at sufficient intervals to assure the control of the fermentation. The progress of the fermentation shall be monitored by pH measurements or acid/base titrations or both according to methods acceptable to the process authority, at sufficient intervals to assure the control of the fermentation. The concentration of salt or acid in the brine in bulk tanks containing salt stock may become significantly diluted and therefore should be routinely checked and adjusted as necessary.

4.5.2 Instruments and Controls Common to Different Thermal Processing Systems

4.5.2.1 Indicating Thermometer

Each retort, product sterilizer or pasteurizer shall be equipped with at least one indicating thermometer.

The mercury-in-glass (MIG) thermometer is recognized as the most reliable temperature indicating instrument at the present time. An alternative instrument having equal accuracy, precision and reliability may be used subject to the approval of the Regulatory Authority. The MIG thermometer shall have divisions that are easily readable to 0.5ºC (1ºF) and whose scale does not contain more than 4ºC per centimetre (17ºF per inch) of graduated scale. Thermometers shall be tested for accuracy against a known accurate standard thermometer. This should be done in steam or water as appropriate and in a similar aspect or position to that in which it is installed in the retort. Such tests shall be performed just prior to installation, and at least once a year thereafter or more frequently as may be necessary to ensure their accuracy. A dated record of such tests should be kept. A thermometer that deviates by more than 0.5ºC (1ºF) from the standard thermometer reading shall be replaced. A daily inspection of MIG thermometers shall be made to detect and replace thermometers with divided mercury columns or other defects which may impede their accuracy. If alternate devices are used they shall be subject to the same testing and standardization as described for MIG thermometers.

The indicating thermometer shall be located so as to be accurately and easily read, since these are the reference instruments for indicating the processing temperature, not the recording thermometers.

4.5.2.2 Temperature/Time Recording Devices

Each retort, product sterilizer or pasteurizer shall be equipped with at least one temperature/time recording device. This may be combined with a steam controller, i.e., a temperature controlling and recording instrument. It is important that the correct chart be used for each device. The chart shall have a working scale of not more than 12ºC to the centimetre (55ºF to the inch) within the range of 10ºC (18ºF) of the sterilizing or process temperature, and the chart graduations shall not exceed 1ºC within 6ºC of the processing temperature. The recorder shall be calibrated so that the temperature indicated is not greater than the temperature of the indicating thermometer. A means of preventing unauthorized changes in the adjustment shall be provided. It is important that the chart be used to provide a permanent record of the thermal processing temperature in relation to time. The timing device shall be accurate, reliable and checked as often as necessary to ensure that its accuracy and reliability is maintained.

4.5.2.3 Pressure Gauge

Each pressure vessel or retort shall be equipped with an accurate and reliable pressure gauge. The gauge shall be checked for accuracy at least once a year. The gauge shall be set so as to read zero at the prevailing atmospheric pressure. The scale shall have a range such that the safe working pressure of the retort is approximately two-thirds of the full scale and be graduated into divisions not greater than 14 KPa (2 p.s.i.). The gauge dial shall be large enough to be easily and accurately read (diameter not less than 10 cm or 4 in). The instrument may be connected to the retort by means of a gauge cock and syphon.

4.5.2.4 Steam Controller

Each retort, product sterilizer or pasteurizer in which steam is the source of heat shall be equipped with a steam controller to maintain the desired temperature. This may be a recording-controlling instrument when combined with a recording thermometer.

4.5.2.5 Pressure Safety Valve

Each retort shall be equipped with a pressure safety valve having a capacity sufficient to prevent undesired increases in the retort pressure. Such valves shall be of a type and installed in a manner approved by the agency having jurisdiction. If a retort is used only at atmospheric pressure, a pressure safety valve may not be necessary.

4.5.2.6 Timing Devices

These shall be checked to ensure accuracy as often as necessary.

4.5.3 Pressure Processing in Steam

4.5.3.1 Batch Still Retorts

4.5.3.1.1 Common Instruments and Controls

All retorts shall be equipped with the instruments and devices described in 4.5.2.1 to 4.5.2.5, inclusive.

Bulb sheaths of indicating thermometers and probes of temperature recording devices shall be installed either within the retort shell or in external wells attached to the retort. External wells should be connected to the retort through at least a 19 mm (3/4 in.) diameter opening and shall be equipped with an adequate (1.6 mm or 1/16 in., or larger) bleeder opening so located as to provide a constant flow of steam past the length of the thermometer bulb or recorder probe. The bleeder for external wells shall emit steam continuously during the entire thermal processing period. Thermometers shall be installed where they can be accurately and easily read.

4.5.3.1.2 Steam Inlet

The steam inlet to each retort shall be large enough to provide sufficient steam for proper operation of the retort, and shall enter at a suitable point (generally opposite) to facilitate air removal during venting.

4.5.3.1.3 Crate Supports

A bottom crate support shall be employed in vertical retorts so as not to substantially affect either venting or steam distribution. Baffle plates shall not be used in the bottom of retorts.
Centering guides shall be installed in vertical retorts to ensure adequate clearance between the retort crate and the retort wall.

4.5.3.1.4 Steam Spreaders

Perforated steam spreaders, if used, shall be checked regularly to ensure they are not blocked or otherwise inoperative. Horizontal still retorts shall be equipped with perforated steam spreaders that extend for the full length of the retort. In vertical still retorts perforated steam spreaders, if used,

shall be in the form of a cross or coil. The number of perforations in spreaders for both horizontal and vertical still retorts shall be such that the total cross-sectional area of the perforations is equal to 1.5 to 2 times the cross-sectional area of the smallest part of the steam inlet line.

4.5.3.1.5 Bleeders for Condensate Removal

Bleeders shall be of a suitable size, e.g., 3 mm (1/8 in) and location and shall be fully open during the entire thermal process, including the come-up-time. In retorts having top steam inlet and bottom venting, a bleeder or other suitable device shall be installed in the bottom of the retort to continuously remove condensate. All bleeders shall be arranged in such a way that the operator can observe that they are functioning properly. Bleeders are not part of the venting system.

4.5.3.1.6 Stacking Equipment

Crates, trays, gondolas, dividers, etc., for holding product containers shall be so constructed that steam can adequately be circulated around the containers during the venting, come-up and sterilization times.

4.5.3.1.7 Vents and Venting Systems

To ensure adequate removal of air from the retort and uniform temperature distribution during thermal processing, venting schedules shall be established with correctly applied temperature distribution studies. Such studies shall be carried out by persons competent and experienced in thermal processing. Records of all studies shall be made available to the inspector upon request and maintained. Once established, the venting schedule shall be posted adjacent to the applicable equipment at the processor's location.

(1) Vents shall be installed in such a way that air is removed from the retort before timing of the process is started.

(2) Vents shall be controlled by gate, plug cock or other adequate type valves and must be fully open to permit rapid discharge of air from the retort during the venting period.

(3) Vents shall not be connected directly to a closed drain system. If the overflow line is used as a vent, there shall be an atmospheric break in the line before it connects to a closed drain.

(4) The vent should be located in that portion of the retort opposite the steam inlet; for example steam inlet in bottom portion and vent in top portion.

(5) The total cross-section area of steam vent outlets shall always be greater than the cross-section area of the steam inlet.

When a retort manifold connects several vent pipes from horizontal single retorts, it shall be controlled by a gate, plug cock or other adequate type of valve. The retort manifold shall be of a size such that the cross sectional area of the pipe is larger than the total cross sectional area of all connecting vents.

The discharge shall not be directly connected to a closed drain without an atmospheric break in the line. A manifold header connecting vents or manifolds from several still retorts shall lead to the atmosphere. The manifold header shall not be controlled by a valve and shall be of a size such that the cross-sectional area is at least equal to the total cross-sectional area of all connecting retort manifold pipes from all retorts which could be venting simultaneously.

Timing of the process shall not begin until the retort has been properly vented and the processing temperature has been reached.

4.5.3.1.8 Venting Considerations

The suggested venting method described in the following pages implies that the steam valve is also wide open. Using a steam controller to regulate the supply of steam before the vent temperature requirement has been reached invalidates the concept of venting. This is because the control valve will oscillate between fully open and fully closed (unless the retort controller is proportional). This means that the flow of steam will shut off intermittently during the vent. Manual throttling of the bypass reduces the flow of steam but does not shut it off. If such throttling is required temperature distribution studies shall be undertaken to prove the vent effectiveness.

Example: When it is suggested that vent valves be wide open for at least five minutes and to at least 107ºC (225ºF) it means that timing commences <u>when steam is turned on</u> and if at the end of five minutes, the temperature equals <u>or exceeds</u> 107ºC (225ºF), then the vent schedule has been satisfied.

The following vents and venting procedures are to provide guidance only and shall always be verified in practice.

If dividers are used in the retort baskets the following venting methods are not valid. Temperature distribution tests are required to determine the proper venting procedures.

4.5.3.1.8.1 Venting Horizontal Retorts

1. Venting through multiple 25 mm (1 in) vents discharging to atmosphere (see figure 1).

Specifications: There should be one 25 mm (1 in) vent equipped with a gate or plug cock valve for discharging to the atmosphere for every 1.5 m (5 ft) of retort length and the end vents should not be over 0.75 m (2.5 ft) from the ends of the retort.

Venting method: Vent valves should be wide open for at least 5 minutes and to a retort temperature of at least 107ºC (225ºF) or for at least 7 minutes and a temperature of 104.5ºC (220ºF).

2. Venting through multiple 25 mm (1 in) vents discharging through a manifold to atmosphere (see figure 2)

<u>Specifications</u>: There should be one 25 mm (1 in) vent for every 1.5 m 5 ft) of retort length and the end vents should not be over .75 m (2.5 ft) from the ends of the retort. For retorts less than 4.5 m (15 ft) in length the inside diameter (ID) of the manifold should be not less than 64 mm (2.5 in) and for retorts whose length is 4.5 m (15 ft) or greater the ID should be at least 75 mm (3 in).

Venting method: The manifold valve should be wide open for at least 6 minutes and to a retort temperature of 107°C (225°F), or for at least 8 minutes and to a temperature of 104.5°C (220°F).

3. Venting through water spreaders (see figure 3)

Specifications: The size (ID) of the water inlet, vent pipe and vent valve for retorts less than 4.5 m (15 ft) in length should be not less than 50 mm (2 in) and for retorts 4.5 m (15 ft) or greater in length they should be not less than 64 mm (2.5 in). The size (ID) of the water spreader for retorts less than 4.5 m (15 ft) in length should be not less than 40 mm (1.5 in) and for retorts 4.5 m (15 ft) or greater in length they should not be less than 50 mm (2 in).

Venting method: The water spreader vent gate or plug cock valve should be wide open for at least 5 minutes and to a retort temperature of at least 107°C (225°F), or for at least 7 minutes and to at least 104.5°C (220°F).

4. Venting through a single 64 mm (2.5 in) top vent (for retorts not exceeding 4.5 m (15 ft) in length) (see figure 4)

Specifications: The vent should have an ID of at least 64 mm (2.5 in) and be equipped with at least a 64 mm (2.5 in) gate or plug cock valve and be located within .6 m (2 ft) of the center of the retort.

Venting method: The vent gate or plug cock valve should be wide open for at least 4 minutes and to a retort temperature of at least 104.5°C (220°F).

4.5.3.1.8.2 Venting Vertical Retorts

1. Venting through a 40 mm (1.5 in) overflow (see figure 5)

Specifications: The overflow pipe should have an ID of at least 40 mm (1.5 in) equipped with at least a 40 mm (1.5 in) gate or plug cock valve and with not more than 1.8 m (6 ft) of 40 mm (1.5 in) pipe beyond the valve before the break to the atmosphere or to a manifold header.

Venting method: The vent gate or plug cock valve should be wide open for at least 4 minutes and to a retort temperature of 103.5°C (218°F), or for at least 5 minutes and to at least 101.5°C (215°F).

2. Venting through a single 25 mm (1 in) side or top vent (see figure 6)

Specifications: The vent in the lid or top side should have an ID of at least 25 mm (1 in) and be equipped with a 25 mm (1 in) gate or plug cock valve and discharge directly into the atmosphere or to a manifold header.

Venting method: The vent gate or plug cock valve should be wide open for at least 5 minutes and to a retort temperature of at least 110°C (230°F) or for at least 7 minutes and to at least 104.5°C (220°F).

Other installations and operating procedures which deviate from the foregoing may be used provided that there is evidence that adequate venting of the air is accomplished. This would be determined by a heat distribution test, and the data obtained should be kept on file by the processor.

4.5.3.1.9 Air Inlets

Retorts using air for pressure cooling shall be equipped with an adequate tight closing valve and piping arrangement on air line to prevent leakage of air into the retort during processing.

4.5.3.2 Batch Agitating Retorts

All retorts shall be equipped with the instruments and devices described in 4.5.2.1 to 4.5.2.5, inclusive.

4.5.3.2.1 Steam Inlet (see 4.5.3.1.2)

4.5.3.2.2 Steam Spreaders (see 4.5.3.1.4)

4.5.3.2.3 Bleeders and Condensate Removal (see 4.5.3.1.5)

At the time the steam is turned on, the drain shall be opened for a time sufficient to remove steam condensate from the retort and provision should be made for continuous drainage of condensate during the retort operation. The bleeders in the bottom of the shell serve as an indicator of continuous condensate removal. The retort operator shall observe and periodically record how this bleeder is functioning.

4.5.3.2.4 Stacking Equipment (see 4.5.3.1.6)

4.5.3.2.5 Vents (see 4.5.3.1.7)

4.5.3.2.6 Air Inlets (see 4.5.3.1.9)

4.5.3.2.7 Retort or Reel Speed Timing

The rotational speed of the retort or reel is critical and shall be specified in the scheduled process. The speed shall be adjusted and recorded when the retort is started, and at intervals of sufficient frequency to insure that the retort speed is maintained as specified in the scheduled process. If a change of speed inadvertently occurs, this shall be recorded together with corrective action taken. Additionally, a recording tachometer may be used to provide a continuous record of the speed. The speed shall be checked against a stop watch at least once per shift. A means of preventing unauthorized speed changes on retorts shall be provided.

4.5.3.3 Continuous Agitating Retorts (e.g. FMC)

All retorts shall be equipped with the instruments and devices described in 4.5.2.1 to 4.5.2.5 inclusive.

4.5.3.3.1 Steam Inlet (see 4.5.3.1.2)

4.5.3.3.2 Steam Spreaders (see 4.5.3.1.4)

4.5.3.3.3 Bleeders and Condensate Removal (see 4.5.3.2.3)

4.5.3.3.4 Vents (see 4.5.3.1.7)

4.5.3.3.5 Retort and Reel Speed Timing (see 4.5.3.2.7)

4.5.3.4 Hydrostatic Retorts (e.g. Stork)

4.5.3.4.1 Indicating Thermometers (see 4.5.2.1)

Thermometers shall be located in the steam dome near the steam/water interface and preferably also at the top of the dome. Where the scheduled process specifies maintenance of particular temperatures of water in the hydrostatic water legs, at least one indicating thermometer shall be located in each hydrostatic water leg so that it can accurately measure water temperature and be easily read.

4.5.3.4.2 Temperature/Time Recording Device (see 4.5.2.2)

The temperature recorder probe shall be installed either within the steam dome or in a well attached to the dome.
Additional temperature recorder probes shall be installed in the hydrostatic water legs if the scheduled process specifies maintenance of particular temperatures in these hydrostatic water legs.

4.5.3.4.3 Pressure Gauges (see 4.5.2.3)

4.5.3.4.4 Steam Controllers (see 4.5.2.4)

4.5.3.4.5 Steam Inlet (see 4.5.3.1.2)

4.5.3.4.6 Bleeders

Bleeders shall be of suitable size, e.g., 3 mm (1/8 in.) and location and shall be fully open during the entire process, including the come-up-time and shall be suitably located in the steam chamber or chambers to remove air which may enter with the steam.

4.5.3.4.7 Venting

Before the start of processing operations, the retort steam chamber or chambers shall be vented to ensure removal of air.

4.5.3.4.8 Conveyor Speed

The speed of the container conveyor shall be specified in the scheduled process and shall be determined with an accurate stop watch, and recorded at the start of processing and at intervals of

sufficient frequency to insure that the conveyor speed is maintained as specified. An automatic device should be used to stop the conveyor and provide warning when the temperature drops below that specified in the scheduled process. A means of preventing unauthorized speed changes shall be provided. Additionally a recording device may be used to provide a continuous record of the speed.

4.5.4 Pressure Processing in Water

4.5.4.1 Batch Still Retorts

4.5.4.1.1 Indicating Thermometer (see 4.5.2.1)

Bulbs of indicating thermometers shall be located in such a position that they are beneath the surface of the water throughout the process. On horizontal retorts this shall be in the side at the center, and the thermometer bulbs shall be inserted directly into the retort shell. In both vertical and horizontal retorts, the thermometer bulbs shall extend directly into the water for a minimum of at least 5 cm (2 in).

4.5.4.1.2 Temperature/Time Recording Device (see 4.5.2.2)

When the retort is equipped with a temperature recording device, the recording thermometer bulb shall be at a location adjacent to the indicating thermometer or at a location which adequately represents the lowest temperature in the retort. In any case, care shall be taken that the steam does not strike the controller bulb directly.

4.5.4.1.3 Pressure Gauge (see 4.5.2.3)

4.5.4.1.4 Pressure Safety Valve (see 4.5.2.5)

4.5.4.1.5 Pressure Control Valve

In addition to the pressure safety valve an adjustable pressure control valve of a capacity sufficient to prevent undesired increases in retort pressure, even when the water valve is wide open, shall be installed in the overflow line. This valve also controls the maximum water level in the retort. The valve shall be suitably screened to prevent a blockage by floating containers or debris.

4.5.4.1.6 Pressure Recorder

A pressure recorder device is needed and may be combined with a pressure controller.

4.5.4.1.7 Steam Controller (see 4.5.2.4)

4.5.4.1.8 Steam Inlet

The steam inlet shall be large enough to provide sufficient steam for proper operation of the retort.

4.5.4.1.9 Steam Distribution (see 4.5.3.1.3)

Steam shall be distributed from the bottom of the retort, unless the steam is fed to the water during recirculation outside the retort, in a manner to provide uniform heat distribution throughout the retort.

4.5.4.1.10 Crate Supports (see 4.5.3.1.3)

4.5.4.1.11 Stacking Equipment

Crates, trays, gondolas, etc. and divider plates when used for holding product containers, shall be so constructed that the heating water can adequately circulate around the containers during the coming-up and sterilization times.
Special equipment will be required to ensure that the thickness of filled flexible containers will not exceed that specified in the scheduled process and that they will not become displaced and overlap one another during the thermal process.

4.5.4.1.12 Drain Valve

A screened, non-clogging, water-tight valve should be used.

4.5.4.1.13 Water Level

There shall be a means of determining the water level in the retort during operation (e.g. by using a water gauge glass or petcock(s)). Water shall adequately cover the top layer of containers during the entire coming-up, sterilizing and cooling periods. This water level shall be at least 15 cm (6 in.) over the top layer of product containers in the retort.

4.5.4.1.14 Air Supply and Controls

In both horizontal and vertical still retorts for pressure processing in water, a means shall be provided for introducing compressed air at the proper pressure and rate. The retort pressure shall be controlled by an automatic pressure control unit. A non-return valve shall be provided in the air supply line to prevent water from entering the system. Air or water circulation shall be maintained continuously during the coming-up-time, processing and cooling periods. Air is usually introduced with steam to prevent "steam hammer." If air is used to promote circulation it shall be introduced into the steam line at a point between the retort and the steam control valve at the bottom of the retort.

4.5.4.1.15 Cooling Water Entry

In retorts processing glass jars, the cooling water should be introduced in a manner which avoids direct impingement on the jars, in order to prevent breakage by thermal shock.

4.5.4.1.16 Retort Head Space

The air pressure in the head space of the retort shall be controlled throughout the process.

4.5.4.1.17 Water Circulation

All water circulation systems, whether by pumps or air, used for heat distribution shall be installed in such a manner that an even temperature distribution throughout the retort is maintained. Checks for correct operation shall be made during each processing cycle, for example, alarm systems to indicate a malfunction of water circulation.

4.5.4.2 Batch Agitating Retorts

4.5.4.2.1 Indicating Thermometer (see 4.5.2.1 and 4.5.3.1.1)

4.5.4.2.2 Temperature/Time Recording Device (see 4.5.2.2)

The recording thermometer probe shall be located adjacent to the bulb of the indicating thermometer.

4.5.4.2.3 Pressure Gauges (see 4.5.2.3)

4.5.4.2.4 Pressure Safety Valve (see 4.5.2.5)

4.5.4.2.5 Pressure Control Valve (see 4.5.4.1.5)

4.5.4.2.6 Pressure Recorder (see 4.5.4.1.6)

4.5.4.2.7 Steam Controller (see 4.5.2.4)

4.5.4.2.8 Steam Inlet (see 4.5.3.1.2)

4.5.4.2.9 Steam Spreader (see 4.5.3.1.1)

4.5.4.2.10 Drain Valve (see 4.5.4.1.12)

4.5.4.2.11 Water Level Indicator (see 4.5.4.1.13)

4.5.4.2.12 Air Supply and Controls (see 4.5.4.1.14)

4.5.4.2.13 Cooling Water Entry (see 4.5.4.1.15)

4.5.4.2.14 Water Circulation (see 4.5.4.1.17)

4.5.4.2.15 Retort Speed Timing (see 4.5.3.2.7)

4.5.5 Pressure Processing in Steam-Air Mixtures (eg.Lagarde retort)

Both the temperature distribution and the rates of heat transfer are critically important in the operation of steam-air retorts. There shall be a means of circulating the steam-air mixtures to prevent formation of low temperature pockets. The circulating system used shall provide acceptable heat distribution as established by adequate tests. The operation of the processing system shall be the same as that required by the scheduled process. A recording pressure controller shall control the air inlet and the steam-air mixture outlet. Because of the variety of existing designs, reference should

be made to the equipment manufacturer and to the agency having jurisdiction for details of installation, operation and control. Some items of equipment may be common to those already in this code and those standards given may be relevant.

4.5.6 Aseptic Processing and Packaging Systems

4.5.6.1 Product Sterilization Equipment and Operation

4.5.6.1.1 Temperature Indicating Device (see Sub-Section 4.5.2.1)

The device shall be installed in the product holding section outlet in such a way that it does not interfere with product flow.

4.5.6.1.2 Temperature Recording Device (see Sub-Section 4.5.2.2)

The temperature sensor shall be located in the sterilized product at the holding section outlet in such a way that it does not interfere with the product flow.

4.5.6.1.3 Temperature Recorder-Controller

An accurate temperature recorder-controller shall be located in the product sterilizer at the final heater outlet in such a way as not to interfere with product flow. It shall be capable of ensuring that the desired product sterilization temperature is maintained.

4.5.6.1.4 Product-to-Product Regenerators

Where a product-to-product regenerator is used to heat the cold unsterilized product entering the sterilizer by means of a heat exchange system, it shall be designed, operated and controlled so that the pressure of the sterilized product in the regenerator is greater than the pressure of any unsterilized product. This ensures that any leakage in the regenerator will be from the sterilized product into the unsterilized product.

4.5.6.1.5 Differential Pressure Recorder-Controller

Where a product-to-product regenerator is used, there shall be an accurate differential pressure recorder-controller installed on the regenerator. The scale divisions shall be easily readable and shall not exceed 14 KPa (2 lbs per square inch) on a working scale of not more than 140 KPa (20 lbs per square inch per scale inch). The controller shall be tested for accuracy against a known accurate standard pressure indicator, upon installation and at least once every three months of operation thereafter or more frequently as may be necessary to ensure its accuracy. One pressure sensor shall be installed at the sterilized product regenerator outlet, and the other pressure sensor shall be installed at the unsterilized product regenerator inlet.

4.5.6.1.6 Metering Pump

A metering pump shall be located upstream from the holding section and shall be operated consistently to maintain the required rate of product flow. A means of preventing unauthorized speed

changes shall be provided. The product flow rate, which is the critical factor controlling the sterilization holding time, shall be checked with sufficient frequency to ensure that it is as specified in the scheduled process.

4.5.6.1.7 Product-Holding Section

The product sterilizer holding section shall be designed to give continuous holding of the product, including particulate, for at least the minimum holding time specified in the scheduled process. It shall be sloped upward at least 2.0 cm/m (0.25 in. per foot).
The holding section shall be designed so that no portion between the product inlet and the product outlet can be heated.

4.5.6.1.8 Start Up

Prior to the start of aseptic processing operations, the product sterilizer shall be brought to a condition of commercial sterility.

4.5.6.1.9 Temperature Drop in Product Holding Section

When product temperature in the holding section drops below the temperature specified in the scheduled process, the product in the holding section and any downstream portions affected shall be diverted to recirculation or waste and the system returned to a condition of commercial sterility before flow is resumed to the filler.

4.5.6.1.10 Loss of Proper Pressures in the Regenerator

Where a regenerator is used the product may lose sterility whenever the pressure of sterilized product in the regenerator is less than 7 KPa (1 lb per square in.) greater than the pressure of unsterilized product. Product flow shall be directed either to waste or recirculated until the cause of the improper pressure relationship has been corrected and the affected system(s) has been returned to a condition of commercial sterility.

4.5.6.2 Product Container Sterilization, Filling and Closing Operations

4.5.6.2.1 Recording Devices

The systems for container and closure sterilization, as well as filling and closing shall be instrumented to show that the scheduled conditions are achieved and maintained. During pre-sterilization as well as production, automatic recording devices shall be used to record, where applicable, the sterilization media flow rates and/or temperatures. Where a batch system is used for container sterilization, the sterilization conditions shall be recorded.

4.5.6.2.2 Timing Method(s)

A method(s) shall be used either to give the retention time of containers, and closure if applicable, as specified in the scheduled process, or to control the sterilization cycle at the rate as specified in the scheduled process.

A means of preventing unauthorized speed changes shall be provided.

4.5.6.2.3 Start Up

Prior to the start of filling, both the container and closure sterilizing system and the product filling and closing system shall be brought to a condition of commercial sterility.

4.5.6.2.4 Loss of Sterility

In the event of loss of sterility, the system(s) shall be returned to a condition of commercial sterility before resuming operations.

4.5.7 Flame Sterilizers, Equipment and Procedures

The container conveyor speed shall be specified in the scheduled process. The container conveyor speed shall be measured and recorded at the start of operations and at intervals of sufficient frequency to ensure that the conveyor speed is as specified in the scheduled process. Alternatively, a recording tachometer may be used to provide a continuous record of the speed. Speed shall be checked against a stop watch at least once per shift. A means of preventing unauthorized speed changes on the conveyor shall be provided. The surface temperature of at least one container from each conveyor channel shall be measured and recorded at the end of the pre-heat section and at the end of the holding period at intervals of sufficient frequency to ensure that the temperatures specified in the scheduled process are maintained.

4.5.8 Other Systems

Systems for the thermal processing of low-acid foods and acidified low-acid foods in hermetically sealed containers shall conform to the applicable requirements of this chapter and shall ensure that the methods and control used for the manufacture, processing and/or packing of such foods are operated +9-and administered in a manner adequate to achieve commercial sterility.

4.6 Evaluation of Deviation in Thermal Processing

Whenever the in-process monitoring records, processor check or other means disclose that a low-acid food or container system has received a thermal or sterilization treatment less than that stipulated in the scheduled process, or when any critical factor does not comply with the requirements for that factor as specified in the scheduled process, it shall be considered a deviation in processing or process deviations. Deviations in processing (or process deviations) shall be handled in accordance with the following paragraphs:

(1) Deviations Identified in Process:

If a deviation is noted at anytime before the completion of the intended scheduled process, the processor shall:

(i) immediately reprocess the product using the full scheduled process; or

(ii) use an appropriate alternate scheduled process provided such a scheduled process has been established in accordance with section 4.4. This alternate process shall be made readily available to the inspector upon his request; or

(iii) hold the product involved and have the deviation evaluated by competent processing expert(s) in accordance with procedures recognized as being adequate to detect any hazard to public health.

Upon completion of the evaluation, a record shall be made of the handling of each deviation. Such records shall include, at a minimum, the appropriate processing and production records, a full description of the corrective actions taken, the evaluation report and the disposition of the affected product. Such records shall be maintained in a separate file or log, and be made available to the inspector upon request.

(2) Deviations Identified Through Record Review:

Whenever a deviation is noted during review of the processing and production records, the processor shall hold the product involved and have the deviation evaluated by competent processing expert(s) in accordance with procedures recognized as being adequate to detect any hazard to public health. Upon completion of the evaluation, a record shall be made of the handling of each deviation. Such records shall include, at a minimum, the appropriate processing and production records, a full description of the evaluation report and the disposition of the affected product. Such records shall be maintained in a separate file or log, and be made available to the inspector upon request.

In the case of a stoppage of continuous agitating retorts, emergency scheduled processes may be established to permit compensation for temperature deviations, not to exceed 5^0C (10^oF). Such scheduled processes must be established in accordance with sub-section 4.4 of this document.

4.7 Cooling

To avoid thermophilic spoilage and/or organoleptic deterioration of the product, the containers shall be cooled as rapidly as possible to an internal temperature of about 40^{o}C (105^{o}F). In practice, water cooling is used for this purpose. Further cooling is done in air to evaporate the adhering water film. This aids in preventing both microbiological contamination and corrosion. If indicated, extra pressure can be applied during cooling to compensate for the internal pressure inside the container at the beginning of cooling, to prevent the deformation or leakage of containers. This can be minimized by equating the over pressure with the internal container pressure. When the integrity of the container is not adversely affected, water or air under atmospheric pressure may be used for cooling. Extra pressure is commonly achieved by introducing water or compressed air into the retort under pressure. The container and closure manufacturers' instructions shall be followed. To reduce thermal shock to glass containers the temperature of the cooling medium in the retort shall be reduced slowly during the initial cooling phase.

Air cooling alone may be used for products in which thermophilic spoilage is not a problem.

4.7.1 Cooling Water Quality

Although containers may normally be considered hermetically sealed, a small number of containers may leak during the cooling period mainly due to mechanical stress and pressure differential. Cooling water shall consistently be of low microbial content. (For example, an aerobic mesophyllic total colony count of less than 500 colony forming units (c.f.u.)/ml). Records shall be kept to demonstrate that cooling water is of acceptable microbiological quality (see chapter 8 for frequency of tests and standards).

Water satisfying standards found in Chapter 8 including total count may be used as cooling in retorts with further treatment.

If water to be used for cooling does not meet with this microbiological specification, which is considered to be the case when cans are cooled in a cooling canal or when the cooling water is recirculated, then it must be treated in a manner which will ensure that at the time of use it will meet the specification. While chlorination is generally used as an effective treatment, other treatments such as ozone, iodine compounds, etc. may be used.

An inspector that has serious doubts on the microbiological quality of the cooling water can request that samples be taken for microbiological analysis (coliform count, total plate count).

4.7.1.1 Chlorination Treatment

The chlorine must be thoroughly mixed with the water to a level sufficient to reduce the contamination to an acceptable limit. (A 20 minute contact time at suitable pH and temperature is normally considered adequate. Shorter contact times may be used under certain circumstances) The effect on the microbiological quality of the cooling water must be determined and found acceptable. All results must be recorded.

The adequacy of a suitable chlorination treatment may be established by:

(a) the presence of a measurable residual free chlorine in the water at the end of the contact time; and

(b) detectable amounts of residual free chlorine in the water after it has been used for cooling containers. (Residual free chlorine content of 0.5 to 2 p.p.m. are usually considered adequate. Chlorine levels in excess of this may accelerate corrosion of certain metallic components).

(c) a low microbial content of the water at the point of use.

Once a suitable system has been established, the adequacy of treatment is indicated by measuring and recording the free residual chlorine according to b) above.

In addition, water temperature and pH shall be measured and recorded since marked changes from the reference values previously established may adversely affect the disinfecting action of the added chlorine. The amount of chlorine required for adequate disinfection will depend upon the chlorine demand of the water, its pH and temperature. Where water with a high level of organic impurity, (e.g., surface water) is used as a source of supply, it will usually be necessary to provide suitable

treatment for separation of impurities, prior to disinfection by chlorine thereby reducing excessive chlorine demand. Recirculated cooling water may gradually increase in organic load and it may be necessary to reduce this by separation or other means. If the pH of cooling water is greater than 7.0 or its temperature is above 30ºC it may be necessary to increase the minimum contact time or concentration of chlorine to achieve adequate disinfection. Similar actions may be necessary with water disinfected by means other than addition of chlorine.

It is essential that cooling water storage tanks be constructed of impervious materials and protected by close fitting covers thus preventing contamination of the water by seepage, entry of surface water or other sources of contamination. These tanks shall also be fitted with baffles or other means of ensuring thorough mixing of water and chlorine or other disinfectant. They shall be of sufficient capacity to ensure that the minimum residence time is achieved. Particular attention shall be paid to positioning of inlet and outlet pipes to ensure all water follows a pre-determined flow pattern within the tank. Cooling tanks and systems shall be drained, cleaned and refilled periodically to prevent excessive organic and microbial build-up. Records shall be kept of such procedures.

Measurements of microbial content and chlorine or alternative disinfectant levels shall be made with sufficient frequency to enable adequate control of cooling water quality.

4.8 Post Process Container Handling

A small proportion of correctly made and closed cans may be subject to temporary leaks (micro leakage) during the later stages of cooling and for as long as the cans and their seams remain externally wet. The risk of micro leakage may be increased if poor seam quality and inadequately designed container conveyor, handling, labelling and packaging equipment result in increased can abuse. When such leakage occurs, water on the can provides a source and a transport medium for microbial contamination from conveyor and equipment surfaces to areas on or near the can seams. To control leaker infection it is necessary to ensure that:

(1) cans are dried as soon as possible after processing;

(2) conveying systems and equipment are designed to minimize abuse; and

(3) conveyor and equipment surfaces are effectively cleaned and disinfected.

Glass jars may be similarly affected.

The post-process area shall be effectively separated from raw food to avoid cross-contamination. Precautions (i.e. notices posted in critical areas) shall also be taken to ensure personnel from the raw food areas do not have uncontrolled access to the post-process area.

Generally, temporary leaks are not a problem with correctly formed heat seals on semi-rigid and flexible containers. However, leakage may occur through defective seals and perforations in the container bodies. Therefore the requirements for drying containers, minimizing abuse and ensuring effective cleaning and disinfection of conveyor systems are equally applicable to these types of containers.

4.8.1 Retort Crate Unloading

To minimize leaker infection, processed containers should not be manually handled while still wet.

Before unloading retort crates, water shall be drained from container surfaces. In many instances this can be accomplished by tilting the retort crates as far as possible and allowing sufficient time for the water to drain. The containers shall remain in the crates until dry before unloading by hand. Unloading of wet containers by hand presents a risk of contamination from food poisoning organisms which may be transferred from the hands onto the container.

4.8.2 Container Drying

Where used, driers shall be shown not to cause damage to or contaminate containers and shall be readily accessible for routine cleaning and disinfection. Not all driers meet these requirements. The drying unit shall be employed in the line as soon as practicable after cooling.

Labelling and packaging operations are to be considered only after the containers are dry.

Driers do not remove all cooling water residues from container external surfaces but they reduce significantly the time containers are wet. This reduces the length of post-drier conveying equipment that becomes wet during production periods and which requires extra cleaning and disinfection measures.

The drying of batch processed containers may be accelerated by dipping the filled retort crates in a tank of a suitable wetting agent. After immersion (15 seconds) the crates should be tipped and allowed to drain. It is essential that the solution of wetting agent be kept at not less than 80ºC to avoid microbial infection and be changed at the end of each shift.

4.8.3 Container Abuse

Mechanical shock or abuse is mainly caused by either containers knocking into each other, (for example, on gravity runways), or by pressing against each other, (for example, when the backup of containers on cable runways results in the development of excessive pressure). Abuse may also be caused by containers hitting protruding sections on conveying systems. Such mechanical shocks may cause temporary or permanent leaks and result in infection if the containers are wet.

Careful attention to the design, layout, operations and maintenance of conveying systems is necessary if abuse is to be reduced to a minimum. (One of the commonest design faults is unnecessary changes in the height of different sections of the conveying system. For line speeds above 300 cpm, (containers per minute), multi-lane conveying systems coupled with container accumulation tables are recommended. Sensors should be installed to allow the conveyor to be stopped if excessive build up of containers occur.) Poor seam quality in combination with inadequately designed, adjusted or maintained unscrambling, labelling and packaging equipment increases the risk of micro leakage. Special care shall be taken to prevent abuse to glass containers and their closures, as well as to semi-rigid and flexible containers.

Abuse of semi-rigid and flexible containers may lead to perforation of the container or to flexcracking in the case of pouches. Therefore these types of containers should not be allowed to fall or slide from one section to another of the conveying system.

4.8.4 Post-Process Cleaning and Disinfection

Any container conveyor or equipment surface that is wet during production periods will permit rapid growth of infecting microorganisms unless it is effectively cleaned at least once every 24 hours and, in addition, regularly disinfected during production periods. The chlorine in the cooling water deposited on these surfaces from cooled cans is not an adequate disinfectant. Any cleaning and disinfection program that is instituted shall be carefully evaluated to ensure that microbial loads are reduced to a minimum before being adopted as a routine procedure. The assessment of the continuing effectiveness of post-process cleaning and disinfection programs can only be established by bacteriological monitoring.

Conveying systems and equipment shall be critically examined with the view to replacing unsuitable materials. Porous materials shall not be used and surfaces which become porous, heavily corroded or damaged shall be repaired or replaced.

All personnel shall be made fully aware of the importance of personal hygiene and good habits in relation to post-process container handling.

Post-cooling areas of continuous cookers, including hydrostatic cookers, may constitute continuing sources of high bacterial concentrations unless stringent measures are taken to clean and disinfect them regularly to avoid microbial build up.

When containers are to be over wrapped, the secondary wrap shall be placed on dry containers only. Generally, flexible and semi-rigid containers should be over wrapped to protect from perforation or cracking during shipping and handling.

5. Quality Assurance

It is important that scheduled processes be properly established, correctly applied, sufficiently supervised and documented to provide positive assurance that the requirements have been met. These assurances apply also to the seaming and sealing operations. For practical and statistical reasons, an end-product analysis by itself is not sufficient to monitor the adequacy of the scheduled process.

5.1 Processing and Production Records

Permanent, legible and dated records of time, temperature, codes and other pertinent details shall be kept concerning each retort load or code lot for continuous retorts or aseptic processes. Such records are essential as a check on processing operations and will be invaluable if some question arises as to whether a particular lot had received adequate heat processing. These records shall be made by the retort or processing system operator or other designated person, on forms which shall include: product name and style, the code lot number, the retort or processing system and recorder chart identification, the container size and types, the approximate number of containers per code lot interval, the minimum initial temperature, the scheduled and actual processing time and temperature, the recorder-controller and indicating thermometer readings, and other appropriate processing data.

Closing vacuum (in vacuum-packed products), fill-in weights, filled flexible pouch thickness, and/or other critical factors specified in the scheduled process shall also be recorded. When deviations occur in the application of the scheduled process refer to Sub-Section 4.6 of this Code. In addition, the following records shall be maintained:

5.1.1 Processing in Steam

5.1.1.1 Batch Still Retorts

< Time steam on

5.1.1.2 Autoclaves Statics

< venting time and temperature,

< time sterilization temperature reached,

< time steam off.

5.1.1.3 Batch Agitating Retorts

As for still retorts (see 5.1.1.1) with additions of functioning of condensate bleeder as well as retort and/or reel speed. Where specified in the scheduled process it is important to also record container head space and critical factors such as in-going product consistency and/or viscosity, maximum drained weight, minimum net weight and per cent solids (see 4.4.2).

5.1.1.4 Continuous Agitating Retorts (See 5.1.1.3)

5.1.1.5 Hydrostatic Retorts

The temperature in the steam chamber at just above the steam-water interface, at the top of the dome, if applicable, speed of the container conveyor, and, where the scheduled process specifies, measurements of particular temperatures and water levels in the hydrostatic water legs.

In addition, for agitating hydrostatic retorts, rotative chain speed, and other critical factors such as the head space and in-going product consistency.

5.1.2 Processing in Water

5.1.2.1 Batch Still Retorts

< Time steam on.

5.1.2.2 Autoclaves Statics

< come-up time,

- < time sterilization starts,
- < sterilization temperature,
- < water level,
- < water circulation and pressure maintained,
- < time steam off.

5.1.2.3 Batch Agitating Retorts

As for still retorts (Sub-Section 5.1.2.1) with the addition of retort and/or reel speed. Where specified in the scheduled process it is important to record container head space and critical factors such as in-going product consistency, maximum drained weight, minimum net weight and per cent solids (see 4.4.2).

5.1.3 Processing in Steam/Air Mixtures

5.1.3.1 Batch Still Retorts

- < Time steam on,
- < come-up time,
- < time sterilization starts,
- < maintenance of circulation of steam/air mixture,
- < pressure,
- < sterilization temperature,
- < time steam off.

5.1.4 Aseptic Processing and Packaging

Detailed automatic and manual record requirements depend on the type of aseptic processing and packaging system, but they must provide complete and accurate documentation of the pre-sterilization and running conditions actually used.

5.1.4.1 Product Container Sterilization Conditions

Record sterilization media flow rate and/or temperature, where applicable, retention time in the sterilizing equipment of containers and closures. Where a batch system is used for container and/or closure sterilization, sterilization cycle times and temperatures should be recorded.

5.1.4.2 Product Line Conditions (see 4.5.6)

Record pre-sterilization of the product line, "stand-by" and/or "change-to-product", as well as running conditions. Running condition records should include product temperature at the final heater outlet, product temperature at holding section outlet, differential pressures if a product-to-product regenerator is used, and the product flow rate.

5.1.4.3 Filling and Closing Conditions (see Sub-Section 5.1.4.1)

5.1.5 Flame Sterilizers

- Container conveyor speed,
- can surface temperature at the end of the process holding period, and
- nature of container.

5.2 Record Review and Maintenance

5.2.1 Processing Records

Recorder charts shall be identified by date, product, container size, retort and where applicable the cooker shell number and other data as necessary volume of production, so they can be correlated with the written record of lots processed. Each entry on the record shall be made by the retort or processing system operator, or other designated person, at the time the specific retort or processing system condition or operation occurs, and the retort or processing system operator or such designated person shall sign or initial each record form. Prior to shipment or release for distribution, but not later than one working day after the actual process, a representative of plant management who is knowledgeable and experienced in canning technology shall review and ensure that all processing and production records are complete and that product received the scheduled process. The records, including the recorder thermometer chart, shall be signed or initialed by the person conducting the review.

5.2.2 Container Closure Records

Written records of all container closure examinations shall specify the code lot, the date and time of container closure inspections, the measurements obtained, and all corrective actions taken. Records shall be signed or initialed by the container closure inspector and shall be reviewed by a representative of plant management who is knowledgeable and experienced in canning technology with sufficient frequency to ensure that the records are complete and that the operation has been properly controlled.

5.2.3 Water Quality Records

Records shall be kept of the results of all tests of microbiological quality and cooling water treatment records shall be retained for at least 3 years.

5.3 Retention of Records

The records specified in Sub-Sections 4.4, 4.7, 5.1 and 5.2 shall be retained for a period of not less than 3 years to assist investigation of problems. They shall be held in a manner which will permit ready reference by the processor. The statement of a scheduled process shall be retained for at least 3 years after its discontinuation of its use.

6. Storage and Transport of Finished Product

Conditions of storage and transport shall be such that the integrity of the product container and the safety and quality of the product are not adversely affected. Attention is drawn to common forms of damage such as that caused by improper use of fork lift trucks.

Warm metal containers should not be stacked so as to form incubation conditions for the growth of thermophilic organisms.

High humidity storage should be avoided. Metallic containers kept at high humidity particularly for a long time and especially in the presence of mineral salts or substances which are even very weakly alkaline or acidic are likely to corrode.

Labels or label adhesives which are hygroscopic and therefore liable to promote rusting of tinplate should be avoided as should pastes and adhesives that contain acids or mineral salts.

Cases and cartons should be thoroughly dry. If they are made of wood it should be well seasoned. They should be of the proper size so that the containers fit snugly and are not subject to damage from movement within the case. They should be strong enough to withstand normal transportation.

Metal containers should be kept dry during storage and transportation. The mechanical properties of outer cartons etc., are adversely affected by moisture and the protection of the containers against transport damage may become insufficient.

The storage conditions, including temperature, should be such as to prevent deterioration or contamination of the product. Rapid temperature changes during storage should be avoided as this may cause the condensation of moist air on the containers and thus lead to container corrosion.

7. Laboratory Control Procedures

Each establishment should have access to laboratory facilities to assist in the control of the process and as well as the product packed. The amount and type of such control will vary with the food product as well as the needs of management. Such control should reject all food that is unfit for human consumption.

Where appropriate, representative samples of the production should be taken to assess the safety and quality of the product.

Laboratory procedures used should follow recognized or standard methods in order that the results may be readily interpreted.

Laboratories checking for microorganisms shall be well separated from food processing areas.

(1) End Product Specification

Microbiological, chemical, physical or extraneous material specifications may be required depending on the nature of the food. Such specifications should include sampling procedures, analytical methodology and limits for acceptance.

To the extent possible under good manufacturing practice the products shall be free from objectionable matter.

The products shall be commercially sterile, and not contain any substances originating from microorganisms in amounts which may represent a hazard to health.

The products shall be free from chemical pollutants in amounts which may represent a hazard to health.

9. Incubation

Spoilage of canned goods is generally due to growth of microorganisms after heat processing, either from under processing, faulty cooling or post processing contamination via leakers.

Microbial growth within the can often, but not always, results in production of gas and a consequent loss of vacuum. If gas production continues flippers or blown cans result.

Note that growth of C. botulinum may occur without gas production. The incubation test alone cannot be relied for product safety or replace close control of each processing step; however, incubation of cans after processing provides a simple means to routinely check for processing defects.

It is the duty of the inspection staff to monitor the incubation procedure and to ensure that it is done as described in this section.

9.1 Incubation Facilities

The establishment shall provide incubation facilities which include a thermometer, a temperature/time recording device, a means for the circulation of the air inside the incubator to prevent temperature variations, and a means to prevent unauthorized entry into the facility. An employee designated by the operator shall be responsible for the security of the incubator. Details of the facilities required are to be found in Chapter 5, section under Retorts and Official incubation.

9.2 Product Requiring Incubation

Shelf stable product requiring incubation includes:

(a) Low acid products and,
(b) Acidified low acid products.

9.3 Incubation Samples

(a) From each load of product processed in a batch type thermal processing system (still or agitation) the operator shall select at least one container per retort basket for incubation.

(b) For continuous rotary retorts, hydrostatic retorts, or other continuous type thermal processing systems, the operator shall select at least one container per 1000 for incubation.

(c) Only normal-appearing containers shall be selected for incubation.

(d) The operator shall identify the selected containers to ensure they are incubated for the required period of time.

9.4 Incubation Temperature and Time

The required samples for shelf stable products shall be tested by incubation for at least 10 days at 37 ± 1 ºC.

9.5 Incubation Checks and Records Maintenance

A designated person shall visually check all containers under incubation each working day and the inspector shall be notified when abnormal containers are detected. For each incubation test the establishment shall record at least the product name, container size, container code, number of containers incubated, in and out dates, and incubation results. The establishment shall retain such records, along with copies of the temperature/time recording charts for at least three years.

9.6 Abnormal Containers

The finding of abnormal containers among incubation samples is cause to officially retain at least the code lot involved.

N.B.

When abnormal containers are detected by any means other than incubation, the operator shall inform the inspector and the affected lot(s) shall not be shipped until the inspector is satisfied that the product is safe and fit for human consumption.

9.7 Shipping

In those instances where a good record of proper canning procedures has been demonstrated and routine incubation tests have proven negative, the operator may be permitted to ship the product to another registered establishment or to a distribution warehouse for storage, without awaiting the results of the incubation tests for the particular lot, provided that the inspector is advised of the product destination, and the product is not offered for sale until the results are known.

Where product leaves the originating establishment prior to incubation being completed, the operator must maintain a detailed record of product codes, amounts shipped and destinations, in case a recall is initiated.

10.0 Records to Maintain

10.1. Processing and Production Records

(1) Processing and production information should be entered by the retort or processing system operator or other designated person, on forms which should include the product, the code number, the retort or processing system number, the size of the container, the approximate number of containers per coding interval, the minimum initial temperature, the actual processing time and temperature, the mercury-in-glass and recording thermometer readings, and other appropriate processing data. Closing machine vacuum (in vacuum-packed products), maximum drained weight, or other critical factors specified in the scheduled process should also be recorded. In addition, the following records should be maintained.

(a) Still retorts

Time steam on: time temperature up to processing temperature; time steam off; venting time and/or temperature to which vented (as applicable).

(b) Agitating retorts

Functioning of condensate bleeder; retort speed; and, where specified in the scheduled process, head space, consistency, maximum drained weight, minimum net weight and percent solids.

(c) Hydrostatic retorts

The temperature in the steam chamber between the steam-water interface and the lowest container position; speed of the container conveyor chain: and where the scheduled process specifies maintenance of particular temperatures in the hydrostatic water legs, the temperatures near the top and the bottom of each hydrostatic water leg.

(2) Recording thermometer charts shall be identified by date, and other data as necessary, so that they can be correlated with the written record of lots processed, Each entry on the record shall be made by the retort or processing system operator, or other designated person, at the time the specific retort or processing system condition or operation occurs, and the retort or processing system operator or such designated person shall sign or initial each record form. Not later than one working day after the actual process, and prior to shipment or release for distribution, a representative of plant management who is qualified by suitable training or experience shall review all processing and production records for completeness and to ensure that the product received the scheduled process. The records, including the recording thermometer chart(s), shall be signed by the individual conducting the review.

(3) Written records of all container closure examinations should specify the product code, the date and time of container closure inspections, the measurements obtained, and all corrective actions taken. Records should be signed by the container closure inspector and

should be reviewed by management with sufficient frequency to assure that the containers are hermetically sealed.

(4) Written records should be kept to show that desired equilibrium pH is obtained where the food acidity is adjusted for processing.

(5) Records shall be kept on cooling water chlorination and microbiological testing.

10.2 Distribution Records

Records shall be maintained identifying the initial distribution of the finished product.

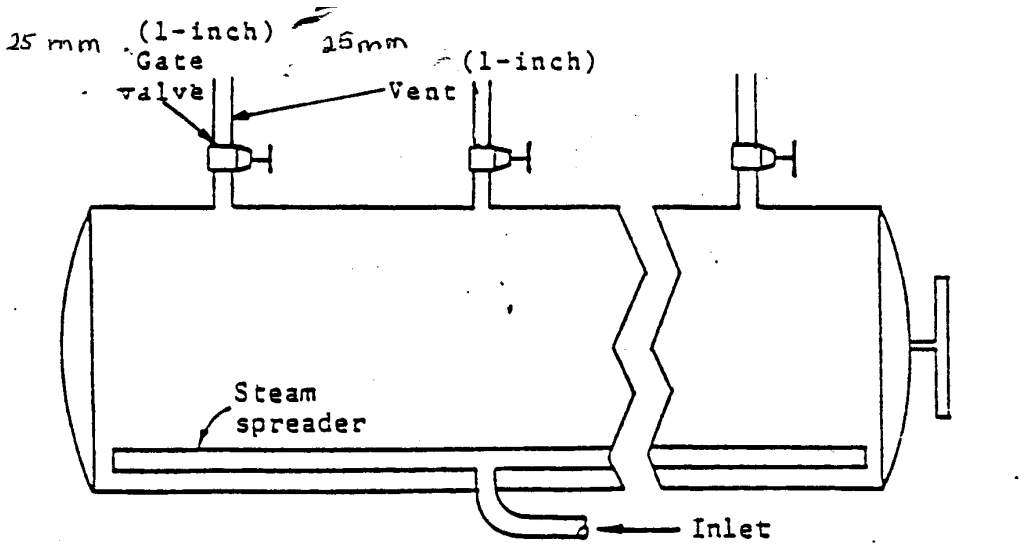
Copies of all records provided for in this section except those on cooling water chlorination, shall be kept by the company for a period of not less than three years, and shall be available to an inspector at any time.

10.3 Incubation Records

A permanent log shall be maintained by an inspector, listing product, code, number of containers, dates of start and finish of incubations period, together with results of all examinations (cans should be examined at least every three days).

FIGURE 1 - Venting Horizontal Retorts

Venting through multiple 25 mm (1 in) vents discharging to atmosphere



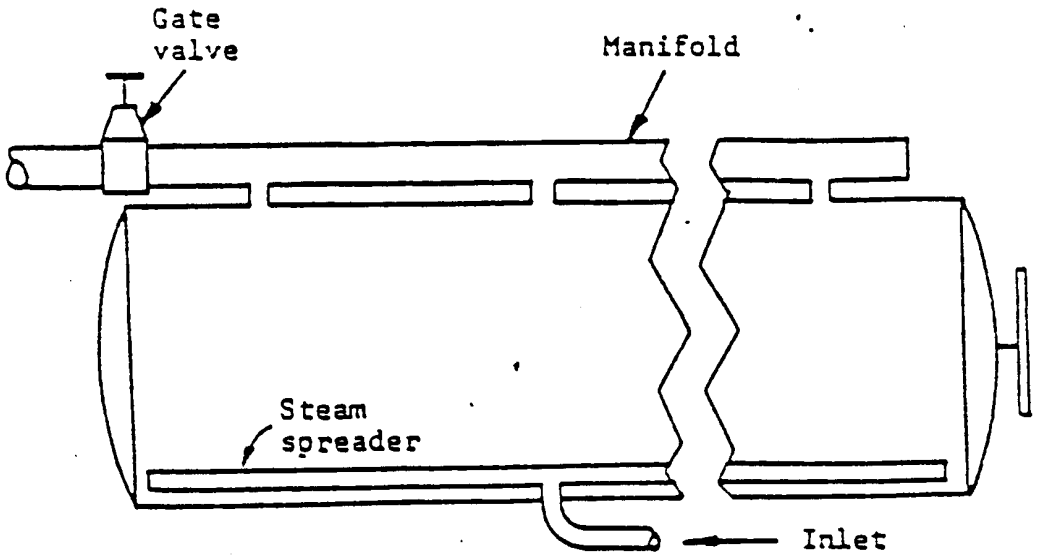
Specifications: There should be one 25 mm (1 in) vent equipped with a gate or plug cock valve for discharging to the atmosphere for every 1.5 m (5 ft) of retort length and the end vents should not be over 0.75 m (2.5 ft) from the ends of the retort.

Venting method: Vent valves should be wide open for at least 5 minutes and to a retort temperature of at least 107ºC (225ºF) or for at least 7 minutes and a temperature of 104.5ºC (220ºF).

Note: If dividers are used in the retort baskets the above venting method is not valid. Heat distribution tests are required to determine the proper venting procedure.

FIGURE 2 - Venting Horizontal Retorts

Venting through multiple 25 mm (1 in) vents discharging through a manifold to atmosphere



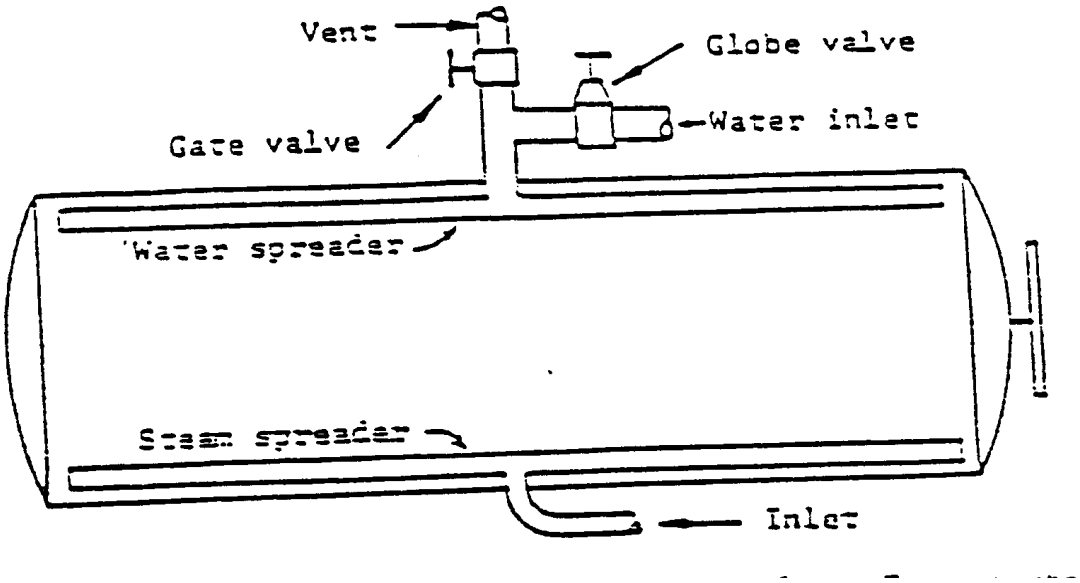
Specifications: There should be one 25 mm (1 in) vent for every 1.5 m 5 ft) of retort length and the end vents should not be over .75 m (2.5 ft) from the ends of the retort. For retorts less than 4.5 m (15 ft) in length the inside diameter (ID) of the manifold should be not less than 64 mm (2.5 in) and for retorts whose length is 4.5 m (15 ft) or greater the ID should be at least 75 mm (3 in).

Venting method: The manifold valve should be wide open for at least 6 minutes and to a retort temperature of 107ºC (225ºF), or for at least 8 minutes and to a temperature of 104.5ºC (220ºF).

Note: If dividers are used in the retort baskets the above venting method is not valid. Heat distribution tests are required to determine the proper venting procedure.

FIGURE 3 - Venting Horizontal Retorts

Venting through water spreaders



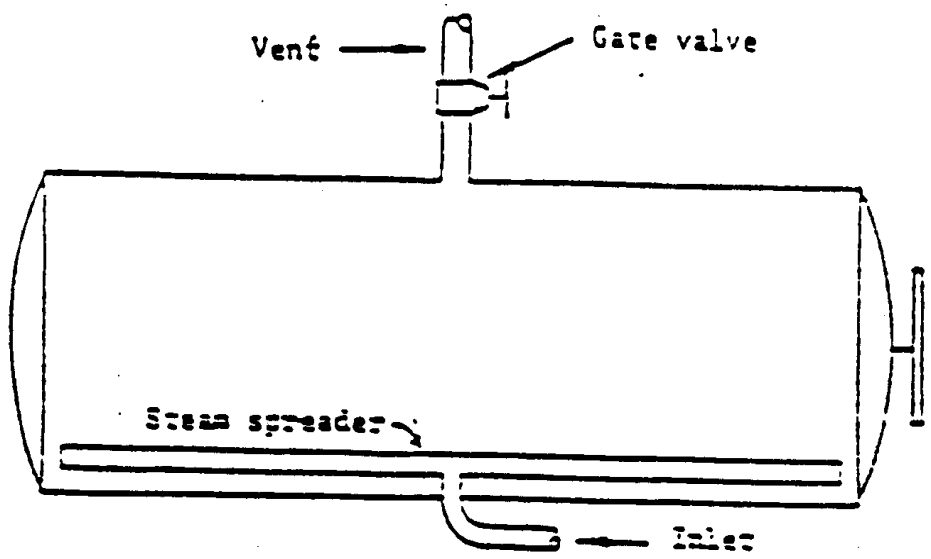
Specifications: The size (ID) of the water inlet, vent pipe and vent valve for retorts less than 4.5 m (15 ft) in length should be not less than 50 mm (2 in) and for retorts 4.5 m (15 ft) or greater in length they should be not less than 64 mm (2.5 in). The size (ID) of the water spreader for retorts less than 4.5 m (15 ft) in length should be not less than 40 mm (1.5 in) and for retorts 4.5 m (15 ft) or greater in length they should not be less than 50 mm (2 in).

Venting method: The water spreader vent gate or plug cock valve should be wide open for at least 5 minutes and to a retort temperature of at least 107°C (225°F), or for at least 7 minutes and to at least 104.5°C (220°F).

Note: If dividers are used in the retort baskets the above venting method is not valid. Heat distribution tests are required to determine the proper venting procedure.

FIGURE 4 - Venting Horizontal Retorts

Venting through a single 64 mm (2.5 in) top vent (for retorts not exceeding 4.5 m (15 ft) in length)



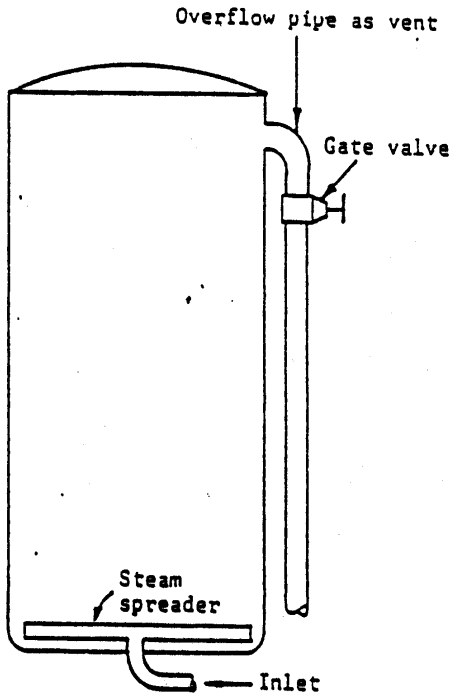
Specifications: The vent should have an ID of at least 64 mm (2.5 in) and be equipped with at least a 64 mm (2.5 in) gate or plug cock valve and be located within .6 m (2 ft) of the center of the retort.

Venting method: The vent gate or plug cock valve should be wide open for at least 4 minutes and to a retort temperature of at least 104.5°C (220°F).

Note: If dividers are used in the retort baskets the above venting method is not valid. Heat distribution tests are required to determine the proper venting procedure.

FIGURE 5 - Venting Vertical Retorts

Venting through a 40 mm (1.5 in) overflow



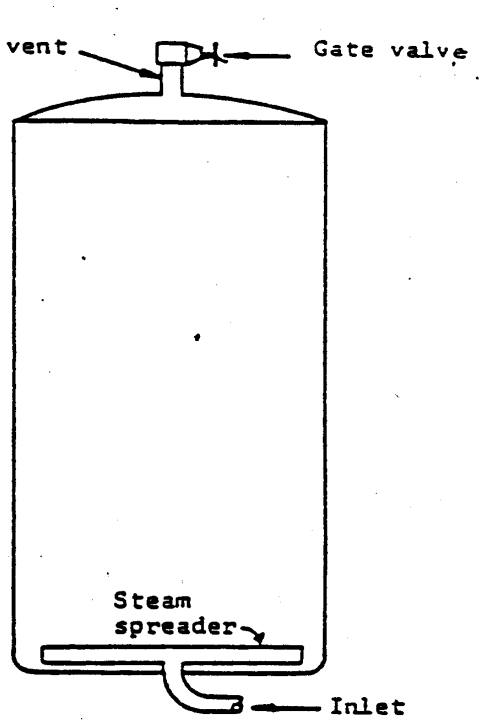
Specifications: The overflow pipe should have an ID of at least 40 mm (1.5 in) equipped with at least a 40 mm (1.5 in) gate or plug cock valve and with not more than 1.8 m (6 ft) of 40 mm (1.5 in) pipe beyond the valve before the break to the atmosphere or to a manifold header.

Venting method: The vent gate or plug cock valve should be wide open for at least 4 minutes and to a retort temperature of 103.5ºC (218ºF), or for at least 5 minutes and to at least 101.5ºC (215ºF).

Note: If dividers are used in the retort baskets the above venting method is not valid. Heat distribution tests are required to determine the proper venting procedure.

FIGURE 6 - Venting Vertical Retorts

Venting through a single 25 mm (1 in) side or top vent



Specifications: The vent in the lid or top side should have an ID of at least 25 mm (1 in) and be equipped with a 25 mm (1 in) gate or plug cock valve and discharge directly into the atmosphere or to a manifold header.

Venting method: The vent gate or plug cock valve should be wide open for at least 5 minutes and to a retort temperature of at least 110ºC (230ºF) or for at least 7 minutes and to at least 104.5ºC (220ºF).

Note: If dividers are used in the retort baskets the above venting method is not valid. Heat distribution tests are required to determine the proper venting procedure.

PART 12

SAMPLING AND TESTING PROCEDURES

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SAMPLING AND TESTING PROCEDURES

Provisions of Samples and Test Results
Official Test Method

Reference: Part 12 - Sections 75, 76 & 77 of the National Meat & Poultry Regulations

OUTCOME REQUIRED

< The provisions of wholesome meat to the consumer which requires an assurance that the product does not contain residues of Agricultural chemicals or Veterinary drugs or micro-organisms in concentrations that may be harmful to human health.

RATIONALE

< To assure safety, aesthetic acceptability and compliance to standards of meat products, ante and postmortem inspections are supplemented with laboratory examinations to detect chemical substances and microorganisms and to verify compliance to compositional standards.

< The objective of monitoring quality assurance is to ascertain that established processes will result in a non-adulterated meat product, and conform to compositional requirements.

< The objective of residue monitoring is to identify the prevailing levels and trends of chemicals and drugs present in animals and meat products. Follow-up action should be conducted on specific compounds or groups of compounds of concern.

12.1 General Requirements

12.1.1 Purpose and Objectives Sampling and Testing

The operator of an establishment is responsible for regular sampling and testing programs, to ensure that meat and meat products, slaughtered or processed at an establishment, do not contain residues of Agricultural chemicals or Veterinary drugs or microorganisms in concentrations that may be harmful to human health.

The sampling and testing procedures shall be implemented at pre-determined frequencies, in order to verify that existing production controls result in meat products that comply with standards prescribed in the National Meat and Poultry Regulations and Code.

The applicable *Regulatory Authority* is responsible for verification that meat products are produced in accordance with standards under the *National Meat and Poultry Regulations and Code* and the *Food and Drugs Act and Regulations.*

Contaminants in livestock which are outside the control of operators, shall be governed by the appropriate *Regulatory Authority* in respect to the implementation of monitoring and surveillance programs.

12.1.2 Objectives of Sampling and Testing Programs

The objectives of sampling and testing programs is to ensure:

< the safety of meat and meat products;
< the aesthetic acceptability of such products;
< that products are in compliance with standards;
< that chemical substances are at acceptable levels;
< that microorganisms do not exceed acceptable levels or standards;
< compliance with compositional standards

12.2 Provisions of Samples and Test Results

An inspector may require from an operator, free of charge, samples of the following for laboratory examination and testing:

< samples of any meat product; or

< any ingredient or additive or any other material that is used or may be used in the preparation of or

< in connection with a meat product

When samples have been submitted for testing, an operator of an establishment may request an inspector to provide a copy of any report, or the actual results compiled by the laboratory performing the examinations on the sample(s) submitted.

12.3 An Official Test Method

An official test method is a method of testing or examination that has been approved by the *Association of Official Analytical Chemists*. All samples of meat products or ingredients shall be analyzed or tested using the official method. In addition, the *Regulatory Authority* must provide to an operator, upon request, a written description of any official method requested.

12.4 Types of Sampling and Testing Programs

12.4.1 Bacteriological Contamination

Contamination occurs from poor or improper slaughter and dressing procedures and subsequent handling and secondary processing methods and procedures. Spoilage organisms and pathogens from the intestinal tract of animals and the plant environment are sources of bacterial contamination.

The objective of bacteriological monitoring of meat products at critical stages of production or of ready to eat meat products is to verify that production methods, as well as, any company quality control measures at the establishment are adequate to assure safe and adulterated meat products for human consumption.

12.4.2 Products to be sampled may involve the following types of meat products:

< ready to eat meat products, all types or categories

12.4.3 Sample collection procedures:

< the applicable *Regulatory Authority* shall develop a sampling plan at pre-determined frequencies, requesting specific samples required for examination and testing.

< persons collecting a sample must wash hands thoroughly in order not to contaminate the sample unit and shall ensure that, all utensils shall be cleaned and disinfected prior to contact with sample unit

< products marked fresh shall not be frozen, as freezing reduces the number of bacteria

< the sample container unit must contain a sufficient amount of refrigerant to ensure that the temperature is maintained below 10 °C, (fresh) until the sample reaches the laboratory

12.4.4 Microbiological Standards

Interpretation of laboratory test results. Figures represent estimated number of organisms per gram.

Microbial Standards

	No. Of samples	No. Of sub samples	Cooked	Cured	Raw	Cooked	Cured	Raw
	n	c	m	m	m	M	M	M
TAC	5	2	10 4	NA	105	10 5	NA	10 7
S. aureus	5	2	20	100	100	100	1000	1000
E. coli	5	2	20	50	100	50	100	500
Coliforms	5	2	50	100	500	100	500	1000
Salmonella	5	0	0	0	NA	0	0	NA
L.mono	5	0	0	0	NA	0	0	NA

Further understanding of above readings:

n =	number of subsamples tested
c =	number of subsamples which may exceed the number of bacteria indicated under m.
m =	number of bacteria which should not be exceeded by more than c subsamples
M =	Maximum number of bacteria which should not be exceeded in any one subsample
N/A	not applicable
TAC	total aerobic count

The above values are maximum retail levels. At the producer level fresh product should have a TAC one log lower and there should be no *S. aureus* or *E. coli* on heated products.

12.4.5 Follow-Up When Standards Are Not Met

Where the above limits are exceeded, follow-up action as to the source of contamination shall be initiated by the operator of the establishment.

The inspector is responsible to verify that the quality control measures implemented by the operator of the establishment are being performed satisfactorily and as intended to correct the problem and to prevent recurrence.

The operator shall conduct a systematic investigation that shall focus on the processing method of the product in question and may include in-line and finished product testing. The operations from the

point of raw material through formulation, heating, drying, packaging and storage to the final product, shall be evaluated in order to determine probable causes.

Deviations in processing methods that may result in unsatisfactory product should be examined by the operator, and may include the following elements:

< contamination of the processing line or raw materials,

< insufficient heat exposure during cooking or smoking,(re-evaluate established process flows and hazard analysis critical control points)

< equipment preventative maintenance programs (inadequate calibration programs)

< inadequate training programs for plant employees

< storage activities

When the operator is convinced that the product meets acceptable standards, check samples should be taken and examined by a laboratory for confirmation. Appropriate records shall be maintained by the operator for verification purposes, and in order to ensure that the corrective actions taken have been effective to prevent a recurrence.

Should the results of the sample analyzed determine that the product contains a banned substance or a substance in excess of levels permitted under the *Food and Drugs Act & Regulations*, the operator must treat the product as 'condemned' and dispose of the product(s) in accordance with section 47 (2) of the Regulations.

Where expertise or facilities for resolving the problem are not available in an establishment, outside consultants or laboratories are recommended.

When the contamination problem is corrected, additional samples, shall be taken by the inspector and forwarded to the laboratory for verification.

12.5 Tuberculosis/Brucellosis

In accordance with the *Health of Animals Regulations*, animals may be ordered to be slaughtered and compensation paid, e.g. brucellosis reactors or tuberculosis non-reactors from herds being depopulated because of tuberculosis.

The compensation payment shall be the market value of the animal, subject to the maximum amount allowable, less an amount equal to the beef value of the carcass. The *Regulatory Authority* shall advise the parties involved and provide the necessary application procedures to farmers or operators for animals ordered slaughtered as a result of tuberculosis or brucellosis.

12.5.1 Handling of Animals Ordered Slaughtered

When animals are ordered to be slaughtered handling procedures shall be followed:

a) The carrier vehicles shall be cleaned and disinfected, when unloaded

b) All animals shall be appropriately identified

c) The animals shall be placed in an isolation or suspect pen

d) The isolation or suspect pen shall be cleaned thoroughly, when empty

12.5.2 Sample Collection

When granulomatous lesions similar to those caused by *C. bovis* are detected in carcasses from animals ordered slaughtered, the lesions shall be collected and submitted to an approved laboratory for histology and, if applicable, culture and typing.

< The sample unit shall be collected in TB kits, containing formaldehyde and sodium borate solutions.

< Under the *Transport of Dangerous Goods Regulations*, granulomatous lesions from these animals are classified as infectious material, as such, the sample units shall be handled and shipped according to specifications of *Animal Health Manual of Procedures, Section XVIII.*

< All brucellosis-susceptible cattle intended for slaughter, and whose herd of origin can be determined, shall be tagged for identification purposes.

< An inspector or examiner shall collect a blood sample for the identified animal (blood samples should be taken at the beginning of the bleeding of the animal).

< All samples taken shall be forwarded to a laboratory as frequently as deemed necessary by the Veterinarian**.**

12.6 Trichinosis Testing

Trichinosis is a reportable disease under the *Health of Animals Regulations,* and when a positive case is found, the *Regulatory Authority* shall be provided with the name and address of the farm of origin.

12.6.1 Animals or Products to be Tested

< hogs
< pork meat and meat bi-products
< wherever possible, carcasses from older animals (sows) and garbage-fed hogs should be sampled

2.6.2 Sample Collection Procedures:

< the applicable *Regulatory Authority* shall develop a sampling plan at pre-determined frequencies, requesting the samples to be tested**,**

- persons collecting a sample must wash hands thoroughly in order not to contaminate the sample unit,

- should utensils be required, all equipment shall be cleaned and disinfected prior to contact with sample unit,

- collect from both pillars of the diaphragm (approximately 50 g tissue) into clean plastic bags; identify the hog carcass by tattoo or another appropriate means in order to maintain identify of the sample,

- pack samples in wet ice (do not freeze) and send to laboratory by most expedient means.

12.6.3 Follow-Up When Standards Are Not Met

As trichinosis is a reportable disease under the *Health of Animals Regulations*, the name and address of the hog farmer shall be provided to the applicable *Regulatory Authority*, and follow-up monitoring may be initiated with testing of a large volume at identified laboratories.

When the pork sample has been found infested with trichina (positive test result), the carcass shall be held and additional samples shall be forwarded to a laboratory. Carcass disposition or options for anti-parasitic treatments shall be determined by the inspector.

12.6.4 Products to be Treated (Anti-parasitic Treatments):

Options for pork products or meat products containing pork striated muscles, which are customarily eaten without further cooking or which have the appearance of a cooked meat product, shall be treated to destroy *Trichinella spiralis*, by *cooking, freezing, curing* or another procedures or processes, to ensure the destruction of all live *Trichinella*. *Refer to Section 11, Processing and Meat Standards, Appendix A for requirements on anti parasitic treatments.*

12.6.5 Exempted Products (Products Not to be Treated):

All forms of fresh pork containing striated muscle, including fresh unsmoked sausage containing pork muscle tissue, and pork products designated as side bacon, Wiltshire bacon or smoked pork jowls are exempted from anti-parasitic treatments.

Should the results of the sample analyzed also determine that the product contains a banned substance or a substance in excess of levels permitted under the *Food and Drugs Act & Regulations*, the operator must treat the product as ‘condemned’ and dispose of the product(s) in accordance with section 47 (2) of the Regulations.

12.7 Species Verification

Sampling and testing programs for species verification are performed to detect unlawful substitution of meat products, derived from one species, with meat products derived for another species.

12.7.1 Products to be Sampled May Involve the Following Types of Meat Products:

a) boneless beef, veal, mutton, lamb or trimmings

b) ground beef, pork, veal, lamb, etc.

c) mechanically separated beef, pork or chicken, etc.

d) processed products, cooked or cured where meat from other species than those declared may be present

12.7.2 Sample Collection Procedures

The applicable *Regulatory Authority* shall develop a sampling plan at pre-determined frequencies, requesting the samples to be tested. In order to ensure the suitability of the samples for all tests, attention should be paid to the following collection procedures:

< Persons collecting the samples shall wash hands thoroughly prior to contact with sample;

< Disinfect equipment used to assist with collection of sample: drill, forceps, scalpel, by thorough cleaning, dipping in alcohol and flaming before taking a sample, where applicable;

< Avoid contamination, peel outer wrapper to expose clean area for sampling from boxed meats;

< Collect 100 gram of lean meat as one sample unit;

< Cooked and cured products should also be submitted for bacteriological testing and species verification. The laboratory will conduct both tests from one sample;

< Avoid thawing and refreezing of products, as much as possible.

12.7.3 Follow-Up When Standards Are Not Met

The operator shall conduct a systematic investigation from raw material through formulation, processing, packaging and labelling to final produce storage, in order to determine probable causes.

Deviations in processing methods that may result in unsatisfactory product should be examined by the operator, and may include the following elements:

< evaluation of procedures and controls of incoming materials (identification of incoming materials);

< investigation of production identification throughout all stages of manufacturing processes and storage activities;

- an investigation of recipes, formulations, method of preparations, process control documents (re-evaluate established process flows and hazard analysis critical control points);

- re-evaluation of employee training programs in product safety; operational controls and procedures; specific work tasks and responsibilities; an on-site observations of employee handling procedures and methods;

- investigation and evaluation of existing premise and equipment sanitation program;

- evaluation of product processing lines during manufacturing operations

When the operator is convinced that the product meets acceptable standards, check samples should be taken and examined by a laboratory for confirmation. The operator shall maintain appropriate records for verification purposes, and to ensure that the corrective actions taken have been effective to prevent a recurrence.

Should the results of the sample analyzed also determine that the product contains a banned substance or a substance in excess of levels permitted under the *Food and Drugs Act & Regulations*, the operator must treat the product as 'condemned' and dispose of the product(s) in accordance with section 47 (2) of the Regulations.

12.8 Compositional Analysis

The operator is responsible for compliance with compositional standards as prescribed in the Schedules of the Regulations. The inspector is responsible for the monitoring of the company's quality assurance programs and the review of all compositional data, reports and records.

12.8.1 Products to be Sampled:

- the applicable *Regulatory Authority* shall develop a sampling plan at pre-determined frequencies, requesting the samples to be tested.

- processed products that do not contain filler, (*Refer to Schedule I of the Regulations*). Submit samples of finished product only.

- process products that contain filler, *(Refer to Schedule I of the Regulations).*

- processed meat products containing non-meat entities.

12.8.2 Sample Collection Procedures:

- persons taking the sample shall wash hands thoroughly and any required utensils, prior to collecting sample unit

- samples should be collected into containers: vials, jars, cans, plastic containers or bags

< each organ must be collected in a separate container

< a sample unit shall consist of 400-500 gram unit

< the sample shall be packaged to prevent moisture loss or leakage

< sample should be frozen as quickly as possible after collection

12.8.3 Follow-Up When Standards Are Not Met

Should the results of the samples tested be found in violation of regulatory standards, the operator shall conduct a systematic investigation from raw material through formulation, processing, packaging to final product storage, in order to determine probable causes.

Deviations in processing methods that may result in product not meeting compositional standards, may include the following elements:

< evaluation of procedures and controls for incoming materials (meat products and non-meat ingredient commodities);

< investigation of existing production systems and controls for compliance with acceptable procedures and methods;

< evaluation of employee training programs, related to responsibilities and monitoring tasks involving process controls and procedures; on-site observations of employee handling and operational activities, (process controls, recipes, method of preparations for processed products).

Following an appropriate corrective action, the product should be held until the operator has provided analytical evidence that the corrective action has resulted in products that are in compliance with applicable regulatory standards.

The operator shall maintain appropriate records for verification purposes, and to ensure that the corrective actions taken have been effective to re-establish and maintain compliance and to prevent a recurrence.

Should the results of the sample(s) being analyzed determine that the product contains a banned substance or a substance in excess of levels permitted under the *Food and Drugs Act & Regulations*, the operator must treat the product as ‘condemned’ and dispose of the product(s) in accordance with section 47 (2) of the Regulations.

12.8.4 Compositional Violations - Disposition Options

Products found in non-compliance with compositional standards may be considered for alternate dispositions. The operator, in consultation with an inspector, may elect to dispose of the identified products as follows:

a) The meat product may be sold to plant employees.

b) The product may be used for rework product.

c) If the product is in a comminuted state, such as fresh sausage or pate, it may be reprocessed to achieve compliance with standards.

d) If the product is structured, such as, cooked sausage or meat loaves, in order to comply with legislative requirements *(Refer to Schedule I of the Regulations)*, the operator may elect to correct the identified products, (i.e., for meat product or total protein) by scheduling the products for further processing in order to meet the required compositional standards for the products in question.

e) Other disposal or corrective actions proposed by the industry will be considered on their individual merit, by the applicable *Regulatory Authority.*

12. 9 Veterinary Drugs and Agricultural Chemicals

12.9.1 Definition

Veterinary drugs and Agricultural chemicals are compound substances, used to promote growth, prophylaxis and therapy in livestock and are licensed by the *Veterinary Biologics Section of the Animal Health and Production Division, Canada Food Inspection Agency***.** The Agency also sets acceptable withdrawal times and applicable tolerances.

Agricultural chemicals are used on farms as an aid in crop and livestock production. Criteria for use and tolerances are established by *Canadian Food Inspection Agency and Health Canada.*

12.10 Antibiotic Residues in Meat

Details regarding the type of antibiotic, animal species, withdrawal times and dose level that may be added to feed are listed in the *Compendium of Medicating Ingredients Brochure.* For treatment purposes a Veterinarian is responsible to caution the owner of necessary withdrawal times.

Antibiotic residues in meat may cause reactions in sensitized persons, proliferation of antibiotic-resistant bacteria and possible direct toxic effects of minute amounts over long periods of time.

2.10.1 Monitoring Procedures

Operators engaged in the slaughter of food animals shall monitor the animals being slaughtered for antibiotic residues, to check that current methods of use do not produce residues in meat. Of special concern are animals which may have:

a) Been treated for any disease or condition without observing required withdrawal times
b) Animals showing evidence of injection marks,

c) Animals showing evidence of chronic non-febrile conditions, such as mastitis, arthritis, metritis, etc. Such animals are considered "Suspect" and must be treated for antibiotic residues.

12.10.2 Products to be Sampled:

< the applicable *Regulatory Authority* shall develop a sampling plan at pre-determined frequencies, requesting the samples to be tested.

< kidney, muscle tissue (diaphragm, neck or cheek meat), liver (optional) of swine, calves, sheep, horses, and if applicable, 150 gram of muscle from the injection site

12.10.3 Sample Collection Procedures:

< persons taking the sample shall wash hands thoroughly and any required utensils, prior to collecting sample unit

< samples should be collected into clean plastic bags and identified

< a sample units shall consist of 150 gram unit; packaged to prevent moisture loss or leakage

< the sample should be frozen as quickly as possible after collection and subsequently forwarded to a laboratory for examination and testing

12.10.4 Follow-Up When Standards Are Not Met:

Should the results of the samples tested be found in violation of regulatory standards, the operator shall forward the owner's name and address for a follow-up visit by the applicable *Regulatory Authorities*.

When an owner has been identified by the *Regulatory Authority* as a repeated offender, subsequent animals or lots from such an owner are to be sampled according to sampling procedures and forwarded for laboratory analysis.

When a flock or herd has been sampled the lot shall be deemed unacceptable if one animal or carcass exceeds the tolerance limit.

12.10.5 Disposition of Carcasses and Organs:

< carcasses and organs are to be held under identification until laboratory reports are received.

< the dressed carcasses and all organs derived from the carcass shall be condemned if the muscle tissue from that carcass gives a positive result.

< should a liver or kidney sample or both are found positive but the muscle tissue is negative, then only the organs shall be condemned.

To note, final disposition will depend on the type and level of antibiotic present in the sample unit. A decision shall be made by the *Regulatory Authority* regarding the disposition of lots and if so directed, the operator must treat the product as 'condemned' and dispose of the product(s) in accordance with section 47(2) of the Regulations.

12.11 Sulfonamides

Sulfonamides constitute a veterinary drug for direct administration, primarily in the prophylaxis and therapy of bacterial diseases. In combination with antibiotics, specifically, the tetracyclines and penicillin group, they are widely employed to increase the rate of weight gain in livestock.

In hogs, the use of these chemical agents assist in the prevention of bacterial enteritis, including *Salmonella*, *Cholera suis* and *Vibrio dysentery*. In poultry, sulfonamides form a valuable aid in preventing or in reducing mortality due to coccidiosis, fowl typhoid and acute fowl cholera.

There are only three types of Sulfonamides licenced for use as a medicating feed ingredients:

< Sulfanitran
< Sulfamethazine
< Sulfaquinoxaline

12.12 Therapeutic Agents

Therapeutic agents are a group of chemical substances that includes Medicating Feed ingredients as well as Veterinary Drugs. The following chart is a listing according to chemical similarities. For more details, consult the Compendium of Medicating Ingredient Brochure {MIB):

12.13 Nitro-Compounds

	MIB NO.	SPECIES	WITHDRAWAL (Days)
NITROFURANS:			
Nitrofurazone	6	POR	5
Furazolidone	11, 35A, 60	CHK, TUR, POR	5, 7
Nihydrazone	29	CHK	5
Nifursol	52	TUR	5
SUBSITUTATED UREAS:			
Nicarbazine	9	CHK	4
Nithiazide	16	CHK, TUR	1
NITROBENZAMIDES:			
Zoalene	7	CHK, TUR	**
Nitromide	13, 13A	CHK	5

Aklomide	32	CHK	4
NITROIMIDAZOLES:			
Dimetridazole	33	TUR	5
Ronidazole	59	TUR, POR	7, 3
NITROBENZENESULFONAMIDES:			
Dinsed	2, 13, 32	CHK, TUR	4, 5

***** Consult the Compendium of Medicating Ingredient Brochures***

12.13.1 Nitrogenous Compounds

	MIB No.	SPECIES	WITHDRAWAL (Days)
ACWTAMIDOBENZOIC ESTERS:			
Etopabate	27A	CHK	1, 3
PYRIDINOLS & QUINOLINE CARBOXLIC ESTERS:			
Clopidol	45	CHK	**
Buquinolate	44	CHK	**
Decoquinate	50	CHK, BOV	**
Nequinate	51	CHK	2
CARBAZATES:			
Carbadox	53	POR	35
GUANIDINES:			
Robenidine	58	CHK, TUR	6, **
OTHER NITROGENOUS COMPOUNDS:			
Amprolium	27, 27A	CHK, TUR, CAL	1, 3, 7
Levamisole	54, 54A	POR, BOV	4, 10
Morantel	61	POR, BOV	30
Phenothiazine	22	CHK, TUR	---
Piperazine	19, 22	CHK, TUR, POR	---
Reserpine	28	TUR	---

***** Consult the Compendium of Medicating Ingredient Brochures***

12.13.2 Other Medicating Feed Ingredients

	MIB No.	SPECIES	WITHDRAWAL (Days)
Monensin	57	BOV	3
Dibutyltin dilaureate	2, 22, 31	CHK, TUR	5, 10
Poloxaline	56	BOV	---

12.14 Hormonal Substances

Hormonal substances are used as:

< anabolic agents, (to increase feed efficiency, accelerate attainment of market weight and improve carcass quality)
< as oestrus regulators and
< for the treatment of specific disorders

There are various endogenous hormone preparations *(e.g. Synovex*) and one exogenous hormone preparation *(Zeanol)* which are licensed for use as implanted pellets for growth promotion in calves, heifers and steers. In all cases, the recommended implant site is the ear.

According to Health Canada,

"the use of an implantation site other than what is recommended would unlikely be sufficient proof of adulteration under the Food and Drugs Act. While acknowledging the probable absence of harmful residue, the Drugs Directorate recommended that liver and kidney of animals implanted with these drugs in areas other than the ear not be permitted for sale as food.

As well, all the area of implantation and any adjacent areas showing evidence of inflammation are to be completely destroyed".

Should implanted pellets of any description be found in any area other than the ear, the above policy is in effect.

Should an inspector or an examiner believe that implanted pellets may be other than those licensed for use in Canada then the carcass should be detained and the pellets analyzed by a laboratory found acceptable by this *Regulatory Authority.*

In addition, should an inspector or an examiner, have reason to believe that hide-on-calves have been implanted with hormonal preparations in areas other that the ear such carcasses should be detained, skinned out, and throughly examined fro such implants.

2.15 Hormonal Drugs for Use in Food Producing Animals in Canada

Hormonal substances are substances that involve (or treat):

1. Anabolic agents, which purpose is to increase feed efficiency, accelerate attainment of market weight and improve carcass quality
2. As oestrus regulators and
3. For the treatment of specific disorders

Growth Promotants

Registered Trade Name	Ingredient	Species	Indications	Withdrawal Time	Dose
Compudose	Estradiol	Steers over 272 kg body weight in feedlot or on pasture	Improved gain & feed efficiency	Zero	1 implant (24 mg)
Raigro Ralabol	Zeranol	Suckling, weaned & growing beef cattle, feedlot steers and heifers	Improved gain & feed efficiency	Zero	1 implant (3 x 12 mg pellets)
Synovex -H Ganamaz-H Heiferoid	20 mg Estradiol benzoate 200 mg. Testosterone propionate	Heifers 180-400 kg	Improved gain & feed efficiency	Zero	1 implant (8 pellets)
Synox-S	20 mg Estradiol benzoate 200 mg Progesterone	Steers 180-450 kg	Improved gain & feed efficiency, steer may be reimplanted	zero	1 implant (4 pellets)
MGA	Melengestrol acetate	Heifers fed for slaughter	improved gain & feed efficiency through suppression of estrus	48 h	0.4 mg/head/ day orally in the feed
Revalor-S	120 mg Trenbolone acetate 24 mg Estradol	Feedlot Steers	Improved gain and feed efficiency	Zero	1 implant (6 pellets)

12.16 Bovine Estrus Regulators Other Hormonal Drugs (Bovine) Hormonal Drugs for use in Horses

Anestrol	Azium	Azium
Estrumate	Cystorelin	Betasone
MGA	Factrel	Equimate
Lutalyse	Flumethazone	Flucort
Synchrocept B	Planate	Lutalyse
Veramix		Regumate
		Synchrocept
		Winstrol-V

12.17 Illegal Use of Hormonal Substances

The use of the synthetic stilbene derivative Diethylstibestrol (DES) has been prohibited in Canadian food producing animals since 1974. Since illegal use of DES in Canada could be attempted, inspectors and examiners in calf slaughter establishments should check for precocious sexual development in veal calves on ante mortem and post mortem inspections. Special attention should be paid to the mammary gland and teat development in males and females. Uterine and ovarian enlargement in females, and testicular and prostatic enlargement in males. Milk veal calf operations would be the prime candidates for illegal use of DES.

The following samples should be taken from suspected carcasses and submitted for laboratory testing:

< one pound of liver, immediately frozen

< the sexual organs of the pelvic cavity, specifically prostate or Bartholin glands, as well as mammary glands or teats are required for histological examination. Sexual organs are to be immersed in 10 % formalin. Care should be taken to avoid large pieces of tissue, as formalin will only pentetrate a quarter of an inch of tissue.

Anatomical location of prostate:

In the pelvic portion of the penis at the junction of the ureter, seminal vesicles, and corpus peni and the end of the urethral muscle. It straddles the dorsal side of the ureter in the form of a horseshoe the size of a large pea. The Bartholin glands are found on the caudo-ventral side of the vagina, on each side of the end of the ureter and clitoris. As a sample, the caudo-ventral portion of the vagina should be taken.

2.18 Clenbuterol Drug - Restricted Use

Clenbuterol is a drug approved by Health Canada with specific restrictions. Specifically, Clenbuterol is approved for use in horses that are not to be slaughtered for food. Veterinarians prescribe the drug, as an agent for the delaying of parturition.

Animals that test positive (retina test), will result in the producers being notified, in writing, by the appropriate regulatory authority, that the results of the testing has constituted an adulteration under the *Food and Drugs Act and Regulations* and shall be further advised on next steps and instructions on livestock herds or carcass dispositions.

12.19 Pesticides

Pesticides are a form of agricultural chemicals which, if applied correctly, serve to increase the efficiency of food production through the control of pests affecting both plant and animal life.

With the present use of agricultural chemicals, the possibility of accidental contamination of feeds or direct exposure of livestock is ever present. Inspectors must be aware of the possibility of such contamination and follow up indication that such contamination has occurred, either from reports of

owners or other people connected with the livestock industry, or from observations on antemortem and postmortem inspection activities.

12.19.1 Products To Be Sampled May Involve the Following:

< renal or dorsal fat or other tissue when specified by the applicable *Regulatory Authority*

< Where animals are suspected of heavy metal exposure to a particular pesticide, shall be followed by an investigation. All available information, including findings on antemortem and postmortem, shall be reported to the applicable *Regulatory Authority and,*

< 250 gram samples of liver, kidney and fat shall be collected for examination and testing

12.19.2 Sample Collection Procedures:

< person collecting the sample unit shall wash hands thoroughly and clean and disinfect any utensils required for collection purposes

< fat or other tissue shall be collected into a clean plastic bag and identified

< sample is to be frozen and packed into an insulated container with refrigerant, sufficient to maintain the sample in the frozen state, (no partial thawing)

12.19.3 Follow-Up Action When Standards Are Not Met:

< animals suspected of heavy exposure to a particular pesticide should be followed up by an investigation in order to identify the cause of the problem

< subsequent verification that the corrective action taken has been effective to correct the problem, and

< further re-sampling, if necessary, in order to verify compliance with standards and to prevent recurrence.

Should the results of the sample analysed also determine that the product contains a banned substance or a substance in excess of levels permitted under the *Food and Drugs Act & Regulations*, the operator must treat the product as ‘condemned’ and dispose of the product(s) in accordance with section 47(2) of the Regulations.

12.20 Heavy Metals

General

Heavy metals are some of the industrial pollutants that enter the food chain inadvertently, creating serious problems. Contamination with heavy metal residues has occurred from the following:

< seeds treated with fungicides and disinfectants containing mercury,

< from arsenic, and subsequent feedstuffs, or
< accidents in formulations of feeds with arsenicals or
< from environmental contamination by lead, cadium or mercury

12.20.1 Products To Be Sampled:

< a sample unit liver and kidney

12.20.2 Sample Collection Procedures:

< persons collecting the samples shall wash hands thoroughly and clean and disinfect any utensils used for collecting sample units

< samples are collected into clean plastic bags and identified

< packed into an insulative container with sufficient refrigerant to arrive at the laboratory in the frozen state

12.20.3 Follow-Up When Standards Are Not Met:

Animals found with elevated levels of heavy metal compounds shall be traced to the farm of origin, and an investigation shall be conducted by an inspector for the appropriate regulatory authority, as to the source of elevated levels. Subsequent shipments from the producer shall be checked.

Should the results of the sample analysed also determine that the product contains a banned substance or a substance in excess of levels permitted under the *Food and Drugs Act & Regulations*, the operator must treat the product as 'condemned' and dispose of the product(s) in accordance with section 47(2) of the Regulations.

EXTRACT FROM DIVISION 15 FOR THE FOOD AND DRUGS REGULATIONS - VETERINARY DRUGS

B.15.003. A food named in column IV of an item of Table III to this Division is exempt from paragraph 4(d) of the Act if the drug named in column I, and analysed as being the substance named in column II, of that item is present in the food in an amount not exceeding the limit, expressed in parts per million, set out in column III of that item for that food.

TABLE III
VETERINARY DRUGS

	Column I	Column II	Column III	Column IV
Item No.	Common Name (or Brand Name) of Drug	Name of substance for Drug Analysis Purposes	Maximum Residue Limit ppm	Foods
A.1	Ampicillin	ampicillin	0.01	Edible tissue of swine & cattle; milk
A.2	Amprolium	amprolium	0.5 1.0 7.0	Muscle of chickens & turkeys Liver & kidney of chickens & turkeys Eggs
A.3	Apramycin	apramycin	0.1	Kidney of swine
A.4	Arsanillic acid	arsenic	0.5 2.0	Muscle of swine, chickens & turkeys; Eggs Liver of swine, chickens & turkeys
B.1	Buquinolate	buquinolate	0.1 0.4	Muscle of chickens Liver, kidney, skin & fat of chickens
C.1	Cephapirin	cephapirin	0.02 0.1	Milk Edible tissue of cattle
C.2	Chlortetra-cycline	chlortetracycline	0.1 0.2 0.5 1.0 2.0 4.0	Kidney, liver & muscle of cattle; muscle of sheep Fat of swine Liver of sheep Muscle, liver, skin & fat of chickens & turkeys; muscle of swine; muscle & fat of calves; kidney of sheep Liver of swine Kidney of swine, chickens & turkeys; liver & kidney of calves
C.3	Clopidol	clopidol	5.0 15.0	Muscle of chickens & turkeys Liver & kidney of chickens & turkeys
D.1	Decoquinate	decoquinate	1.0 2.0	Muscle of cattle, goats and chickens Kidney, liver and fat of cattle and goats; kidney, live, skin and fat of chickens
D.2	dihydrostreptomycin	dihydrostreptomycin	0.125	Milk
D.3	Dinitolmide (zoalene)	dinitoimide, including the metabolite 3-amino-5-nitro-o-toluamide	2.0 3.0 6.0	Fat of chickens Muscle of chickens & turkeys; liver & fat of turkeys Liver & kidney of chickens

Annex B/13

TABLE III
VETERINARY DRUGS - (Continued)

Item No.	Column I Common Name (or Brand Name) of Drug	Column II Name of Substance for Drug Analysis Purposes	Column III Maximum Residue Limit ppm	Column IV Foods
E.1	Erythromycin	erythromycin	0.05 0.1 0.125	Milk Edible tissue of swine Edible tissue of chickens & turkeys
G.1	Gentamicin	gentamicin	0.1	Milk
I.1	Ivermectin	22,23-dihydroavermectin B	0.015 0.03	Liver of cattle Liver of sheep
L.1	Ievamisole	ievamisole	0.1 (calculated as levamisol hydrochloride	Edible tissue of cattle, sheep & swine
M.1	Monensin	monensin	0.05	Edible tissue of cattle
N.1	Neomycin	neomycin	0.25	Edible tissue of calves
N.2	Nicarbazin	N,N! - bis(4-nitrophenyl)urea	4	Muscle, liver, kidney & skin of chicken
N.3	Nitarsone	arsenic	0.5 2.0	Muscle of turkeys Liver of turkeys
N.4	Novobiocin	novobiocin	1	Edible tissue of cattle, chickens & turkeys
P.1	Penicillin G	penicillin G	0.1 I.U/ml 0.01 0.05	Milk Edible tissue of turkeys Edible tissue of cattle
P.2	Polymyxin B	polymyxin B	4.0 u/ml	Milk
P.3	Pyrantel	N-methyl-1,3-propanediamine	1.0 calculated as pyrantel tartraye) 10.0 (calculated as pyranteltartrate)	Muscle of swine Liver & kidney of swine

Annex C/13

TABLE III
VETERINARY DRUGS - (Concluded)

Item No.	Column I Common Name (or Brand Name) of Drug	Column II Name of substance for Drug Analysis Purposes	Column III Maximum Residues Limit ppm	Column IV Foods
R.1	Robenidine hydro-chloride	robenidine	0.1 (calculated as robenidine hydro-chloride) 0.2 (calculated as robenidine hydro-chloride)	Muscle, liver & kidney of chickens Skin & fat of chickens
R.2	Roxarsone	arsenic	0.5 2.0	Muscle of swine, chickens & turkeys; eggs Liver of swine, chickens & turkeys
S.1	Spectinomycin	spectinomycin	0.1	Edible tissue of chickens
S.2	Streptomycin	streptomycin	0.125	Milk
S.3	Sulfachlorpyridazine	sulfachlorpyridazine	0.1	Edible tissue of cattle & swine
S.4	Sulfadimethoxine	sulfadimethoxine	0.01 0.1	Milk Edible tissue of cattle
S.5	Sulfaethoxypyridazine	sulfaethoxpyridazine	0.1	Edible tissue of cattle
S.6	Sulfamethazine	sulfamethazine	0.1	Edible tissue of cattle, swine, chickens & turkeys
S.7	Sulfathiazole	sulfathiazole	0.1	Edible tissue of swine
T.1	Tetracycline	tetracycline	0.25	Edible tissue of calves, swine. Sheep, chickens & turkeys
T.2	Thiabendazole	thiabendazole & total 5-hydroxy-thiabendazole metabolites (free form, glucuronide & sulfate conjugates)	0.05	Milk
T.3	Tiamulin	8-alpha-hydroxy-mutilin	0.4	Liver of swine
T.4	Tylosin	tylosin	0.2	Muscle, liver, kidney & fat of cattle, swine, chickens & turkeys

PART 13

IDENTIFICATION AND LABELLING

PART 13
IDENTIFICATION AND LABELLING

PART 13
IDENTIFICATION AND LABELLING

Identification of Products
Use of Meat Inspection Legend

Reference: Part 13 - Sections 78, 79, 80, 81, 82, 83 & 84 of the National Meat & Poultry Regulations

OUTCOME REQUIRED

< Implementation of adequate, accessible and accurate product information that permits the next person in the product chain to handle, store, process, prepare and display meat products safely and correctly and enables lot or batch to be easily identified.

RATIONALE

< Insufficient product information, and/or inadequate knowledge of general food hygiene, can lead to products being mishandled at later stages in the food chain. Such mishandling can result in illness, or products becoming unsuitable for consumption, even when adequate hygiene control measures have been implemented earlier in the food chain.

13.0 General

13.1 Definitions

As defined in the Regulations.

13.2 Applicable Legislation

In this section we shall explain the necessary legislative requirements in respect to packaging and labelling of edible and inedible meat products, as well as, the labelling requirements of non-meat food ingredient products, such as binders, seasonings and food additives prepared in establishments.

An operator of an establishment must ensure that edible and inedible meat and meat products prepared in an establishment are packaged and labelled in accordance with the following legislative requirements:

a) *The National Meat & Poultry Regulations*.
b) *The Food and Drugs Act and Regulations*.
c) *The Consumer Packaging and Labelling Act and Regulations*.
d) *The Canadian Agricultural Products Act and Regulations*.
e) *The Livestock Carcass Grading Regulations*.

It would be in an operators best interest to attain the aforementioned governing legislative requirements, in order to have current requirements available in respect to packaging and labelling of meat products. The information shall assist operators in label preparations and other related requirements.

13.3 Use of the Meat Inspection Legend

The meat inspection legend, stamp or seal serves as physical evidence that an animal slaughtered for food or a meat product prepared or processed and intended for sale to consumers, has been inspected or examined, in accordance with this code.

A meat inspection legend shall not be used on inedible meat products or on packages or containers of inedible meat products. An inspection legend can only be applied or affixed to meat or meat products suitable for food and fit for human consumption in an establishment governed by the regulations and under the supervision of an inspector.

The meat inspection legend shall be authorized for use:

a) as part of a label applied to edible meat products,

b) for direct application to carcasses, sides, quarters, primal cuts, sub-primal cuts and organs,

c) for direct application to a natural casing containing a meat product.

The meat inspection legend or seal intended for use on meat or meat products must be in a form or a design that has been found acceptable for use by the appropriate *Regulatory Authority*.

It is the responsibility of all operators to submit a sample of every stamp, label, tag, container, bag or package bearing the inspection legend or seal to the appropriate *Regulatory Authority* for acceptance, prior to use or application.

The use of an inspection legend, approved marking or seal, clearly indicates that the meat product has been examined or inspected in accordance with prescribed requirements, before leaving an establishment.

At times, it may be impractical to apply an inspectional legend stamp or seal directly on a meat product. Should this be the case, it may be found acceptable that the legend or seal be applied to the packaging of the product, or to a tag or label attached to the product. Acceptability of such applications shall be given by an inspector, as a representative of the *Regulatory Authority.*

13.4 Design and Size of The Meat Inspection Legend

Refer to section 13.6.2 information on the design and size of a meat inspection legend. Jurisdiction and acceptance in regards to design and size of a meat inspection legend shall rest with the appropriate *Regulatory Authority.*

13.5 Types of Containers and Labels

Containers can be divided into two categories: retail containers and non-retail containers *refer to Section 14.8 Part 14, Packaging, for a listing of containers.*

13.5.1 Types of Labels

The Packaging, Labelling and Evaluation Unit of the Canadian Food Inspection Agency distinguishes the following types of labels and refers to them under the following codes:

A	Artificial casing	HB	Hessian bag	RS	Stamp, stencil or pressure-sensitive label for use with shipping container
B	Printed Bag	HL	Header Label (hanging)	S	Shipping Container
BL	Pressure-sensitive labels	I	Insert Label	SB	Sleeve printed band
C	Individual carton and mono-cup lid	K	Kemex Label	SL	Label for shipping container
CB	Combo Bins	L	Paper Label	SV	Sealed Vehicle

D	Stenciled product description, (pail, barrel head, barrel and drum)	M	Breast tag; clip for bag or casing	T	Lithographed can
D	Display Carton	P	Pouch, film, foil or paper	W	Wrap, cello, foil or paper
E C	Edible Casing	PB	Poultry bag	X	Shipping tag
F	Bacon folder or wallet	PL	Placard label for freight car, tank car or truck	Y	Stockinette
G	Paper label for glass jar	PS	Pressure-sensitive label for consumer size products	Z	Tag for sausage in natural casing

13.5.2 Package Design Guidelines For Vexar Netting, Coloured Casings and Bags

(a) General

< Opaque bags, casings or wrappings of any colour are acceptable, including for poultry carcasses.

< Tinted transparent and semi-transparent bags, wrappings or films are permitted under certain conditions (see item b).

< Vexar netting, or any simulation thereof, must be of significantly contrasting colour to the product it is covering.

The wrappings shall not be of a colour, or design or appear to be misleading with respect to colour, quality or kind of product to which they are applied. For example, transparent or semi-transparent wrappings for sliced bacon or fresh (uncooked) meat products, shall not bear lines or other designs of red or other misleading colour which may give the consumer a false impression of leanness of the product.

Transparent or semi-transparent wrappings, casings or bags used for the packaging of cured, smoked, meat products, or cured and cooked sausage products, as well as, sliced ready-to-eat meat products, may not bear red designs on the package. Such packaged products may provide false representation, and provide a misleading appearance to the consumer.

In the case of packages of bacon slices (belly or side), the window area on the package must be large enough to expose at least ⅔ (66%) of the bacon strip length, as well as, the complete width of the bacon strip, in order for the consumer to visually see the meat and the amount of fat from the belly or side, prior to purchasing.

(b) Use of coloured transparent or semi-transparent containers;

(i) *prepackaged meat products*, meat products intended to be sold directly to the consumer shall not be packaged in coloured transparent or semi-transparent containers unless a declaration statement appears on the container that the package is coloured and:

1) on the label in close proximity to the product name (e.g. "Beef sausage in coloured casing"); or;

2) on the container printed in a repeated manner and;

3) a cross section of the meat product is visible through a clear colourless film.

Note, that, the size of the lettering for the declaration will be a minimum of one-half the size of type of the product name.

(ii) *non-prepackaged meat products:* this category of meat products refers to those meat products that are not intended to be sold directly to the consumer in their original container but require slicing and cutting by the retailer before being offered for sale. Such products are not required to bear special markings/declaration or to show a clear cut surface. This would include meat products sold to deli outlets, hotels and restaurants. There is no weight restriction for these products.

13.6 Labelling of Edible Meat Products

All meat products shall be accompanied by, or bear, adequate information to provide the receiver of the product with a clear understanding of how to handle, display, store, prepare and use the product safely and correctly.

In the case of prepackaged foods (i.e. retail packaged products), the products should be labelled with clear instructions in order to advise the next person in the food chain to handle, display, store and use the product safely and correctly.

13.6.1 Mandatory Requirements for Labels of Edible Meat Products

Refer to Section 13.6.2 for additional information and requirements
Food legislation is intended to protect the consumer from unsafe food or fraudulent practices, as well as, promote fairness in trade and safe food manufacturing practices. Insufficient product information can result in illness to the consuming public or products becoming unsuitable for human consumption.
When edible meat products are labelled for retail sale, the following mandatory requirements shall appear in both official languages on the container:

1. the identity of the meat product;

The identity of a meat product should describe the name under which the meat product is generally known. Meat products for which a compositional standard has been prescribed can be found in the Appendix and Schedule I of the regulations.

In the case of a beef carcass, a complete side, a hind quarter, a front quarter, a primal cut or a subprimal cut, the product must be identified according to specifications prescribed in the *Livestock Grading Regulations, Refer to section 13.14(3) beef grades of* this Code.

The meat product shall be identified by the "common name" for which a standard chemical composition is prescribed; the animal species it is derived from; the types of non-meat products added or processing treatments applied. *Refer to section 13.6.2 for examples* of common names and additional requirements.

2. the net quantity of the meat product (except in the case of random or catch weight products);

The numerical declaration of net weight must be followed by a metric measure. The symbols of units of measure which may be used are as follows: g, kg, ml or ML, I or L. No punctuation marks are permitted.

Operators may ship random catch weight meat products without marking the actual weight on individual packages. Shipping cartons containing catch weight products shall show a net weight declaration when shipped.

Refer to Schedule II, of the regulations for Permitted Weights For Prepackaged Meat Products. In addition, information on net weights can be found in the *Consumer Packaging and Labelling Regulations*.

3. the list of ingredients (where applicable);

Should an ingredient be added to the meat product, all ingredients shall be listed on the label in descending order of their presence or the relative proportion of the ingredients before they are combined to form the meat product. Refer to the *Section 13.6.2 of* the code *and the Food and Drug Regulations* for addition requirements.

4. the name and address of the registered establishment;

The operator or manufacturer of the food products shall provide information on the label pertaining to the origin of the product. The information should consist of the manufacturer's complete name and address, and unless the product is prepared for, or labelled for another company, the name and address of the company, preceded by the words "Prepared for" and "Préparé pour";

5. the meat inspection legend;

The meat inspection legend is the exclusive property of the *Regulatory Authority*. As such, it may only be used as authorized by *the regulations.*

*A*ll labels used for edible meat products produced in an establishment shall bear the meat inspection legend or an acceptable means of identification or mandatory markings found acceptable by the appropriate *Regulatory Authority.*

6. the storage instructions;

All retail packages or consumer and bulk containers used in connection with edible and perishable meat products, shall be labelled with appropriate storage instructions, such as, " Keep Frozen," "Keep Refrigerated".

The storage instructions may be presented in a checkoff form on the principal display panel of the container/package or label.

The following will also be acceptable, "Keep refrigerated" if used before (date) or Freeze immediately, should certain types of meat products be destined for institutional products.

In the case of meat products considered shelf stable and that fall under one of the following categories, storage instructions would be non-applicable:

< meat products with a water activity level of 0.85 or less, (dried meat products);
< meat products which have a ph value of 4.6 or lower;
< meat products packed in 100% brine solution, (salt and water);
< commercially sterile meat products in cans, jars, or pouches. This category does not include pasteurized meat products that require refrigeration after processing.

7. the durable shelf life statement;

The *Food and Drug Regulations*, item B.01.007, regulates that the words "Best Before" and "Meilleur avant", followed by the durable life date of the meat product which must appear on the label or prepackaged product, where the durable life of the meat product is 90 days or less.

8. the production date or the identification code of production lot.

Meat products shall be labelled with the production date or with a code identifying the production lot, on the immediate container of a prepackaged meat product or a tag attached to it or on bulk containers.

In order to ensure a rapid identification of the product in the case of a recall procedure, the code or date of
production on the shipping containers of the prepackaged meat product will assist the operator in identifying, initiating recall procedures and in isolating defective products as quickly as possible.

It is possible to use the durable life date statement as an identification code of production, should the operator wish to do so. Refer to Section 13.6.2 for additional information and requirements.

13.6.2 Additional Requirements and Information on Identification and Labelling of Meat Products

1) Common names and identity of edible meat products

The operator of an establishment shall be responsible for complying to label requirements in respect to applicable legislation. The operator shall implement adequate, accessible and accurate product information that permits the receiver of the product to handle, store, process, prepare and display meat products safely and correctly. Meat products should be identified by the "common name" for which standard chemical composition is prescribed plus the pertinent details about the meat product, such as animal source and the types of non-meat products added for processing treatments.

a) For example: "Regular ground meat" - the term "meat" shall be replaced by the animal species.

Depending on the fat content, only four designations are permitted:

Regular ground beef 30% fat maximum	Medium ground beef 23% fat maximum	Lean ground beef 17% fat maximum	Extra lean ground beef 10% fat maximum

Where a non-meat product ingredient such as fruit, vegetables, nuts, cheese, macaroni, pickles or olives is added to a standardized meat product, the name of the meat product ingredient shall be included in the product name, for example: "meat spread and tomato"

In the case of a meat product that contains meat, meat by-products, mechanically separated meat, or a combination of meat ingredients that have been derived from various animals species, then all animal species shall be identified, for example: "Beef, mutton, and pork loaf" or as "meat loaf"

In the case of a "solid cut meat product", the meat product shall consist of either a solid piece of meat or an amount of at least 80% of boneless skinless meat in pieces weighing 25 g or more. Such product may be identified as "Boneless Ham", without further qualifications.

b) Use of superlatives, together with the name of the product

The use of superlatives such as "First Choice" or "Best Quality", is only acceptable if the superlative is preceded by the name of the firm manufacturing the meat product or by the name of the firm for which the meat product has been prepared, for example: " A.Z. Packers Best Quality Wieners" is acceptable.
It would not be acceptable to label the product as, " Beat Quality Wieners".

c) Use of natural casings

Special attention must be paid to the origin of natural casings used as wrapping and/or as rework material. If the natural casing used is of a different animal species than that of the meat ingredients used in the sausage, the natural casing must be declared.

The declaration of the animal species may be added at the end of the list of ingredients either, or, if the natural casing is used to wrap or stuff the product, in the common name of the product.

For example,

i) Declaration of the natural casing in the list of ingredients:

The declaration of the natural casing is not required when it is derived from an animal species that is used as a meat ingredient in the product.

Example 1: Product name: "Beef Sausage" or "100% Beef Sausage" or "Pure Beef Sausage" etc.
Ingredients: "Beef, water, ...spice"

In this case the declaration of the casing is not required but it must be of beef origin. If a casing from another animal species is used then it must be declared with the name of the product.

Example 2: Product name: "Sausage" or "Pepperoni" etc.
Ingredients: "Beef, pork, water, ...spice"

In these cases it is not required to declare the natural casing(s) if they are of beef and/or of pork origin. However if a casing from another animal species is used then it must be declared at the end of the ingredient list. For example: "Beef, pork, water, ... spice ; lamb natural casing."

ii) Declaration of the natural casing with the name of the product:

The declaration of the natural casing with the name of the product is allowed only when the product is stuffed in the declared natural casing. When the natural casing is associated with the name of the product it is not required to declare it at the end of the ingredient list.

Example 1: Product name: "Beef sausage in lamb natural casing" or "100% Beef sausage in lamb natural casing or "Sausage in lamb natural casing"
Ingredients:"Beef, water,...spice"

Example 2: Product name: "Beef and pork sausage in lamb natural casing" or "Sausage in lamb natural casing"
Ingredients: "Beef, pork, water, ...spice"

iii) Declaration of the natural casing without naming the animal species is also possible:

Example 1: "Lamb Sausage in natural casing" (when a lamb casing is used), "Pork Sausage in natural casing" (when a pork casing is used).

Example 2: "Pepperoni in natural casing" Ingredients: Beef, pork, water, spice, salt, nitrite. In this case the natural casing must be either of beef or pork origin.

iv) The declaration of the casing must appear as part of the name of the product when:

< animal species (re. meat ingredients) are declared in the product name, and the casing is of a different animal species than the ones declared.

Examples: Product name "Beef Sausage in pork natural casing", "100% Beef sausage in lamb natural casing", or, "Beef and Pork Sausage in lamb natural casing"

d) Common Name of Sausages

Common name descriptions of well known types of sausages do not require the word "sausage" as part of the common name description. All other sausages, no matter under what name they are marketed, must have the word "sausage" added as part of the name of the product.

For example: Jagdwurst sausage, Metwurst sausage, Thuringer sausage, etc.

e) Use of modifiers

Modifiers such as, “100%”, “All” or “Pure” in names of sausages or meat patties are acceptable, providing the meat product ingredients have been derived exclusively from the same animal species, and the qualifying phrase “with seasoning added” appears in close proximity to the product name.

For example: “Pure Beef Patties with Seasonings Added” or “100% Pork Patties with Seasonings Added”.

These modifiers are permitted for sausages and patties and not for other meat products.

Close attention should be paid to the nature of the casing used. For instance, a "100% Beef Sausage" shall not be encased in a natural casing derived from any other animal species. However, an edible collagen casing or any other artificial casing will be acceptable.

f) Use of qualifiers

Should qualifiers be used, such as smoked, basted, etc., plus naming the meat product are used as names, then they must conform with the requirements of Schedule III of the regulations.

For example: “Smoked Bologna”.

Enzyme: Meat products which are tenderized with a proteolytic enzyme shall be described as tenderized with (naming the proteolytic enzyme or enzymes).

Flavour: When a flavour is added to a meat product, it is not necessary to reflect this in the product description. However, flavours shall be shown in the list of ingredients as "flavour" or "artificial flavour", as applicable.

The added flavour (actual flavour and carrier) shall not exceed 1% of the total product by weight.

g) Labelling of dressed chicken/duck carcasses and portions containing kidneys

All dressed chicken and/or duck carcasses and cut-up chicken and/or duck portions containing turkeys when packaged for sale, must be labelled with a statement that declares, “may contain kidneys” and “peut contenir des reins”. These declarations on breast tags, bags, packages and any

other retail or bulk container constitute part of the product description and shall be shown as part of it on the main panel.

h) Coined names

(Labelling of meat product as "Fingers", "Nuggets", "Sticks", "Strips")

More and more meat processing plants are engaged in the production of finger foods. Names most commonly used include: fingers, nuggets, sticks and strips. Since there are quite a few different types of products involved, what follows is an attempt at classifying those types of products.

Products which are made from a solid piece of meat may use such terms as "Nuggets, Fingers, etc." as part of the product name without further qualifications e.g. "Chicken Nuggets".

Products made from chopped and formed meat may use such terms as "Nuggets, Fingers, etc." as part of the product name provided a qualifying statement describing such process is shown contiguous to the product name, e.g. "Chicken Nuggets, chopped and formed".

Products made from chopped meat and containing fillers may be described as "Nuggets, Fingers, etc." provided a descriptive name immediately follows e.g. "Nugget Shaped Chicken Burgers", otherwise, the product name must fully describe the product. Note, that, Breaded products described in the paragraphs above shall be labelled as "Breaded".

i) Meat product labels with claims that are unsubstantiated or unverifiable by inspectors

Labels containing statements referring to production methods for the live animals. An example of this type of statement is: "Hormone Free".

It is not permitted to show such statements on the label of a meat product. Labels containing statements such as these will not be registered at the present time.

13.6 3 Additional Requirements - List of Ingredients

All ingredients of a meat product shall be listed in descending order of their presence. This will reflect the relative proportion of the ingredients before they are combined to form the meat product. Water and smoke are considered as ingredients and shall be listed as such.

In variable formulation all meat product ingredients shall be grouped together and placed in the appropriate position in the ingredient listing and be segregated from non-meat ingredients by a semi-colon (;) or a dash (-). If meat product ingredients are fixed as to inclusion and order, segregate each meat product ingredient by a comma (,).

If the meat portion varies as to inclusion or order, then it may read: "Beef, Pork and/or Mutton". If all meat product ingredients are interchangeable, then it may read: "Beef and/or Pork and/or Mutton".

Designations of species should appear, in the case of variable formulation, in either of the following

formats:

(i) ingredients: may contain beef, pork, mutton and their by-products;
(ii) ingredients: beef and/or pork and/or mutton and/or their by-products;

A filler may be listed as an ingredient, followed by a listing of the components between parenthesis, i.e., filler (flour, skim milk powder), or the components making up the filler may be listed individually as ingredients.
Additives such as antioxidants BHA (Butylated Hydroxyanisole), BHT (Butylated Hydroxytoluene) may be abbreviated, but a flavour enhancer, such as monosodium glutamate shall be spelled out in full, in the ingredient listing.
Toasted Wheat Crumb may be listed as an ingredient. Toasted Wheat Crumb is a food made by cooking a dough prepared with flour and water, which may be unleavened, or chemically or yeast leavened, and which otherwise complies with the standard described in B13.021 and B13.022 of the *Food & Drug Regulations*. The components of this ingredient do not have to be declared in the ingredient listing when it is added to a meat product.

(a) Requirements for cured meat products

The declaration of ingredients of cured meat products, such as ham and bacon, shall be shown as follows on the label:

(i) where the list of ingredients appears on the main panel, immediately below the name of the meat product, neither naming the kind of meat product nor repeating the name is required in the ingredient listing.

Example 1: Smoked ham
Cured with water, salt, sodium phosphate, sodium nitrite.

Example 2: Bacon
Artificial maple flavour added. Cured with water, salt, sugar, dextrose, sodium nitrite.

(ii) where the ingredient listing is not immediately below the name but located elsewhere on the label, a total list of ingredients, including the kind of meat product, becomes necessary following the word "ingredients".

Example 1: Smoked ham
Ingredients: ham, water, salt, sodium phosphate, sodium nitrite, smoke.

Example 2: Bacon
Ingredients: Pork, water, salt, sugar, dextrose, sodium nitrite, smoke, artificial maple flavour.

(b) Requirements for products where mechanically separated meats have been used

The declaration of ingredients for products where mechanically separated meats have been used shall be shown as follows on the label:

(i) If more than one mechanically separated species meat is used in the meat block; e.g.

Mechanically Separated Chicken	26.85%
Mechanically Separated Pork	20.00%
Mechanically Separated Beef	10.00%
Mechanically Separated Veal	9.55%
Water	22.60%
Spices & Filler	11.00%

< the ingredient list should read: Mechanically separated meat (Chicken, Pork, Beef, Veal) water, ...

(ii) If only one mechanically separated species meat is used in the meat block; e.g.

Mechanically separated chicken	25.85%
Pork	20.00%
Beef	10.00%
Veal	9.55%
Water	22.60%
Spices & Filler	12.00%

< the ingredient list should read: Mechanically separated chicken, pork, beef, veal, water, ...

(iii) If more than one mechanically separated species meat is used in the meat block as well as boneless meats, e.g.

Mechanically separated chicken	12.85%
Mechanically separated turkey	10.00%
Mechanically separated pork	8.0%
Beef	18.00%
Pork	9.00%
Beef by-products (plasma,tripes)	8.00%
Water	22.60%
Filler & Spices	11.55%
	100.00%

< where the mechanically separated meats represent, in total, the highest percentage of the meat block, the ingredients list should read:

Mechanically separated meat (chicken, turkey, pork), beef, pork, beef by-products; water,

(c) Requirements for products to which smoke or smoke flavour was added

Smoke and smoke flavour are ingredients and must be listed accordingly. The following designation

shall be used depending on how these ingredients were added to the meat product:

(i) "naturally smoked" - the meat product was exposed to smoke generated from the direct combustion of hardwood, hardwood sawdust or corn cobs. his can be done either in the presence of heat or not;
(ii) "smoke" - the meat product was treated with smoke derived directly or indirectly (i.e. liquid smoke) from hardwood, hardwood sawdust or corn cobs.

In the case of liquid smoke, the term "smoke" shall be used only if the meat product was subjected to heat in the presence of a vaporized liquid smoke solution or when the meat product subjected to heat has been packaged in a casing or wrapping impregnated with liquid smoke;

(iii) "smoke flavour" - this term shall be used when liquid smoke has been added to the meat product by methods other than those mentioned above, e.g. adding liquid smoke directly into the emulsion.

(d) Requirements for meat products wrapped in collagen or carrageenan films

The use of edible wrappings (e.g. collagen or carrageenan) in the preparation of meat products other than sausages must be declared at the end of the ingredient list. For example, the declaration "wrapped in “carrageenan", "coated with carrageenan" or "wrapped in collagen" shall appear at the end of the ingredient list of hams wrapped in such material.

13.7 Additional Information on The Use of Meat Inspection Legend

The Meat Inspection Legend, when placed on a label, shall have no transverse measurement through the center of the legend of less than 12.5 mm and, where stamped or branded directly on a meat product, shall have no transverse measurement through the center of the legend of less than 25 mm.

When the Meat Inspection Legend is applied to a natural casing it shall be clear and legible. It is not practical to stamp sausages enclosed in natural casings that have a diameter of less than 5 cm.

In the case of sausages which are enclosed in natural casings and subsequently packaged in a fully marked container for retail sale (bearing all mandatory information), the stamping of individual casings is optional.

When wieners are sold "skin-on" in artificial casings, all mandatory information must be printed on the casings. In view of the small size of the sausage, it is permitted to spread the information over three consecutive wieners.

To satisfy stamping requirements, the Meat Inspection Legend shall be applied to an edible dressed carcass or portions derived thereof and to edible organs.

The Meat Inspection Legend may be applied to the meat product by means of:

< stamping or branding;

- a sealed bag on which the meat inspection legend is printed or applied by means of a sticker or an insert;
- a breast tag in the case of a poultry or domesticated rabbit carcass; or
- a container bearing all the mandatory requirements.

The Meat Inspection Legend contains the registrar number of the establishment producing the meat product. However, it may be applied without the registrar number where the meat product is packaged in:

(i) a hermetically sealed container;
(ii) a casing or bag closed by a metal clip, if the registration number is legibly engraved on the metal clip and is visible when the clip is closed, and is preceded by the abbreviation "EST"; or
(iii) a cardboard container, a corrugated fibreboard container, a bulk container or a plastic container, if the registration number is clearly marked elsewhere on the principal display panel, and is preceded by the abbreviation "EST".

13.7.1 Marking of Carcasses

An impression of the inspection legend must be stamped on each quarter of an approved carcass, excluding the carcass of a bird or a domesticated rabbit, prior to refrigeration. By the end of the day's slaughter activities, all inspected and approved carcasses, portions and organs, shall bear the mark of a clear and legible inspection legend.

Approved marking or stamp ink.

Should ink be used for the identification and stamping of carcasses, portions and organs, the operator shall provide evidence that the ink is acceptable for use for edible purposes and that such use shall not increase the risk of contamination to an edible product.

13.7.2 Marking of Meat Portions and Offal Products

Offal and meat cuts must be individually marked with a legible imprint of the inspection legend, unless they are packaged in a fully labelled container bearing the legend and the container is sealed in a manner that would indicate evidence of tampering with the contents.

13.8 Meat Products Lot Identification

Lot identification of products manufactured at the establishment is an essential element of an effective product recall program, and also contributes to an effective stock rotation system. Each container of food destined to retail, should be marked to identify the producer and the lot identification number or coding of the product.

Permanent, legible and dated records of pertinent processing and production details should be maintained concerning each lot. These records should be retained for a period that exceeds the shelf life of the product, but unless a specified need exists, a period of two years would be acceptable.

Records should also be kept and maintained current, of the initial distribution or customer list, identifying what products went where and when.

a) Use of code on hermetically sealed containers to identify the establishment

Appropriate codes may be used on hermetically sealed containers to identify the establishment's number, the meat product and the date of production.

The use of a code in replacement of the registration number is permitted provided the code is placed in front space clearly distinguishing the establishment code from the production code. If desired, the establishment code may be placed on a separate line, above the production code. If the registration number is used, the same conditions apply.

Examples:

	Est. Code Production code		Reg. No. Production code
1.	Z-232W30XQ	or	999-232W3OXQ
2.	Z/232W3OXQ	or	999/232W3OXQ
3.	Z 232W3OXQ	or	999 232W3OXQ
4.	Z 232W3 OXQ		999 232W3 OXQ

Should an operator wish to use a code instead of the establishment number, the operator shall provide the meaning of the code to the applicable *Regulatory Authority*.

13.9 Non-Mandatory Information on Labels for Edible Meat Products

(a) Pictorial representation (vignette)

A pictorial representation (vignette) may be used on containers of meat products, provided such pictorial representations neither are false nor misleading as to the character and value of the contents. (Refer to Section 5 of the *Food and Drugs Act and Regulations*, Section 7 of the *Consumer Packaging and Labelling Act and Regulations.)*

Each vignette will be evaluated on its own merit.

(b) Suggested serving

On a vignette which illustrates a food that is not part of the package and could be misleading to consumers, the words "Suggested Serving" shall be placed in proximity to the vignette. This indicates that the vignette provides a serving suggestion and does not represent the exact content of the package.

(c) Product of Canada

Operators are encouraged to show the words "Product of Canada" on the labels of meat products prepared in establishments. Some importing countries make it a mandatory requirement that the wording "Product of Canada" be shown on the label used in connection with exported meat products. It is the exporter's responsibility to comply with the requirements of importing countries.

(d) Trade marks and brand names

Trade marks and brand names may be used on labels of meat products in registered establishments. The use of the usual symbols associated with trade marks such as (r), T.M. or Registered T.M. are also acceptable in close proximity to a trade mark. It should be pointed out however that the mere registration of a trade mark by the *Trade Marks Branch of Industry Canada* does not entitle an operator to use the registered trade mark in connection with all labels of meat products. It will be the responsibility of the operator to comply with the spirit of Article 5 of the *Food and Drugs Act and Regulations* and Article 7 of the *Consumer Packaging and Labelling Act and Regulations* in regard to the use of trade marks and brand names. Any label registration granted does not extend to the trade mark.

(e) Claims

Claims such as "Contains not more than x% fat" or "Contains less than x% fat" are acceptable. The operator shall substantiate that his claim reflects the composition of the finished product and the label must comply with nutritional labelling. Labels with claims such as ABC packers lean or extra lean ham are not considered acceptable.

Ground "meat" must be identified by one of the following claims, depending on the fat content: regular, medium, lean or extra-lean.

"Lean" or "extra-lean" claims may be made for meat cuts and prepared meat products provided they comply with the following nutrition labelling requirements for the terms "lean" and "extra-lean":

a) "Lean" and "extra-lean" meat products shall contain 10% fat or less and 7.5% fat or less respectively;
b) the actual content in fat shall be indicated on the principal display panel in %; and
c) the nutrition information shall be shown on the package in one of the following manners (not necessarily on the principal display panel):
   - grams (g) of fat per serving (90 g - 130 g); or

NUTRITIONAL INFORMATION per "X" g serving (90-130)

Energy	Cal kg
Protein	g
Fat	g
Carbohydrate	g

For example: Lean "name of the meat cut or prepared meat product"
* contains 8% fat
** each portion of 100 g contains 8 g of fat

* shall appear on the principal display panel of the label
** may appear elsewhere than the principal display panel

Note, that, it is not permitted to label the product ""Lean" name of the meat cut or prepared meat product" with the claim 92% fat free (instead of contains 8% fat).

For additional information on claims, please refer to the "*Guide for Food Manufacturers and Advertisers*" and to the "*Nutrition Labelling Handbook*" produced formerly by *Consumer and Corporate Affairs Canada* and now by the *Food Division, Canadian Food Inspection Agency.*

13.10 Other Labelling Requirements (Principal Display Panel)

(a) Generally, mandatory information must appear on the principal display panel of a label, package or container. In order to provide some flexibility in design, minor deviations to the above will be considered when the need arises. If a vignette or an illustration is printed on the label, then it shall be part of the principal display panel.

The principal display panel is the panel of a container that incorporates the label. It is permissible to use two principal display panels, one with an English label and the other with French label. In this instance both labels must contain all mandatory information.

In addition, the principal display surface of a label on a round shall not exceed 50% of the total cylindrical circumference of the can.

(b) Colour contrast and label design

Good colour contrast must be maintained in order that all mandatory statements are readily legible.

Particular attention shall be paid to the Meat Inspection Legend, which must not be altered in any way, and shall be separate from, and shall not form an integral part of, any special pattern or design on the container.

13.11 Cutting and Labelling Requirements of Poultry Parts

The following is a description of poultry parts generally prepared in establishments.

(a) "Trimmed Breasts," shall be breasts separated from the back at the shoulder joint and by a cut running backward and downward from that point along the junction of the vertebral and sternal ribs. The ribs may be removed from the breast, and the breast may be cut along the breast bone to make two approximately equal halves; or the wishbone portion, as described in (c) may be removed before cutting the remainder along the breast bone to make three parts.

Pieces cut in this manner may be substituted for lighter or heavier pieces, for exact weight making purposes, and the package may contain two or more of such parts without affecting the appropriateness of the labelling as "Trimmed Breasts". Neck skin shall not be included.

(b) "Breasts" shall be separated from the back at the junction of the vertebral ribs and back. Such breasts, with ribs, may be cut along the breast bone to make two approximately equal halves; or the wishbone portion, as described in (c) may be removed before cutting the remainder along the breast bone to make three parts.

Pieces cut in this manner may be substituted for lighter or heavier pieces, for exact weight making purposes, and the package may contain two or more of such parts without affecting the appropriateness of the labelling as "Breasts". Neck skin shall not be included.

(c) "Wishbones" (clavicle or pulley bones) with covering muscle and skin tissue shall be severed from the breast approximately halfway between the end of the wishbone (through the hypocledium ligament) and front point of the breast bone (anterior part, cranial process of the sternal crest) to a point where the wishbone joins the shoulder. Neck skin shall not be included.

(d) "Drumsticks" shall be separated from the thigh by a cut through the knee joint (femorotibial and patellar joint) and from the foot at the hock joint (tarsal joint).

(e) "Thighs" shall be disjointed at the hip and may include the pelvic meat, but shall not include the pelvic bones. Back skin shall not be included.

(f) "Legs" shall include the whole leg, i.e. the thigh and the drumstick, whether jointed or disjointed. Back skin shall not be included.

(g) "Wings" shall include the entire wing with all muscles and skin tissue intact, except that the wing tip may be removed. Wings shall be separated from the breast by a cut through the shoulder joint (articulation of the clavicle, coracoid and humerus).

(h) "Wing Drumettes" shall be separated from the breast by a cut through the shoulder joint (articulation of the clavicle, coracoid and humerus) and from the winglet at the elbow joint (articulation of humerus, radius and ulna) and include the muscles and skin normally adherent. "Wing Drumettes" correspond to the full length of the humerus bone.

(i) "Winglets (V Wings)" shall be the wings less the "Wing Drumettes" except that part of the wing tip may be removed.

(j) "Backs" shall include the pelvic bones and all the vertebrae posterior to the shoulder joint. The meat shall not be peeled from the pelvic bones. The vertebral ribs and/or scapula may be

removed or included without affecting the appropriateness of the description. Skin shall be substantially intact.

(k) "Stripped Backs" shall include the vertebrae from the shoulder joint to the tail, and include the pelvic bones. The meat may be stripped off from the pelvic bones.

(l) "Necks" with or without neck skin, shall be separated from the carcass at the shoulder joint.

(m) "Halves" shall consist of whole poultry carcasses, excluding the necks, which have been cut at the median line dividing the carcass into two equal portions.

(n) "Front Quarters" shall consist of the front portions of a poultry half which has been cut along the line immediately behind the rib cage (posterior border of the seventh rib to the posterior border of the seventh thoracic vertebra).

(o) "Hindquarters" shall consist of the hind portion of a poultry half which has been cut along a line immediately behind the rib cage (posterior border of the seventh rib to the posterior border of the seventh thoracic vertebra).

(p) "Breast Fillets" round elongated muscles (deep pectoral) found on either side of the keel bone (sternum).

Parts of poultry not cut in accordance with the above described anatomical definitions are permissible, so long as the label appropriately reflects the true and complete description of such poultry cuts. For example, breasts from which bones/cartilage have been removed shall be described as "boneless breasts". Breasts from which bones/ cartilage and "Breast fillets" have been removed shall be described as "boneless breast, fillet removed".

Processed Poultry Regulations require giblets to be included with graded poultry carcasses unless otherwise stated on the label. The labels of cut-up whole carcasses that include the giblets must carry a statement to the effect that giblets are present.

13.12 Acceptable Methods of Labelling Meat Products in Artificial Casings

The following three methods will be judged acceptable:

(a) the printing of all mandatory requirements on the artificial casing;

(b) an insert label with all mandatory information, provided the artificial casing is individually sealed;

(c) the establishment number printed directly on the casing and the mandatory information printed on a string tag label, wraparound label or pressure-sensitive label.

13.13 Labelling of Volume Retail Packages

Generally consumer size containers weigh 5 kg or less. However, volume retail packages are

acceptable provided that:

(a) they have all mandatory information printed on the principal display panel, except that the product description and ingredient list, if applicable, may be stenciled, stamped or applied by means of a pressure-sensitive label; and

(b) the unmarked inner packages are not intended for individual sale to consumers.

13.14 Labelling of Shipping Containers

(1) General

All of the mandatory information may be pre-printed or applied to a shipping container by means of a pressure-sensitive label or applied by on-line printing. Only the weight may be handwritten (handwritten product description is therefore not acceptable). The use of a check-off system or stamping or stenciling of the product name would be acceptable.

The following requirements shall be met when a pressure-sensitive label is applied:

(a) The label shall be applied horizontally on the main panel. In the case of a square or rectangular combo bin, the upper right-hand corner of a side is considered to be the main panel. In regard to a round combo bin, the label shall be applied horizontally and in close proximity to the top of the bin.

(b) The label of a small container, e.g. a shipping carton, shall be of a size so that the information can be easily red. In the case of a large container, e.g a combo bin, the minimum size of the label shall be 22.5 x 30 cm.

(2) Marking of shipping containers for beef hearts

Shipping containers, for beef hearts shall bear the product description in one of the following manners in either English or French or both:

(i). Beef Hearts Bone In
(ii) Beef Hearts Bone Removed
(iii) Beef Hearts
- Bone In
- Bone Removed

(3) Beef grades - Marking Requirements

Section 14 of the *Livestock Carcass Grading Regulations* specifies the grade labelling requirements for both domestic and imported beef products.

In respect to domestic beef carcasses or a portion thereof, including a sub-primal cut, not be shipped from a registered establishment, unless:

(a) the beef is packed in a container or bulk container and that container or bulk container is marked with the grade name of the product or in the case of ungraded beef with the words "Ungraded beef".

It should be noted that the grade category or the statement "ungraded beef" is not required on the shipping container of fully labelled prepackaged beef cuts (portions) when the grade statement appears on the label of the prepackaged meat product.

As a reminder, the label of a prepackaged meat product bears all the markings required under the *Consumer Packaging and Labelling Regulations* in order to be sold directly to the consumer; or

(b) the beef is not packed in a container or bulk container and the beef is either graded and marked as required by *the Livestock Carcass Grading Regulations* or treated as ungraded. The documentation that accompanies the meat product shall indicate the grade name or indicate that it is ungraded beef.

The documentation for domestic beef may be the invoice or an equivalent report/document.

The mixing in a container or bulk container of beef cuts of different grades is permitted as follows:

(i) Canadian beef graded Canada A, Canada AA and Canada AAA may be mixed provided the container is marked "Canada A/AA/AAA".

(ii) Canadian beef graded any of the Canada B or Canada D grades or the Canada E grade may be mixed provided the specific grade names of the product are marked on the container. Example: "Canada B2/B3/D3/E".

(iii) Canadian beef graded in the A grades shall not be mixed with the non A grade product or ungraded product and be identified by grade name. Example: the marking of a container "Canada A/AA/B2" is not permitted.

(iv) Containers of ungraded products must be marked with the words "ungraded beef". Should establishments wish to mix graded and ungraded products, the containers must be marked as ungraded. Establishments may also have the option of marking containers of graded beef as ungraded.

The operator of an establishment is responsible for the accuracy of the grade labelling. When repackaging cuts that originate from a mixed-grade container, these cuts may be marked with a specific grade only if each original cut was individually marked with a grade and the grade can be verified.

Example: A mixed-grade container marked "Canada B2/B3/D3/E" contains mixed cuts on which the grade B2 or B3 or D3 or E has been *directly applied by the means of a stamp or a sealed bag.*

In this case, the grade of a cut is easily identified and verifiable. Therefore the derived cuts can be marked accordingly with the grade "Canada B2" or "Canada B3" or "Canada D3" or " Canada E".

(4) Product Descriptions for Meat Cuts on Shipping Containers

The following options for product descriptions on shipping containers for domestic meat cuts may be used:

(a) full product description, names of the meat cuts in the Lexicon produced by Agriculture Canada must be used, or

(b) a generic description as "Bone-in" or "Boneless" species meat. In this case, a code from the list below may be used to designate the appropriate cut. The code designation is to be displayed on the main panel and/or the end panel of the shipping container.

Codes for Boneless and Bone-In Cuts:

BEEF

Top Sirloin Butts	TRI
Clods	CLO
Shank meat	SHK
Flanks	FL
Eye Rounds	EY
Insides	INS
Outsides	OUT
Knuckles	KNK
Chucks	CHU
Trimmings	TRMG
Striploins (Boneless striploin)	STL
Front Quarter	F
Hind Quarter	H
Blended carcass beef	FH
Point end briskets	PEB
Chuck tenders	CT
Rib eyes	RBE
Shortloins	SL
Flank steaks	FLS
Tenderloins	TDR
Rib	RB
Blade	BL
Plate	P
Brisket (point end brisket)	PEB
(navel end brisket)	NEB

PORK

Feet	FT

Ham	HM
Butt	BT
Loin	LN
Side ribs	SDR
Shoulders Butt	SH
Picnic	PIC
Hock	HOC
Belly	BLY
Tenderloin	TDR
Back ribs	BKR
Trimmings	T

VEAL

Legs	LEG
Loins	LON
Shoulders	SHD

MUTTON

Trunks	TRK

LAMB

Legs	LEG
Loins	LON
Shoulders	SHD
Racks	RCK

SEX IDENTIFICATION

Steer	S
Cow	C
Cow and Steer	C
Bull	B

WRAPPING OF MEAT CUTS

Individually wrapped primal cuts	IW
Vacuum packed, individually wrapped primal cuts	IW/VAC
Layer packed primal cuts	LP
Vacuum packed, layer packed primal cuts	LP/VAC
Vacuum packed primal cuts	VAC
Where more than one primal cut is wrapped in a single covering	MW
Where more than one primal cut is vacuum packed in a single covering	MW/VAC

13.15 Ham Nomenclature

The following nomenclature has been adopted for the description of ham:

(a) Whole boneless ham

Shall contain all the muscles or pieces of muscles in the same proportion as would be derived from a whole ham.

The proportion of shank meat shall not exceed that normally present in a whole ham. Shank meat may be ground.

The product may contain up to 20% of the weight of the boneless skinless ham (including shank meat) in pieces weighing less than 25 g (based on the weight of the non-cured product).

(b) Boneless ham

As in (a) above, except that all the muscles or pieces of muscles derived from a whole ham need not be present.

(c) Chopped ham or minced ham

May contain more than 20% of the weight of boneless, skinless ham in pieces weighing less than 25 g.

Note, that, the manufacturing process used in the production of either "Whole boneless ham" or "Boneless ham" must be such that the resulting final product contains a minimum of 80% meat in pieces of muscle weighing 25 grams or more on a raw meat ingredient basis. If the final product does not respect this proportion and size of pieces of meat as a result of a comminuting effect by the tumbling process or other on the meat, the product shall be identified as "Chopped ham" or "Minced ham".

13.16 Labelling Requirements for Non-meat Food Products

All non-meat food products which are received at an establishment for use in meat products shall be marked as required under the *Consumer Packaging and Labelling Act and Regulations and the Food and Drugs Act and Regulations*, and shall bear a label containing the following information:

(i) the name and address of the manufacturer of the food or food additive,
(ii) the descriptive name of the food or food additive, immediately adjacent to its brand name and, where the food or food additive has been imported into Canada, the name of the country of origin in close proximity to the descriptive name
(iii) the net quantity,
(iv) a list of the ingredients in a manner sufficient to indicate their nature,
(v) directions for use, including a warning clause, where applicable, and
(vi) any other information necessary to ensure that the food or food additive is used in a safe manner.

Such products would include fillers, curing agents, anti-oxidants, bases and mixes, batter, breading seasonings, etc.

13.17 Requirements for Labels not Requiring Registration

(1) Shipping cartons for fully labelled prepackaged meat products

The following are the mandatory requirements for such shipping containers:

(i) the identity of the meat product;

(ii) the net quantity;

(iii) the identity and principal place of business of the firm by or for whom the meat product was manufactured;

(iv) the storage instructions if applicable (keep refrigerated or keep frozen); and

(v) in the case of dressed poultry carcasses, all markings as required by Section 17 to 20 of the *Processed Poultry Regulations*;

(vi) in the case of beef, the grade designation is optional (see 13.14(3))

It should be noted that the Meat Inspection Legend on such containers is not required. Sufficient space must be provided at the upper left corner of the principal display panel for an export sticker or stamp. In the case of containers for dressed poultry carcasses sufficient space must also be provided at the upper right hand corner of the principal display panel for the poultry inspection stamp.

(2) Labels for Inedible Meat Products

Shipping containers shall be labelled with the following information:

(i) the identity of the meat product in terms that are descriptive of the product;

(ii) in the case of meat products identified for use as animal food, the words "Animal food" or "Aliments pour animaux", or the words naming the animal species for which the meat product is intended, followed by the word "Food" or preceded by the words "Aliments pour";

(iii) in the case of a meat product identified for medicinal purposes, the words "For medicinal purposes" or "À des fins médicinales", or the words "For pharmaceutical purposes" or "À des fins pharmaceutiques", as the case may be;

(iv) the net quantity of the meat product;

(v) the name and address of the establishment where the meat product was produced or labelled, or the person for whom the meat product was produced or labelled, preceded by the words "Prepared for" or "Préparé pour";

(vi) storage instructions (keep refrigerated or keep frozen); and

(vii) in lieu of the meat inspection legend, the words "Plant Number" or "Numéro d'usine" followed by the number of the establishment in which the meat product was prepared.

13.18 Control of Meat Inspection Legend Stamps, Labels, Tag, Container, Package

An operator shall provide to an inspector designated under the Regulations access to stamps, labels, tags, containers, bags or packaging materials bearing the inspection legend or seal of the establishment. Such access shall be made available by the operator upon request, in order for the inspector to verify compliance with the National Meat and Poultry Regulations and Code.

An operator shall develop effective controls over the use and storage of inspection legends and seals in order to ensure that their use and storage is in accordance with the National Meat and Poultry Regulations and Code.

The inspection stamp(s) shall be maintained in good condition, so that their use, once applied, results in a clear impression of the meat inspection legend. Should there be unusable stamps in the inventory, they shall be destroyed under the supervision of an inspector.

In the case of accidental misplacement or loss of inspection stamps, the operator of the establishment, shall make every reasonable effort to investigate the situation in order to recover lost stamps, and if not found, the operator shall provide a detailed explanation to the inspector as to the reasons why.

In the event any person in an establishment believes that a meat product bearing the inspection legend or seal of the establishment fails to meet the requirements of the National Meat and Poultry Regulations and Code, that person shall notify an inspector immediately for investigation and initiation of the appropriate corrective action, in order to maintain compliance with legislation.

PART 14

PACKAGING

PART 14 - PACKAGING

PART 14 - PACKAGING

Packaging Procedures
Packaging Materials

Reference: Part 14 - Sections 85, 86 & 87 of the National Meat & Poultry Regulations

OUTCOME REQUIRED

< Consistent routine application of appropriate specific hygienic controls on the handling and the use of in-process packaging to prevent physical, chemical and microbiological contamination of meat products.

RATIONALE

< Packaging and wrapping is used to protect meat products from external contamination during handling, storage and transport. It is important that neither the packaging or the wrapping, nor the packaging or wrapping procedure, causes contamination.

< Packaging design and materials provide protection for products to minimize contamination, prevent damage, and accommodate proper labelling.

< Packaging materials or gases where used must be free from contaminants and not pose a threat to the safety and wholesomeness of meat products under the specified conditions of storage and use. Reusable packaging should be suitably durable, easy to clean and, where necessary, sanitized in order to prevent contamination of meat products.

14.1 Definitions

As defined in the Regulations.

14.2 General Requirements

The activities involved in the packaging of a product can be viewed as the final handling "step" in food manufacturing. As such, an operator shall ensure that the area or room used for the packaging of meat and meat products are constructed of materials that can be easily maintained and that are capable of withstanding repeated cleaning and sanitizing. *Refer to Section 4, Establishment: Design and Facilities for construction standards and specifications and Section 6, Sanitation and Pest Control for sanitary maintenance of the room and the establishment.*

14.3 Sanitation and Maintenance

The development, and effective implementation of sanitation and maintenance programs, shall control environmental influences which may adversely affect the safety, the shelf life, the appearance, and the aesthetic acceptability of meat products. The sanitary standard of an establishment depends upon the effectiveness of regular programs of cleaning and sanitizing equipment and rooms to remove unwanted contaminants such as bacteria, rust, dust, corrosion and flaking paint.

The cleanliness, as well as, regular and proper maintenance of the packaging room's equipment (i.e. overhead structures, packaging equipment, tables, walls, floors, drains, ceilings, lights and doors), shall be implemented by the operator, verified and maintained at pre-determined frequencies, in order to minimize potential for physical, chemical and/or biological hazards affecting meat products.

14.4 Packaging and Related Equipment

Equipment used to package, process or other related equipment located within the packaging or assembly room shall be included within the operators written programs (preventative maintenance, calibration, sanitation, pre-operational inspection and microbiological effectiveness checks). All food contact surfaces such as aprons, knives, tables, vats, containers, tables and equipment shall be maintained in a sanitary condition at all times during operations. All equipment within a work room shall be accessible for cleaning, inspection and servicing. *Refer to Sections 5, Equipment and Maintenance and Section 6, Sanitation and Pest Control for additional requirements.*

14.5 Packaging Room and Compatibility of Activities

The room used for the packaging of ready to eat meat products shall be given the most attention in respect to potential biological, physical and chemical hazards. It is particularly important that no contact is possible, either directly or indirectly, between raw and ready to eat meat products.

Ideally, the location of a packaging room shall compliment the manufacturing flow, providing a single direction from raw operations to finished product operations, in order to prevent backtracking of incompatible meat products.

In order to minimize potential situations for cross contamination, a separate room should be made available for the packaging of ready to eat products. The room should be physically separated from all other handling or preparation activities involving raw or other types of incompatible meat products. Should an existing premise not be able to provide a separate room for the packaging of ready to eat meat products, alternate operational controls shall be developed and implemented by the operator.

Operational controls may include scheduled days for incompatible activities. For example, the handling and preparation of raw meat products are scheduled to be performed on separate days from the cooking and packaging of ready to eat meat products. Other types of controls may include, the changing of working apparel, the cleaning and sanitizing of foot wear, the wearing of disposable gloves and aprons, etc. Operational controls shall be monitored and verified by the operator and shall be effective in order to minimize contamination.

14.5.1 Operational Controls *(Packaging Room)*

Should an operator request to handle and/or package a ready to eat meat products in the same room, at the same time, as handling of raw meat products, written operational and hygiene programs/controls shall be developed by the operator and submitted to the appropriate Regulatory Authority for acceptance.

The written programs, shall describe operational procedures, monitoring tasks, deviations and verification procedures, as well as, employee training programs, (specific training elements involved in the ways to avoid contamination of meat products). The programs shall describe how and what equipment is used, sanitary maintenance procedures and all operational controls implemented, monitored and verified. These programs shall ensure that when raw and ready to eat meat products are handled simultaneously, but segregation and control is achieved throughout all manufacturing functions. Deviation procedures should include the company's microbiological effectiveness checks, at a frequency to verify the safety of the products being manufactured. Operational programs shall include, as a minimum:

(a) Operational schedules (time frames or manufacturing schedules).
A written schedule for proposed manufacturing hours in order for the inspector to observe packaging activities and to verify compliance with the National Meat and Poultry Regulations and Code.
Note, that packaging activities shall be performed without unnecessary delays.

(b) A floor plan or a schematic drawing of the operational rooms within the premises.
The drawing shall identify established employee traffic patterns and product flow in order to evaluate possible crossovers and areas to be controlled at specific points in the manufacturing procedures.

(c) All room temperatures and location of hand wash facilities, knife sterilizers, shall be included on the plan. Other flows, for example, garbage/inedible flow, non-meat ingredient flow shall complete the drawing.

(d) Identification of equipment designations within the room. Segregation of raw and ready to eat meat products shall be achieved by the use of separate and designated equipment (direct contact surface areas). Separate work areas within the room is easily achieved with the use of separate and designated equipment.

Schedules for operational sanitation and inspection (time frames). All equipment which has been in contact with raw or contaminated materials shall be thoroughly cleaned, sanitized and inspected prior to being used for ready to eat meat products. A description of the methods employed and at what frequencies to measure and verify the effectiveness of the cleaning and sanitizing programs (microbiological).

(e) A description of employee training programs that include an adequate knowledge in acceptable practises for personal hygiene and ways to avoid contamination of food products. A description of company policies on working apparel and hand washing. The programs shall ensure that food handlers have an adequate knowledge of the many hazards associated with the preparation, processing and packaging of meat products, as well as, necessary precautions to be taken to prevent food from being contaminated during packaging activities.

(f) A description of all operational controls, including "in-process controls" that shall be implemented during packaging activities.

(g) A description, including frequencies, of all monitoring tasks, deviation procedures and verification procedures, including all applicable records to be used.

Written programs shall be developed and provided to an inspector for evaluation and acceptance. Should the operator fail to implement or maintain the agreed upon operational programs and should the packaging activities create potential risks to meat and meat products, the inspector shall initiate appropriate corrective actions in order to achieve compliance the National Meat and Poultry Regulations and Code..

14.6 Approved Packaging Materials

All packaging materials that directly contact meat or meat products shall be evaluated for acceptability by the applicable *Regulatory Authority. Refer to Section 14.7 of this Part for submission procedures.*
Packaging materials that directly contact meat products shall not be used on or in a meat product if the contact might prevent the meat product from conforming to the requirements of the National Meat and Poultry Regulations and Code or the *Food and Drugs Act & Regulations.*

The operator shall demonstrate that the materials used to package meat and meat products' meet the above criteria by maintaining a listing of all packaging materials used in the establishment, together with verification of that the materials have been approved.

A listing of approved packaging materials can be found in the "*Reference Listing of Accepted Construction, Packaging Materials and Non-Food Chemical Agents"*, published by the Canadian Food Inspection Agency, (CFIA) and available on the Internet, (visit Website: http: //www.

cfia.agr.careference/ conteng.htrnl). Should the materials not be listed in this manual, the operator shall maintain either a letter from CFIA or a letter of no objection by Health Canada.

14.6.1 Packaging Material Requirements

Packaging material must:

(a) be free of toxic ingredients;
(b) not impart any odours, flavours or colours to food products;
(c) be free of contaminants;
(d) be durable;
(e) be suitable for its intended use);
(f) (in the case of containers) be corrosion-resistant, sanitized after each use and capable of withstanding repeated cleaning;
(g) be of a design that adequately protects products from sources of contamination;
(h) be of a design that adequately protects meat and meat products from damage during transport;
(i) be of a design that accommodate proper labelling;
(j) stored in a hygienic manner that prevents contamination;

In summary, packaging materials such as, synthetic casings, pouches, bags, wrapping materials, cartons, etc., shall not impart any undesirable substance to the meat product, either chemically or physically and shall protect meat and meat products sufficiently to avoid contamination.

14.7 Submission Procedures for Packaging Materials

Manufacturers and distributors of packaging materials requiring acceptance shall send the new material for evaluation to:

Program Officer,
Hygienic Environment Program,
Science and Technology
Canadian Food Inspection Agency
Camelot Court
59 Camelot Drive
Nepean, Ontario K1A 0Y9

Submissions in duplicate (single sample) shall consist of the following:

(a) a letter of application;
(b) identification of the material;
(c) details in regard to the proposed usage (indicate type of food to be packaged, temperatures at which food will be packaged, stored and reconstituted, etc.);
(d) the complete chemical composition of the material listing the ingredients by percentage or quantitatively. Each component must be chemically identified and include a trade name and manufacturer;

(e) identification of all chemical agents which are used during the manufacturing process as processing agents but are not components of the finished product; and
(f) a sample of the material. The sample should be adequately identified with all other information provided. These are to be forwarded to this office F.O.B. (Freight, custom duties, brokerage and delivery costs prepaid).

14.8 Types of Packaging Materials

In order for a meat or meat product to be protected against damage, contamination, deterioration, physical, chemical or possible biological hazards, all packaging materials, especially the materials that are in direct contact with a meat product must be:

< durable,
< free of contaminants, and
< suitable for its intended use.

As previously mentioned, packaging materials shall be of a design and composition that provides protection for meat products and minimizes contamination from various handling, conveyance, storage and transport activities involved in the packaging, handling and distribution of meat products.

Packaging materials may be grouped under the following categories:

A) Retail Containers:

Bags
Casings (natural and artificial)
Cartons
Mono-cups
Folders
Glass jars
Wraps

B) Non Retail Containers:

Tanker trucks
Combo bins
Tanks
Bags, including stockinette
Wraps
Cartons
Cans

14.9 Gases Used in Packaging

Gas mixtures, such as Co 2 and oxygen, is at times applied during the packaging of a meat product for such reasons as longer shelve life or colour retention. Improper concentrations of gas mixtures during packaging operations may result with possible biological or chemical hazards to meat products.

An operator wishing to use a gas mixture during packaging, shall develop written specifications for incoming non-food chemical products, in order to prevent possible hazards from occurring during final processing steps.

Incoming lots or materials shall be evaluated as frequently as necessary to ensure adherence to pre-determined specifications and that the materials are free of defects. Applicable records of inspection results of both incoming lots and in-process operations shall be monitored, verified and maintained by the operator

Should incoming materials and/or in-process operations be found not to meet the established criteria, the operator shall initiate appropriate corrective actions in order to investigate, record the cause, the corrective actions, including disposition of products.

14.10 Foreign Contaminants

In order to prevent contaminants or hazards to meat products during packaging activities, and/or contamination to packaging materials during storage from such elements such as, paint, dust, condensation, rust, monitoring programs shall be developed and implemented by the operator.

The programs shall include written procedures, methods and controls for:

(a) incoming materials and company specifications on such materials;

(b) the interior building maintenance;

(c) sanitation of rooms including any operational sanitation methods and procedures (condensation control);

(d) the handling and storage procedures for materials (employee training);

(e) all programs shall be monitored and verified at pre-determined frequencies and shall include deviations procedures, records shall be developed by the operator that correspond with the written programs.

Metal contaminants may initiate from a multitude of sources, such as:

< wire brushes or steel wool used as a cleaning tool;
< friction of metal hooks on overhead rails;
< beads and pieces of slag from welding equipment;
< poorly welded equipment;
< broken and worn equipment;
< can openers;
< metal hangers;
< loose strapping, wires;
< boxes formed with the use of staples;
< tag fasteners or skewers on carcasses;

The presence of metal in meat products is a serious situation which calls for careful review of material specifications (incoming materials from suppliers), meat handling practises from slaughter through to shipping of the product and preventative maintenance programs. Every effort must be initiated in order to establish the sources of the problem and to implement corrective actions.

The use of a metal detector is recommended as an alert indicator for the presence of metallic foreign material in meat products.

14.11 Reusable Packaging Materials

14.11.1 Containers

At times, an operator may require the flexibility to reuse packaging materials, such as, plastic or metal containers. The designated containers (reusable) shall be suitable and durable for the intended purpose.

Acceptable containers shall meet the following criteria:

(a) materials that are constructed of corrosion and rust-resistant metal or durable, smooth plastic;
(b) containers shall be maintained in a good state of repair, smooth continuous welded joints;
(c) container integrity shall be of sufficient strength to support the weight of products without collapsing;
(d) equipped with a lid or cover or adequately protected against contamination;
(e) capable of withstanding repeated cleaning and sanitizing, after each use;
(f) stored in areas or rooms that do not subject containers to sources of contamination.

The state of these containers shall be maintained in a condition that will be acceptable as a food contact surface. In addition, provisions for the prompt removal and replacement of all unsuitable containers must be included as part of the operator's handling policies and procedures.

The shipping container shall be labelled in one of the following manners:

(a) marked with all mandatory requirements as described in Part 13, Section 13.9; or,

(b) shipping tag bearing all mandatory information attached to the shipping container.

14.11.2 Reusable Boxes

An operator wishing to reuse cardboard boxes shall develop written policies and procedures respecting the reuse of such containers. An inspector shall evaluate the written programs, as well as, perform an on-site visual observation to ensure that the policies and procedures are being implemented and maintained by the operator.

The operator shall ensure that reusable corrugated containers meet the following requirements:

< the reuse of containers that have remained in the establishment or are from another establishment (*cartons returned from retailers, hotels, restaurants, institutions or non-licensed facilities should not be reused)*;

< the reuse of containers that are clean with no visible contamination;

< the reuse of containers that are in good condition with no physical damage liable to weaken the container's integrity;

< the reuse of containers that have remained completely dry and unsoiled at all times;

< The reuse of containers for the same purpose as previously used;

< The reuse of containers for packaging exposed products, providing a new inside liners is used;

< The reuse containers meet all applicable labelling requirements;

< Provisions for the prompt removal of all unsuitable containers must be included as part of the operator's handling and deviation procedures.

PART 15

TRANSPORTATION AND STORAGE

PART 15
STORAGE AND TRANSPORTATION

PART 15
STORAGE AND TRANSPORTATION

Storage
Storage Containers
Transportation

Reference: Part 15 - Sections 88, 89, 90, 91, 92 & 93 of the National Meat & Poultry Regulations

OUTCOME REQUIRED

< The storage and transportation of meat and meat products, ingredients, packaging materials and chemicals under conditions that consistently control physical, chemical and microbiological contamination.

RATIONALE

< Meat products, ingredients, packaging materials and chemicals, may become contaminated or unsuitable for consumption during storage and transportation unless effective measures are taken to control physical, chemical and microbiological hazards.

15.1 Definitions

As defined in the Regulations.

15.2 Storage of Perishable Meat Products

All perishable meat and meat products manufactured at an establishment shall be stored in a separate refrigerated room, (cooler or freezer room).

Refrigerated storage rooms shall be adequate in temperature to effectively control the growth of microorganisms and to maintain the products in a wholesome state.

Alternately, all perishable incoming materials shall be immediately removed, without delay, to a refrigerated storage room, unless the receiving area or room is equipped with refrigeration units. Meat products shall not remain in an unrefrigerated room or area for a period of time that may subject the product's to a rise in temperature.

Storage rooms, whether it is a cooler or a freezer room, or storage room for packaging materials and food ingredient materials, shall be constructed of acceptable materials that can be cleaned and can be maintained in a sound condition. Regularly implemented maintenance (including refrigeration maintenance) and sanitation programs shall consistently protect products during storage conditions from possible physical damage or biological hazards that may adversely affect meat products.

The operator's written prerequisite programs shall ensure that products and materials are stored under conditions that protect them from sources of contamination and deterioration. Such programs shall include as a minimum:

1. Meat product storage procedures,

< for wrapping, packaging and/or adequately covering meat products, prior to storage, in order to prevent contamination, or contact with other products, and/or situations that may create meat products to loose moisture (freezer burn), as a result of packaging and storage conditions.

< for product identification*; a label or tag* or other acceptable identification, in order to verify the content of the container or package being stored, and the storage instructions for such products, (i.e., "Keep Refrigerated" (0- 4°C) or "Keep Frozen" (-18°C or less).

< for arrangements of products in cooler or freezer rooms that prevent contact with incompatible meat products, such as frozen inedible meat products for animal food, hide on veal carcasses, or the segregation cooked and raw meat products from physical contact. Meat products in cartons shall not be placed directly on the floor, but rather suitable racks, or shelfs, or pallets, or similar materials that are designed to store products off the floor.

< methods and procedures for visually inspecting incoming perishable meat products and materials, to ensure that products are wholesome; materials and products are properly labeled and meet the company's specifications.

2. Sanitation and Pest Control Program

< shall include methods and procedures to clean and sanitize (if applicable) all rooms used for the storage of meat products, in order to maintain the rooms visibly clean, free of ice/snow build-up, free of condensation and free of other sources of contamination.

< adequate and effective pest control devices shall be positioned within applicable rooms.

3. Maintenance Programs (Preventative Maintenance)

A preventative maintenance program shall describe methods, procedures and frequencies to maintain rooms within the building in sound condition, as well as, equipment maintenance procedures.

The maintenance program shall include pre-determined frequencies, methods, procedures, deviation and verification procedures for maintaining:

< walls, floors, ceilings, overhead rails, etc., from peeling paint or material finish coatings, grease and oil drippings from overhead rails, loose plaster, etc. Inspection of doors for adequate seals and if tight fitting.

< refrigeration units and related evaporator piping system, to ensure that the refrigeration system is operating as intended and continue to be capable of maintaining required refrigeration temperatures for each storage room.

< calibration programs that describe procedures, methods and frequencies for calibrating equipment that is critical to food safety, such as temperature control devices, ovens, etc.

4. Temperature Control Programs (Storage Rooms)

The operator shall establish temperature monitoring, deviation and verification programs in order to effectively control the growth of microorganisms and to consistently maintain required temperatures for perishable meat products.

The programs shall include:

< temperature monitoring devices and controls that record automatically or manually the temperatures of each refrigerated room at pre-determined frequencies, in order to verify temperatures of rooms meet the requirements of the National Meat and Poultry Regulations and Code.

All monitoring and verification records shall be kept by the operator, for a minimum of two years and made available to the inspector upon request.

15.3 Storage of Shelf-Stable Meat Products

Shelf stable meat products shall be considered in respect to storage conditions, the same as perishable meat products, except that refrigeration is not required. However, certain types of shelf stable meat products may require the room's environment to be equipped with humidity controlled equipment.

A designated area or a separate room for shelf stable meat products shall be provided. The room shall be constructed of cleanable and durable materials. The meat products shall be segregated from non-meat products or materials and shall be clearly identified as to contents, as well as, storage instructions, (i.e. "Store at Humidity of 60%" or "Keep Dry" or "Do Not Freeze," etc.).

The condition of the room, as well as, the condition of the products being stored shall be monitored at pre-determined frequencies, in order to ensure that the storage conditions do not impart any physical, chemical or biological hazards to meat products.

All products shall be completed protected and stored off the floor by an acceptable means.

15.4 Storage of Food Ingredients (non-meat products)

The storage of food ingredient products, such as, curing agents, spices, binders, etc., shall be stored in a dry storage room or in a designated and suitable area of the establishment. It would not be considered acceptable or compatible to store ingredient food products in areas of the establishment where they may be exposed to contamination sources, such as, a maintenance room, a chemical storage room, a washroom, etc.

The room or area shall be constructed of materials that are cleanable and durable, and that do not impart any physical, chemical or biological hazards to the ingredients being stored. The room or area must be dust and vermin-free and have no air connection with rooms containing substances which might contaminate fresh meat.

In order to protect bags and containers of ingredients from being exposed to contamination sources, the operator shall ensure that proper handling and storage procedures are implemented.

Operational and employee training programs shall include procedures to be followed when preparing ingredient materials for storage, such as:

< all unused ingredient bags to be either transferred into a clean and suitable container that is equipped with a lid and identified as to content, prior to placing into storage area; or

< all unused and opened bags of ingredient products to be sealed, securely closed and identified as to content, prior to placing into storage area.

< ingredients must be stored in a container that is dry and under storage conditions that control moisture and humidity.

< all ingredient bags, containers or boxes, shall be stored off the floor.

Operators that use restricted ingredients, such as nitrite and nitrate salts may store such ingredients in the same areas as non-restricted ingredients, providing segregation can be controlled by a lockable cabinet.

All such restricted ingredients shall be clearly identified and handled only by authorized personnel.

15.5 Storage of Packaging Materials

Packaging materials such as, bags, pouches, films, synthetic casings, nets, cartons, wrapping materials, and any other materials used in the shipping of meat products or which may come in contact with meat products, shall be stored in a separate dry storage room or designated area of the establishment.

The room or area shall be constructed of materials that are cleanable and durable, and that do not impart any physical, chemical or biological hazards to the materials being stored within the areas. The sanitary maintenance of the room shall be included within the company's sanitation program.

Employee training programs shall include procedures to be followed when preparing packaging materials for storage. Training elements shall include as a minimum:

< procedures for wet, damaged, soiled packaging materials, or materials that have fallen on the floor and are contaminated;

< procedures for protecting primary and secondary-type packaging materials prior to and during storage activities;

< procedures and/or methods used for identifying packaging materials, their content and use.

< procedures for housekeeping and organizing materials in a neat and organized manner within the storage area or room.

15.6 Storage Containers

Containers may be used within an establishment for the purpose of storage of edible meat products. When a container is used for this purpose, the operator must ensure that the following criteria is met, in order to minimize physical, chemical or biological hazards to meat products being stored within the container:

b) The container must be constructed of smooth, durable, corrosion-resistant materials; that are free of contaminants and impervious to moisture and be capable of withstanding repeated cleaning;

c) The container shall be marked and identified with securely affixed, clear and legibly labels or suitable markings that identifies its intended use;

c) The container shall be used for no other purpose that what is indicated on the label;

d) The container shall be emptied, cleaned and inspected after each use and prior to re-use;

e) The container shall be maintained in a good state of repair; with no visible damage liable to weaken the container's structure;

f) The container shall be stored in an area that does not subject the container to possible physical, chemical or biological hazards. The storage area shall be visible clean, tidy and free of contamination sources.

15.7 Storage of Inedible Meat Products

An establishment shall have, a separate storage facility for the holding of inedible meat products and waste materials, in order to separate physical the storage of edible and inedible meat products.

An inedible room shall be constructed of materials that are cleanable and durable. The room shall be provided with ventilation in order to remove odours from the room and where inedible meat products are not being removed daily, the room should be equipped with refrigeration. The company's sanitation program shall describe cleaning methods and frequencies for the sanitary maintenance of inedible rooms. *For additional information and requirements on inedible rooms and handling refer to Part 4 and Part 10*.

15.7.1 Inedible Containers

Inedible meat and meat products shall be placed in barrels or bulk containers that shall be used for shipment of inedible meat products, from one establishment to another or to an approved rendering company.
For additional information and requirements on inedible containers refer to Part 10, Section 10.2.2.

15.8 Storage of Chemicals and Agents

Non-food chemicals and agents must be kept physically segregated from all food materials and packaging materials, in order to prevent situations from occurring that may cause contamination of meat products, ingredients or packaging materials.

Segregation can be defined as a separate room or a separate "area" within a room. An "area," for example, could be designed with a partitioned wall constructed of metal fencing within a dry storage room. The "area" could also be a separate cabinet located in a compatible area of the establishment. The importance of a separate chemical storage area or room is to prevent contamination or adulteration of meat products and contamination to other materials through accidental misuse or handling.

The storage of chemicals and agents, such as, cleaners, bleaches, deodourizers, disinfectants, sanitizers, water treatment compounds, denaturing agents, protective oils, etc., shall be stored in a manner that prevents contamination of and minimizes the risk of possible contact with edible meat products, ingredients and/or packaging materials.

Sanitation and employee training programs shall include procedures to be followed when handling or preparing chemicals and agents for storage, such as:

- only trained personnel are authorized to handled non-food chemicals and agents;

- all containers must be clearly identified as to content and usage; labels affixed securely to containers;

- all containers shall have secure lids or other types of suitable and secure coverings, in order to prevent content spillage or leaks;

- materials should be placed on pallets or suitable shelving rack systems that prevent contact with the floor and facilitates housekeeping and sanitation of the room or area;

- chemicals, agents, portable foamers and other related sanitation tools and equipment hoses, brushes, etc., shall be stored in a designated area or room in an organized manner.

15.9 Transportation

15.9.1 General

A carrier vehicle used to transport meat and meat products to a destination could be viewed as a "moveable" storage room, that represents a room within an establishment that is mobile. As such, a transport vehicle used to ship meat and meat products must adhere to construction, maintenance, sanitation and refrigeration standards (where applicable).

Inspection personnel are empowered to detain or refuse entry of products which have been subjected to contamination as a result of either the condition of a transport vehicle or transportation from one destination to another.

The operator's responsibility is to ensure that their vehicles are maintained in a satisfactory condition. In addition, management is expected to prevent loading or unloading of products onto transport vehicles which are not maintained in a sanitary condition.

15.10 Requirements For Carrier Vehicles

An operator must ensure that a transport container:

- is constructed of hard, smooth, impervious and durable materials that is capable of protecting meat products and their packaging from physical damage, deterioration and contamination;

- is equipped (where applicable) with adequate controls to ensure that meat products are transported at appropriate temperatures and humidity and under such conditions as may be necessary for the product being transported;

- used to carrying meat and meat products, shall not be used at the same time, to carrying live animals, hazardous substances or any other materials that may contaminate or adulterate meat products.

15.11 Carrier Inspection

The operator shall develop a written program for carrier inspection in order to verify that each transport container complies with the National Meat and Poultry Regulations and Code. The program shall describe the methods, procedures, frequencies of transport vehicles maintenance, sanitation, refrigeration temperatures and arrangement (loading procedures) of products.

The programs shall establish and demonstrates that the company has developed and implemented acceptable methods and controls for the safe handling and transportation of meat and meat products in accordance with the National Meat and Poultry Regulations and Code.

Carrier Inspection Programs shall include:

1. Transport pre-loading inspection methods and procedures,

A visual inspection, prior to loading or unloading shall be performed, in order to ensure that the transport containers construction is of durable materials; has inside surfaces that are hard, smooth, impervious to moisture, in good repair and free of possible chemical or physical hazards. Unusual odours or incompatible items found on a vehicle shall initiate an investigation and sanitary applications being implemented prior to loading meat products.

2. Cleaning and sanitizing (where applicable) of transport vehicles,

A visual inspection of vehicles, (walls, ceiling, refrigeration unit, overhead rail systems, floor, doors and door seals) shall be performed in order to ensure that the carrier is clean and free of possible biological hazards or physical contaminants that may affect meat products.

The operator should include within his sanitation program, a description of the methods and procedures, together with, a schedule for carrier cleaning and maintenance. Alternately, should the operator use contract carrier companies, the operator shall request a written program of what, how, and when transport vehicles are cleaned and maintained for their record-keeping files.

3. Written procedures that include packaging and loading,

This program shall describe procedures for packaging and loading of meat and meat products that protects the products from physical damage, deterioration and contamination throughout the whole period of transport. For example:

< unwrapped meat cuts, if not packed in a container, they shall be shipped on clean racks, dollies, plastic pallets, vinyl carpets, or such materials found acceptable by the appropriate *Regulatory Authority.*

< suspended sides, primal cuts may be delivered unwrapped if hung with overhead rail equipment designed and maintained to preclude contamination. The loading procedures shall describe the methods of loading products to prevent contamination from contact with floor and contact with walls within the vehicle. Such products may also be wrapped with good quality paper bags, stockinette and/or paper or any other materials found acceptable by the Regulatory Authority.

The operator must also maintain records concerning the receipt and shipment of meat products and make these records available to the inspector upon request. The records must contain the following minimum information of products shipped or received:

(a) date;
(b) description of product;
(c) weight; number of boxes or carcasses;
(d) place of shipment (origin, destination)and, if applicable;
(e) manufacturing code (date of manufacturing);or kill date;
(f) data concerning quality control microbiological programs and sampling at time of shipment (receipt);
(g) temperature of transport containers prior to loading (if applicable);
(h) temperatures of perishable meat products prior to loading and at time of unloading;

4. Verification that the transport vehicle has not been used to transport any materials, product or substance that might contaminate meat products,

Meat products shall not be carried on the same vehicle used to convey live animals or substances, such as, pesticides or other substances that might adulterate a meat product.

Should a carrier be used to transport food products, after being used to transport non-food items, the operator must maintain on file on written cleaning certificates that describe the cleaning and sanitizing procedures for such multiple use vehicles. The content of the documents or certificates shall be found acceptable by an inspector.

5. Methods of (carrier) refrigeration verifications, along with appropriate controls and records,

In order to ensure that meat products are transported at appropriate temperatures and/or humidity and under other specific conditions as may be necessary for the product being transported, the operator shall maintain records that describe controls and verification.

The required product's temperature and condition shall be maintained throughout the whole period of transport and appropriate monitoring and verification records shall be developed, implemented and maintained in order to maintain compliance.

15.12 Temperature Requirements (Transportation)

When transporting meat and meat products to another establishment or to another destination the following requirements shall be implemented:

(a) Carcasses shall be completely eviscerated, and both carcasses and portion cuts shall be chilled to a temperature not exceeding 4 °C before they are shipped from the establishment.

In the case of beef sides and quarters, permission may be given by the *Regulatory Authority* to ship the products once the temperature has reached 10 °C, providing the transport vehicle in which the sides and quarters are hung is equipped with functional refrigeration units, and at the point of destination, the products shall be immediately refrigerated.

Carcasses and sides from other species, which have been chilled but have not reached the required temperature of 4°C may also be shipped, providing the products are being transported a short distance to another establishment where chilling will be completed.

(b) Should outside temperatures be below freezing or the period of transport be less than two hours and fresh meat products are protected against a rise in temperature, the carrier need not be refrigerated.

(c) When shipping fresh and frozen meat products on the same carrier, every effort shall be made to ensure that a rise in temperature of meat products does not occur and that the products will arrive in satisfactory condition.

(d) Frozen meat products shall be transported at temperatures that prevents partial thawing of products. Should a situation occur that identifies accidental thawing has taken place and the condition of the meat has changed, an inspector shall re-examine the meat to verify wholesomeness.

(e) Records shall be completed by the driver or responsible person that monitors temperature and condition of the carrier vehicle during transport periods. Many carrier vehicles are equipped with self recording temperature control monitoring equipment that continually records temperature/time during transport duration. Such records shall contribute to a company's overall health and safety program, as well as, a company's product recall system.

PART 16

RECALL PROCEDURES, DISTRIBUTION RECORDS AND COMPLAINTS

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Recall Procedures - Inspection, Complaints &Testing
Identification & Coding of Products
Inventory of Supplies Bearing Inspection Legend
Product Distribution Records
Slaughter & Processing Records

Reference: Part 16 - Sections 94, 95, 96 & 97 of the National Meat & Poultry Regulations

OUTCOME REQUIRED

< A written procedure is established to permit the timely and complete recall of any lot of meat products.

< Product distribution records are maintained to enable the manufacturer to recall any lot of meat product.

RATIONALE

< Recall is a quick and effective method of removing from the market meat products that may represent a health hazard to the consumer. It is an action taken by a manufacturer or importer to carry out their responsibility to protect the public health and well-being.

< A well established and designed record keeping system provides the manufacturer with the assurance that each lot was produced according to established procedures. Records are also a means for a regulatory agency to verify compliance over a period of time rather than only on a day of inspection.

16.0 Product Recall Procedures

16.1 General

A product recall, may at times be necessary for operators of an establishment should a product represent a health hazard to the consumer. It is essential that operators either producing, importing, or distributing meat products take precautionary steps to initiate appropriate actions if recall procedures become necessary.

In order to implement procedures and systems that will ensure a rapid and effective recall of the product, all operators of an establishment must develop a recall program.

16.1.1 Recall Classifications

The Health Products and Food Branch of Health Canada is responsible for health hazard evaluations, the classifications of product recalls and the actions required in the case of Class I and II product recalls. The Canadian Food Inspection Agency is responsible for the actions required in the case of Class III recalls.

Recall classifications are determined by the degree of danger associated with the product, as well as, the extent of the products' distribution areas.

Recall classifications are described as follows:

Class I is a situation in which there is a reasonable probability that the use of, or exposure to, a volatile product will cause serious adverse health consequences or death to the consuming public.

Class II is a situation in which the use of, or exposure to, a violative product may cause temporary adverse health consequences or where the probability of serious adverse health consequences is remote.

Class III is a situation in which the use of, or exposure to, a violative product is not likely to cause adverse health consequences

16.2 Recall Program (Procedures, Testing, Inspection)

A recall program is a written health and safety document that explains a plan of action that is initiated by an operator of an establishment in the event of defective or hazardous products. The program is developed and maintained by the operator in order to explain in detail, the step by step procedures to be followed in case of recalled products involving animals slaughtered or meat products manufactured at an establishment.

7. A recall program shall include the following elements:

a) The names of individuals and a description of their specific responsibilities in case of a product recall. All individuals identified should have an alternate person named, (in case the other person is not available), and the program shall include their telephone numbers, cellular numbers, facsimile numbers, etc.

A current customer lists, that includes, names, addresses and contact person, either as a separate document or on electronic format. The program shall identify who is responsible for updating the document, in order to maintain an accurate and current listing.

A listing of names, addresses and telephone numbers of contact individuals representing the Canadian Food Inspection Agency having jurisdiction over recalled products, in order to initiate immediate notification, in the event of a product recall.

b) A written description of the company's coding system for meat and meat products.

For prepackaged food, code marks or lot numbers on the packages shall identify the establishment number, the month and year in which the food was produced. The meaning of all code marks used shall be explained within a recall program.

For animals slaughtered refer to item 16.8, of this section.

c) The company's methods to identify, locate, isolate and control recalled products. Including the methods and procedures involved in any subsequent investigation of other products that may be affected by the hazard and that should be included within the program.

d) Procedures to monitor the effectiveness of the recall program, (effectiveness check to the appropriate level of distribution specified in the recall records).

e) A description of methods and procedures to be used periodically, for verification of recall procedures and testing of record-keeping, in order to demonstrate and verify that the program and records can rapidly identify and control recalled products.

16.2.1 Recall Testing

Such testing procedure could be referred to as a "Simulated Recall Procedure" and should be performed at least once annually in order to verify the effectiveness of the program. Verification procedures shall identify deficiencies, corrective actions, and/or if the current program continues to be effective and meets the objectives of the National Meat and Poultry Regulations and Code.

The company's program shall include samples of records, such as, a letter of notification that shall be forwarded by the most efficient means to all concerned, and shall include:

< product identification; name of product;
< size of product,
< code or lots numbers of food recalled,
< amount of product,
< area of distribution of product; local, national, etc.

< reason for the recall.

An operator must produce to an inspector, upon request, a copy of any procedure maintained or record kept with respect to animals slaughtered or meat products manufactured in an establishment. Such, records shall also be used by an inspector to verify compliance over a period of time rather than only on the day of inspection or auditing.

All records and documents required by the National Meat and Poultry Regulations and Code shall be maintained on file by the operator for at least one year after the product's expiration date or best before date, or if no expiration date, for at least two years after the product has been released for sale. *Refer to Section 16.8.1 for retention periods for records involved in slaughter activities.*

16.3 Communication

An operator of an establishment is responsible for notifying the appropriate *Regulatory Authority* and all affected distribution locations (customers) about the recall, as soon as possible.

Initial notification could be made by telex, facsimile or telephone and should be followed-up with written confirmation. The recall communication should include the following elements:

< the identity, product name, code and identification and all other identification data concerning the product to be recalled,
< the reason for the recall;
< advisement that further use or distribution of the product shall cease immediately;
< specific instructions as to what to do with the product;
< a means for the receiver of the communication to acknowledge receipt (i.e. Recall Record), to provide information on the volume of product on hand and to report on their client accounts contacted and that their clients are aware of the product to be recalled.

16.4 Public Warning

In situations where a recalled product could be a serious health hazard, an operator shall be advised by the appropriate Regulatory Authority in respect to issues and procedures concerning public warnings.

A recall situation could happen to any food processor with almost any type of meat product. It is therefore essential that an inspector familiarize themselves with recall procedures, provide assistance or advise to operators or by seeking the input of officials representing the *Regulatory Authority*. Public documents or articles regarding the details and problems found with recalled products should be gathered by the operator as a learning tool in order to enhance their recall program and to keep current with situations involving food borne illnesses.

16.5 Identification and Coding

16.5.1 Product Coding or Identification

A Recall Program shall include the use of sufficient coding of products that clearly shows positive identification of lots. In the case of ready to eat meat products, they shall be identified with a production date or a production coding system that identifies the lot. All products that leave an establishment must be accurately and distinctly identified, in order to be retrievable for the purpose of inspection and/or recall purposes, as well as, to maintain compliance with prescribed marking and labelling requirements.

Proper identification or labelling of products ensures, that, the recipient of the product is provided with clear, accurate and sufficient information necessary to handle the product safely and correctly. For example, cooking instructions on a label advises the recipient that the product has to be cooked at a certain temperature and for a specified period of time. In the case of refrigerated products, the information stated on a label advises the next person in the food production chain that, the product is perishable and shall be stored at a specified refrigerated temperature. *Refer to part 13 Identification and Labelling for additional information.*

The operator must implement and maintain a written record-keeping program, either in paper or electronic format that includes as a minimum the following information:

a) A detailed description of the identification system used for labelling, marking or coding of meat and meat products.

b) Adequate and accurate information regarding the products characteristics, specifications, ingredients, storage instructions, etc.

c) The maintenance of product distribution records, to facilitate location of products that need to be recalled in a timely manner should the situation occur.

It is the responsibility of all operators to maintain all records on file, for such length of time that is prescribed by the appropriate *Regulatory Authority*.

16.6 Inventory of Supplies Bearing the Inspection Legend

An operator shall maintain a complete and accurate inventory listing of all supplies and materials that bear the inspection legend. Such items may include legend bearing labels, tags, cartons, containers, etc.

The inventory record shall include and identify the following:

(a) the type of material;
(b) the number of all items of that type; and
(c) the dates on which an item was used

16.7 Product Distribution Records

It is essential that the operator maintain complete and accurate product distribution records, in order to efficiently and effectively locate, identify, isolate and detain defective products.

Product distribution records or shipping records shall identify:

< the name of the products; the lot or code identification of the products being shipped from the establishment,
< the name of the company, or customer, or establishment that shall received the meat product being shipped from the manufacturer or operator of an establishment,
< the date on which a meat product was shipped.

16.8 Establishments Engaged in the Slaughter of Food Animals

16.8.1 Maintenance of Records for Animals Slaughtered

All animals slaughtered at an establishment shall be documented by the operator. The documentation shall be completed accurately and in a timely manner.

The operator shall develop a record for animals slaughtered that contains sufficient information to allow a carcass, part of a carcass or blood from an animal to be traced back to the animal and the owner, from which it came. The record shall be maintained on file for at least a twelve month period. Such records shall be made available to an inspector upon request.

The record must include:

(a) the names and addresses of the persons from whom animal's area acquired, purchased or consigned;
(b) the date or dates the animals were acquired;
(c) the number and type of animals acquired;
(d) the number of animals that were slaughtered; and
(e) the dates on which animals were slaughtered;
(f) the identification process allowing trace-back to owner.

16.8.2 Processing Records

Operators involved in the processing of meat products shall develop and maintain accurate and complete records of:

(a) incoming ingredients, food additives and any other materials used in the processing of meat products;

The record could be considered, the Receiving Record or Incoming Material Record and shall include information such as identification of material; date received; code or lot number on the package or container; condition or acceptability of product; corrective actions (if applicable) and storage location of materials received.

(b) product preparation and blending;

The records shall identify the formulation of the products being prepared and the method of preparation. The information on the record should provide accurate details on the manufacture of the

food respecting each lot, batch numbers of the product, date of manufacture, ingredients added (water, salt, sugar, nitrites/nitrates, etc.), and their concentration amounts and any other necessary information in order to allow identification and the retrieval of batch manufacturing records.

(c) process design and control procedures;

The operator shall establish written procedures appropriate to the process and the product being manufactured based on the application of Hazard Analysis and Critical Control Point principles. Records, used to monitor a critical control point (CCP) during a process should also include a description of the monitoring procedures, the deviation procedures and the verification procedures.

(d) deviations from the standard process and any corrective measures taken;

The information necessary on this record could be incorporated onto a CCP (Critical Control Point) record, as mentioned in (b) above. The record shall describe the established deviations procedures that shall be initiated when control procedures indicate a problem or when the product is not meeting the prescribed standards of the National Meat and Poultry Regulations and Code.

The information on the record shall include all corrective actions taken, including product disposition and any investigation procedures in order to prevent a recurrence and to maintain compliance with process design and compliance with the National Meat and Poultry Regulations and Code.

(e) monitoring, sampling, testing and verification procedures and results;

The records shall describe monitoring and verification procedures (who is responsible, what is done and how is it done, and at what frequencies). Records for sampling and testing shall describe the product being sampled and shall indicate the type of testing performed, i.e. compositional, bacteriological, fat/protein content, etc. *Refer to Part 11, Processing and Meat Standards for additional information*.

16.9 Complaints

The company's methods for receiving, investigating, tracking and responding to product complaints shall be described in writing. All records of complaints regarding meat products shipped from an establishment shall be maintained by the operator for a period of time found acceptable by the *Regulatory Authority.* A record of complaint shall include details of:

(a) the date on which the complaint was received;
(b) the nature of the complaint; and
(c) how the complaint was investigated and follow up action taken