Canadian Grain Commission
Commission canadienne des grains

Identity Preserved Systems in the Canadian Grain Industry

A Discussion Paper

Prepared by

The Canadian Grain Commission

in collaboration with

The Canadian Wheat Board
The Canadian Seed Growers' Association
The Cereal Research Centre, AAFC
The Country Elevator Association
The Terminal Elevator Association
Some western grain producers

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Canada

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Executive Summary

The present Canadian visual method of segregation of grain through the bulk handling system has come under pressure for change. There are presently a number of cases where varieties with specific desirable qualities are being grown and kept separate in the bulk handling system by means other than visual identification. The purpose of this paper is to discuss issues around non-visual segregation and propose a framework for an identity preserved (or IP) system of handling both large and small volume segregations. The purpose is to stimulate discussion around how IP systems could be set up, not to necessarily endorse these systems.

An IP system could include these elements :

- seed should be of a registered variety, with genetic markers for variety identification specified

- producers contracted to grow the grain should use seed acceptable to the contractor (normally either Certified seed or "verified" as the specified variety)

- contractors who market the grain should have production contracts with producers and be responsible for finding alternative markets for the grain if it does not meet specifications

- movement of the grain through the handling and transportation system should be accompanied by a paper trail, with samples taken and kept at every link in the chain where accountability shifts from one party to another

- accountability will rest with the facility which loads the transport conveyance

- an independent testing facility could test grain shipments to confirm that the grain meets contract specifications

- if shipments do not meet specifications, the samples may be tested down the chain to determine where the problem occurred and thus where financial accountability lies

A major problem with IP systems is how to identify problems and assign liability in cases where the non-IP grain is contaminated with grain of the IP varieties. This issue requires further work to be resolved.

Introduction and Committee Terms of Reference

Grain customer demands, technology, and farmers' and marketers' business strategies have become more sophisticated in recent years. One of the changes has been the demand for, and the resulting desire to market, grain with increasingly differentiated quality specifications. Quality control systems and marketing practices currently employed have established a very positive reputation for Canadian grain quality. However, there is widespread agreement that in some cases the industry needs to improve its ability to preserve the identity of specific lots of grain from farm to market in order to satisfy customer and farmer demands. A significant competitive advantage could be obtained by adding such Identity Preserved (IP) systems to the Canadian industry's capabilities, while maintaining as many of the current system's advantages as possible.

There have been numerous calls for the development of an IP system within the industry. For example:

- The Western Grain Marketing Panel, in its July 1st, 1996 report to the Minister of Agriculture and Agri-Food, made the following recommendation to the Canadian Grain Commission: "A controlled Identity Preserved (IP) system should be developed immediately in co-operation with the industry to accommodate the related recommendations of the Panel report."
- Resolutions for the development of an IP system have also been passed by farmer groups including the Keystone Agricultural Producers (KAP) and the Western Canadian Wheat Growers Association (WCWGA). A 1996 KAP resolution states "…for non-distinguishable varieties which farmers may wish to grow, an identity preservation system, spanning production to processing, should be developed." A WCWGA 1996 resolution states, "Whereas methods for preserving the identity of non-grain crops are currently in use, therefore be it resolved that the Canadian Grain Commission be charged with the task of developing a mechanism for identity preserved grain."
- The Industry Steering Group For Grain Quality Assurance, an industry committee formed in February 1995, presented a report at the Western Grain Standards Committee meeting on April 16,1996. The report outlined points that the committee thought should be considered in the development and management of an IP System. These are contained in Appendix 1.
- The concept of an IP system and its implications to grain marketing are also dealt with in "The Future Quality System for Canadian Wheat" (June 6, 1996), a joint discussion paper by the Canadian Wheat Board (CWB) and the Canadian Grain Commission (CGC). The paper discusses the potential need to segregate varieties by non-visual methods.

The visual grading system can easily segregate parcels of grain that are registered into classes based on kernel characteristics. Unfortunately, no satisfactory rapid testing technology currently exists which makes it possible to efficiently and effectively segregate parcels of visually identical grain on the basis of tests for non-visual characteristics.

Although industry has long desired rapid testing methods to accomplish this, it appears solutions are many years away. In order to speed development of these solutions, the CGC is coordinating efforts to fund an extensive research program called RIOT, or Rapid Instrumental Objective Testing.

Committee Terms of Reference

In response to calls for IP systems, the CGC formed an industry committee in February, 1998 to develop a framework for an IP system for the Canadian bulk grain handling system. The industry committee has representation from producers, seed growers, plant breeders, grain marketers (CWB), the primary and terminal elevator associations and the CGC. The purpose of this committee is to recommend to the CGC a process that will ensure segregation of parcels of grain that are visually indistinguishable from one another. The recommendations are to include a detailed description of the basis for segregation at each level of the handling system, the process for establishing accountability, and recommendations for penalties for non-compliance.

It is important to note that the committee was not asked to evaluate the merits of an IP System versus the alternative of retaining the current methods of quality control (i.e., for wheat, one based on Kernel Visual Distinguishability). Instead, the committee was asked to develop a framework for IP systems, assuming they will be used more extensively in the future.

It is also important to note that the framework described in this paper is not intended to be the only form of IP system in use in the industry. The intention is to provide a framework that would be used by industry as a "standard" form of IP system. In most cases this would be a minimum standard. For example, a variety of wheat might be contract registered subject to a closed loop/IP system using the framework described in this paper. Contracts between industry participants might be stricter than this framework, or have different rules for liability, for example.

Following the submission of these recommendations to the CGC, the committee's understanding is that they will be the subject of wider discussion (and possible amendment) within the industry.

For the purpose of this paper the following definition of an IP system will be assumed**: An IP system is one that will facilitate the segregation of parcels of grain that are visually indistinguishable from other parcels.** The most important point of this definition is that the focus of segregation is on functional, not visual, characteristics. It will also provide a means through which to backtrack through the system to identify where contamination may have occurred.

Background

Current Quality Control Systems

There are in fact various forms of IP systems that are currently in use. Some examples of these are included in a later section entitled, "Case Studies". Malting barley is an example of a grain that uses IP to maintain quality. However, for the most part, the western Canadian grain industry currently bases a large part of its quality assurance on a system of "Kernel Visual Distinguishability (KVD)" for registration and segregation. A description of the current KVD system is attached as Appendix 2.

Market and Industry Trends

Recent developments in the industry that have put pressure on current quality control systems and suggest the need for IP systems include:

- *Increased pressure to reduce or eliminate Kernel Visual Distinguishability (KVD)* – One of the costs to having a KVD system for wheat comes in the form of constraints on development of new varieties with quality that is marketable but different from the standard for each class. If a proposed variety looks like, for example, Canada Western Red Spring (CWRS) wheat but has quality characteristics that are significantly different from the CWRS class, it cannot be registered. Sometimes, this means that varieties that may have good market potential cannot be grown or cannot be marketed as anything other than a feed wheat. These constraints are under more pressure from industry, especially as more private research and/or seed organizations introduce new varieties.

- *The ongoing need to ensure segregation* – The market trend is for customers to demand increasing segregations for specific quality characteristics. An example of this trend is that, in 1985, there was a total of 12 possible segregations of wheat in the handling system. As of 1995 there were 68 possible segregations of wheat. These segregations are based on the seven classes of wheat, up to five grades in each class, and various other segregating factors such as protein, moisture, and degrading factors like ergot and fusarium (Maurice Demmans & Clarence Roth, *Meeting Customers' Quality Requirements with Quality Segregations*, February 27,1998, page 92).

- *The increasing need to segregate specific varieties within a class* – Stronger gluten durum wheat is in demand in some markets. New varieties being developed will create opportunities for farmers but they may also create problems in that these new varieties will have the same kernel characteristics as existing varieties. The Warburtons wheat contract program and the Canadian Wheat Board's malting barley and AC Karma contracts are other examples of buyers demanding more specific quality characteristics than existing grades can offer. Virtually every class of wheat now has the potential for varieties exhibiting ever-widening ranges of quality characteristics.

- *The potential need to segregate genetically enhanced organisms (GEOs) from non-GEOs (also known as genetically-modified organisms or GMOs)* – A bulk handling system poses a potential problem when dealing with GEO varieties that are not accepted in certain overseas markets. Most GEO varieties of grain will be visually indistinguishable from non-GEO varieties and would therefore be co-mingled when they enter into the bulk handling system, making all the product unacceptable to those markets. This translates into lost sales and profits to the Canadian farmer. For example, the European Union (EU) did not approve the importation of genetically enhanced canola as was expected. The co-mingling of this genetically enhanced canola with regular canola has caused a lost opportunity for sales to the EU. An IP system would provide the benefit of protecting the integrity of the product that is supplied to markets.

- *Potential market opportunities for contract registered varieties and contract non-registered production* – The contract registration process allows for the controlled registration of new non-conforming varieties. Contract registration is used in the case "where the biochemical or biophysical characteristics of a variety distinguish it from the majority of registered varieties of the same kind or species and where it could have an adverse effect on the identity of those registered varieties." For example, as these varieties could cause harm if registered into existing wheat classes, they would be contract registered and handled through a "closed loop" or IP system. No wheat varieties have been contract registered to date. Strict quality control is required to ensure that no contamination occurs. Contract non-registered production must also be handled within a closed loop system.

Case Studies

Some IP programs are already being employed by the Canadian grain industry. This section describes five of these: the Canadian Wheat Board's (CWB) IP marketing of both AC Karma and malting barley, the Warburtons Bakery IP program, the high erucic acid rapeseed (HEAR) IP program, and the Canadian Seed Growers' Association (CSGA) IP program.

CWB – AC Karma

AC Karma is a CPS White variety that was developed to improve on some of the characteristics of the previously dominant variety in that class – Genesis. In particular, AC Karma has improved quality for certain Asian noodle products.

The CWB's IP program for this variety has been in effect since the 1996-97 crop year and it was implemented for market development purposes. The program's goal is 100% varietal purity. Significant problems were experienced in the first year of this program, mostly related to the achievement of high levels of varietal purity. For example, one 10,000 tonne cargo tested electrophoretically was found to have just 67% AC Karma, with the rest of the hold being of the Genesis variety. (Note that in this case no guarantee was provided to the customer so no complaints were received; this was a "system test" that demonstrated some obvious problems).

On closer examination it was found that several factors contributed to this large percentage of Genesis being present in the cargo sample. One factor was that there were some mistakes in unloading cars at terminals (identified on I-90 and CITI file incorrectly). Another factor was that there was insufficient understanding of the program by primary elevator managers. Due to the short sample retention periods at the primary and terminal level, problems were also encountered in the tracing of the source of contamination. The primary elevators held on to their samples for approximately 1 to 2 weeks, and the terminal elevators held on to their samples for approximately 25 days. Due to a time delay in sample delivery, the CWB did not receive its test results until after all of the associated samples had been disposed of.

Following the problems in the 1996-97 crop year, the CWB changed its approach in several ways. Farmers and primary elevator managers were made more aware of the importance of variety specific delivery and what it means to the customer's end use. Samples were retained at the primary and terminal levels for longer time periods, sometimes up to 60 days. This introduced the element of potential accountability into the system. These changes increased the success rate of cargoes. Recent cargoes have contained over 97% AC Karma.

CWB – Malting Barley

For many years, malting barley customers have insisted on receiving malting barley on a variety-specific basis. The Canadian Wheat Board has therefore been operating an IP system for malting barley.

Farmers deliver malting barley on a storage and delivery contract, which is in some ways comparable to an affidavit. When two farmers load one rail car, samples must be taken from each farmer's truck in order to determine accountability in the event that problems occur at a later point in time. Gel electrophoresis and high performance liquid chromatography are used to test varietal purity of cargoes. It is at this point that problems

are detected. The CWB specifies a minimum level of varietal purity in its contracts with selectors who are responsible for sourcing malting barley within contract specifications and loading it onto vessels. If this minimum level of purity is not achieved, a series of penalties applies and this may be a factor in decisions to award tenders in future.

This program's goal of providing a minimum percentage of a specific variety in a cargo has not always been met, but the results have been getting closer to the goal over time. One difficulty with producing barley of a specific variety is the tendency for volunteer barley to grow in a field even two or three years after that variety was grown. Producers have to manage crop rotations carefully to avoid mixes of varieties in their fields.

Farmers are educated by CWB and the malting barley industry about the importance of varietal purity through various communication methods, including the *Go Malting* magazine. There are also posters in elevators that list the recommended varieties to be grown, thereby linking the importance of selecting varieties that suit market needs.

Warburtons Family Bakers

Warburtons has been working with the CWB to contract with Canadian farmers since 1996. Warburtons contracts with growers through Agricore and Paterson Grain. They have expanded from producing 3.2 million loaves of bread/week to producing 5.5 million loaves. This translates into a grain volume of approximately 200,000 tonnes annually (*Manitoba Co-operator*, page 13, March 26, 1998). In order to operate this program, Warburtons pays a price premium to the CWB and, through the grain handling companies, directly to the farmers involved.

Warburtons currently uses up to four varieties, with contracts by variety, farmer, and carlot. Following harvest farmers submit a two kilogram sample to Warburtons in Brandon. This sample is inspected to ensure that it meets certain specifications (e.g. ergot and fusarium must be below #1 CWRS levels). As grain is called forward to be shipped another sample is taken at the elevator as the car is loaded. This sample is retained by Warburtons in Brandon until the cargo is received and unloaded in England. Electrophoresis tests are conducted on cargo loading samples by the CGC and on cargo unloading samples by Warburtons in the U.K.

High Erucic Acid Rapeseed (HEAR) IP Program

IP systems, based on ISO 9000 quality management systems, are in place and operational for HEAR oilseed destined for domestic processing. This segregation is needed because of the various quality traits and specific requirements for their end product use.

High erucic acid rapeseed (HEAR) is used in the production of oleochemicals, such as erucamide used in polyethylene films. Erucamide is also a component of Olestra and demand for this product may increase as Olestra becomes more popular. Currently, relatively little HEAR is produced (approximately 1 to 2% of canola) and it is handled

through premium paid grower contracts. Canola specifies less than 2% erucic acid, HEAR contains about 50 %. There is harm if it is mixed either way.

An example of an attempted IP export of HEAR seed was documented in 1984, when 2000 tonnes of HEAR was sold for export. Testing of a cargo sample revealed that there was only 30.4 % erucic acid in the rapeseed loaded into the ship hold. When unloading and loading samples of the cars were tested they were found to contain over 41% erucic acid. The answer was discovered when testing of neighboring holds of canola revealed 3.5 % erucic acid as compared to the normal export level of 0.7%. It seems that approximately 500 tonnes (25%) of the HEAR shipment was misdirected at the terminal into the wrong hold, thus contaminating the canola shipment. The HEAR shipment was in turn contaminated with 500 tonnes of canola.

Currently HEAR varieties are registered under contract registration and the seed is tracked, "Certified through to Oil." Farmers contract to deliver seed to the crushing plant and, regardless of quality, all seed must be accepted.

Canadian Seed Growers' Association (CSGA)

The Canadian Seed Growers' Association is the official pedigreeing agency in Canada for all field crops except potatoes. Its IP program has played a major role in market development for new crops in Canada. CSGA's experience with IP crops goes back to 1972 with the production of Glenlea wheat and Hinoat oats.

CSGA's IP crop program requires the planting of pedigreed seed. Pedigreed seed is produced from a field inspected pedigreed crop and originates from genetically pure breeder seed developed through a pedigreeing system. Pedigreed seed must meet the grade requirements of the Canada Seeds Act & Regulations.

CSGA's IP program includes the verification of planting stock pedigree and previous land use as well as field inspections to verify adequate isolation and purity of variety to contract specifications. Growers must sign application forms attesting to the identification of the pedigreed seed, location of the field, land use, acreage and seeding date.

CSGA feels that at the beginning of any IP program, you need Certified seed. There is a need for quality control plans throughout the system. Monitoring of pedigreed seed varietal purity, including electrophoresis and variety verification is done by the Canadian Food Inspection Agency (CFIA).

Possible Uses for IP Systems

The use of Identity Preserved Systems will presumably evolve as customer requirements evolve through time. Current IP systems usually involve selection of particular varieties from within existing classes. However, the following are examples of an expanding range

of scenarios where IP systems might be used. These are presented to encourage discussion - not to be an endorsement of them.

For Wheat – Within Existing Class Structure

As identified in the case studies, the CWB currently uses IP systems in some variety-specific wheat contract programs. This could continue and expand even without any changes to current KVD regulations. For example, strong gluten durum wheat varieties might be registered that would meet the visual requirements for the CWAD class, but may have to be identity preserved for some markets, either as single varieties or as a group of varieties within the class. This may or may not necessitate IP systems for conventional gluten durum wheat varieties.

For Grains That Currently Have No KVD Regulations

As noted in the case studies, malting barley is currently marketed using an IP system, as are certain varieties of other crops such as canola. The framework for IP systems outlined in this paper could be applied to any number of varieties in these grains.

For Genetically-Enhanced Grains

For those crops that currently have GEO (Genetically-enhanced organisms) varieties and for those which will in the near future, IP systems will be critical to satisfying customer requirements, at least until (if) customer concerns about these crops diminish. IP systems could be used to either segregate GEO varieties for those customers willing to/wanting to receive them or for those customers who require assurance that they are not inadvertently receiving GEO varieties in their shipments.

For Wheat – Reduce Use of KVD as Registration Criteria

One option that has been discussed within the industry is the possible elimination of KVD for three classes of wheat only – Canada Western Extra Strong (CWES), Canada Prairie Spring Red (CPSR) and Canada Western Red Winter (CWRW). KVD would be retained for Canada Western Red Spring (CWRS) and Canada Western Amber Durum (CWAD). Therefore, a candidate variety for CWES, CPSR or CWRW could have the visual characteristics of any of those classes, but it could not look like CWRS or CWAD. This would keep KVD in place to protect the quality of CWRS and CWAD, but allow more flexibility in registering varieties in the other three classes. The advantages of this change would be based on the understanding that removing one constraint to variety registration improves the possibilities of developing varieties with better agronomic, quality or disease performance.

In the absence of KVD for these classes, IP systems would be necessary to deliver the required quality to customers. It should be emphasized that elimination of KVD would not necessarily mean implementation of IP systems for just the “new” varieties. For

example, a new variety that looks like CWES varieties but has CPSR quality characteristics would raise the question of whether it is being "leaked" into CWES shipments. Therefore, identity preservation of all CWES shipments may become necessary. These three classes are not "low quality" – particularly as new and improved varieties come on stream – and customers will require quality assurances. The costs of IP systems for such shipments (and the costs could be quite high) would have to be measured against the benefits of the removal of KVD registration regulations.

A comparable approach could be used for white wheats. There is significant market potential for hard white wheat with a similar quality profile to CWRS, but it may be difficult to develop varieties that are visually distinguishable from Canada Prairie Spring White and Soft White Spring varieties.

For Wheat – Eliminate KVD Entirely

This is an extension of the above scenario to all wheat classes. Similar implications (such as that it may necessitate identity preservation of most or all varieties) would need to be discussed.

Framework for IP Systems

Definitions

Terms defined by the committee include:

Accountability – acceptance of financial responsibility for the identity of a particular parcel of grain. Accountability includes the responsibility for harm to other parcels of grain if there is leakage.

Lowest Detection Limit – as achievable by current methodologies. Factors that affect the lowest detection limit are the sample type being handled and the detection level that instrumentation allows. Buyers and sellers must agree on which methods to use, and both must be aware of the limitations imposed by that method.

Education – involves the process of informing people about their roles and responsibilities throughout the IP process. Education starts with the plant breeder and ends with the buyer.

Harm – when the composition or specifications of the parcel of grain are not as originally declared or contracted.

Penalties – administrative fines, through the Administrative Penalties Act, or as may be further written in the contract.

Certified seed – is pedigreed seed production that has undergone official field inspection and met the requirements to receive "certification" by the Canadian Seed Growers' Association (CSGA).

Verified seed – is seed one generation removed from Certified seed, where the same farmer who grew the Certified seed verifies the variety with a declaration supported by the original Certified seed tags or invoices. This declaration could be subject to verification by testing.

Variety – is defined in the Canada Seeds Act as "an assemblage of cultivated plants, including hybrids constituted by controlled cross-pollination, that

(a) are distinguished by common morphological, physiological, cytological, chemical or other characteristics, and
(b) retain their distinguishing characteristics when reproduced"

Class – is defined in the CGC Official Grain Grading Guide as "a variety, or several varieties, of grain which possess defined processing qualities, disease resistance, and kernel visual distinguishability."

Kernel Visual Distinguishability – for a variety of grain to be eligible for membership in a class it must be visually similar to varieties of that given class, and visually distinguishable from varieties that belong to other classes. (It must also meet accepted standards for end-use quality, yield and disease resistance.)

Canadian Seed Growers' Association (CSGA) Suggestions

The pedigreed seed system is a type of IP system that has been functioning well for a long time. For future IP crop programs, the CSGA made the following suggestions based on its experience:

1) pedigreed seed (usually Certified seed) is required at planting
2) some form of field inspection and a verification of previous land use
3) confirmation by the CSGA that the planting stock is authentic pedigreed seed
4) a farmer declaration, attesting to the accuracy of the completed application and agreeing to comply with IP program requirements
5) an on-farm quality assurance system that can be audited to ensure that the grain produced from the IP crop has been kept clean and segregated
6) a sign off declaration at every transfer stage to transfer the responsibility and liability from one party to the next
7) samples kept at each transfer stage of the process i.e. seed grower, farmer, primary elevator, shipper/handler, terminal, vessel, etc.
8) a schedule of penalties for non-compliance be determined for each stage of the process
9) a systems verification plan to ensure overall compliance and effectiveness

Recommended Framework

Appendix 3 is a map of the proposed IP System. It includes many of the CSGA's suggestions. One thing to note is that the proposed system is quite similar for both CWB and non-CWB grain. The map, and Appendix 4, "Summary of Liabilities or Responsibilities" identify the different levels of accountability and the steps involved in this system.

Variety Breeders/ Owners – Breeder seed entering the market is accompanied by a breeder crop certificate declaring varietal purity. This certificate is issued by CSGA only to recognized plant breeders.

Registration System – The registration system is administered by CFIA. The Prairie Registration Recommending Committee for Grain recommends which varieties should be registered. Genetic markers of varieties must be specified and provided confidentially to an independent quality assurance agency as part of the registration process. Presently much of this information is considered proprietary and hence concealed.

Seed Growers – The appropriate class of pedigreed seed is required for all plantings. Field inspection and verification of previous land use support this official varietal purity certification. Field inspections include verification of seed tags.

Contractor – This could be the CWB or a designated handling company. This would involve having a variety specific delivery and/or a production contract with an affidavit. This party would be responsible for finding alternative markets for the product if it failed to meet delivery or production specifications.

Farmer – Farmers should keep random representative samples of what was planted. A farmer will sign a declaration, attesting to the accuracy of the completed application and agreeing to comply with IP contract requirements. If necessary, farmers should receive training on an on-farm quality assurance system that can be audited to ensure that the grain produced from the IP crop has been kept completely segregated. The CGC or another organization could offer to audit farmers as part of an investigation service offered to the industry, with fees paid by the requestor. A sign off declaration or affidavit verifying the variety delivered, normally accompanied by an official certified seed tag (or invoice) or proof of verified seed, must be completed when the farmer delivers the truckload of grain to the primary elevator. The primary elevator manager, or contracting agent, is responsible for ensuring this document is in order. This will serve to transfer the responsibility and liability from one party to the next. It is suggested, optionally, that at this point, representative samples be drawn, divided and documented with both the primary elevator manager/delivery agent and the farmer receiving samples of the truckload.

Primary Elevator/ Delivery Agent – The primary elevator manager is responsible for keeping an accurate, auditable, documentation trail of all movement of the IP grain as it is

transported through the premises. Grain will be handled by the primary elevator and then loaded into a transport conveyance. At this point, it is suggested that representative loading samples be taken, documented, and held until the period of legal liability is terminated. The shipper must ensure that the car is identified properly on the waybill and the correct information is entered into the Car In Transit Information file (to avoid accidental dumping). The I-90 will serve as the declaration and must be properly completed. The I-90 can also be used as an appropriate legal sign off, if all parties involved agree to use it as such. Failure to properly complete the I-90 will cause the car to be held for non-visual testing and segregation. All associated costs will be charged to the shipper prior to the final grading. The CGC or another organization may be willing to audit primary elevators as part of an investigation service offered to the industry. Costs incurred for the investigation will be covered by the requestor of the service.

Note – In the case of direct hit loading to terminals, or prairie direct to the US or domestic unit trains, non-visual testing will be conducted on the shipment of grain (i.e., at the last official inspection conducted by the CGC).

Railway or Trucker – The railway or trucker is responsible only for timely delivery to the correct terminal/destination. It is not responsible for the contents of the car.

Terminal – The railcar is unloaded in the terminal location. The CGC will take unload samples of each car if required. It is then the CGC's responsibility to properly document and keep these samples for a limited period of time (currently these samples are held for 20 days). It is suggested that the unload samples should be kept for a period no less than 50 days. The terminal elevator will authorize the disposal of the samples. It is recommended that the terminal elevator operator keep an accurate, auditable, documentation trail of all movement of the IP grain as it is transported through the premises. This documentation trail could include but is not limited to, the bin into which the grain is received, the cleaner that it passes over and the dryer used to dry it. It is the terminal elevator operator's responsibility to bin the grain appropriately, according to the accompanying declaration, or to ship the grain. The CGC or another organization could offer to audit terminal elevators as part of an investigation service offered to the industry. Costs incurred by the investigation should be covered off by all parties found liable at that point in time.

Shipments out of Terminals – When the grain is loaded on to an ocean vessel (or railcar, truck or container) loading samples must be taken under the supervision of the CGC. "Supervision of the CGC" is defined as use of CGC approved automatic sampling equipment and regular incremental analysis. These samples will be documented and stored for a period appropriate to the type of shipment. It is at this point that non-visual testing will be carried out to confirm the varietal purity of the shipment. The expense of testing should be incorporated into the final inspection costs. If an anomaly is detected then the shipper (i.e., terminal) and the marketer will be informed. The shipper may be fined through the Administrative Penalties Act, or as may be further indicated in the conditions of the contract. The CGC or another organization could optionally provide a

testing and audit service to determine where the point of contamination occurred in the system and who is accountable for the damages. Costs incurred by the investigation should be covered off by all parties found liable at that point in time. The "Loading Order" will serve as the declaration or legal sign off.

Note – The above illustrates the IP system as it would occur through the ports of Vancouver and Thunder Bay, in the case of ocean vessel loading. There would be some additional steps involved in grain movement through the transfer elevators on the Great Lakes - St. Lawrence Seaway. When loading grain onto a laker, the non-visual testing would not be done until the transfer elevator loaded the final cargo. This process changes slightly in the case of movement of grain through a transfer elevator.

Transfer Elevator – There is a transfer of liability from the terminal to the transfer elevator. Loading samples must be taken under the supervision of the CGC. "Supervision of the CGC" is defined as use of CGC approved automatic sampling equipment and regular incremental analysis. These samples will be documented and stored for a period appropriate to the type of shipment. The transfer elevator operator is responsible for keeping an accurate, auditable, documentation trail of all movement of the IP grain as it is transported through the premises. At this point non-visual testing will be conducted to confirm the varietal purity of the shipment. The expense of testing should be incorporated into the final inspection costs. If an anomaly is detected then the shipper (i.e. transfer) and the marketer will be informed. The shipper may be fined through the Administrative Penalties Act, or as may be further indicated in the conditions of the contract. The CGC or another organization could optionally provide a testing and audit service to determine where the point of contamination occurred in the system and who is accountable for the damages. Costs incurred by the investigation should be covered off by all parties found liable at that point in time. The "Loading Order" will serve as the declaration or legal sign off.

The importance of retaining an appropriate representative sample throughout the whole process must be emphasized strongly. This sample may be used at any step to determine liability in the event that a dispute occurs. In addition to providing an investigation service to determine liability, the CGC or another organization could also offer to conduct random "quality assurance" checks throughout the system to ensure compliance with the IP program. If this is a requested service, it must be determined how much testing will be conducted and who will pay for the associated costs.

Issues for Consideration

How will the other (non-IP) shipments be monitored, who would pay for monitoring, how would liability for contamination be enforced, and for what period of time will shippers of IP grain be held liable? (e.g. If Company A brings in a variety for one year of production and that variety is found in other shipments 5 years later, should Company A be held liable?) It is easy to imagine Company A saying that somebody else must have brought

the variety up from the U.S. and contaminated that other shipment. The proposed framework deals with issues surrounding protecting the quality of the identity preserved grain. However, it says almost nothing about protecting the quality of non-IP grain that might be affected by IP programs. For example, suppose the IP systems framework is used to facilitate production and marketing of a new wheat variety for a specific end use. Customers of the new variety would presumably receive (nearly) pure shipments of that variety under the IP system. But suppose the variety looks like CWRS. What protects the customers (and marketers and farmers) of existing varieties from contamination of their shipments by the new wheat? The IP system might say this shouldn't happen, but how will such a problem really be prevented?

The above scenario can be pictured for high-yielding feed wheat varieties that look like CWRS or CWRW, or a number of other specific quality factors that don't "fit" the current classes. This problem needs to be considered carefully, since this is about multi-million dollar damages. It may be that the conventional classes will have to be identity preserved as well to assure their quality.

The legal enforceability of the accountabilities/liabilities outlined in the framework need to be tested. Obviously, if the system is unenforceable or if enforcement of liability is possible only through very expensive and/or cumbersome dispute settlement mechanisms, it will need improvements. This includes the CGC's ability to levy fines under the Administrative Penalties Act, which is proposed to start in August 1999.

Are there IP systems in place in other countries/commodities that can be referenced for system structure, effectiveness or liability? More research should be undertaken on this to see what lessons can be learned.

Appendix 1: Points Presented by the Industry Steering Group For Grain Quality Assurance to the Western Grain Standards Committee Meeting on April 16, 1996.

There is a requirement or demand for an IP program. There is a growing demand for IP programs for registered and authorized varieties from customers.

Management and leadership are responsible and committed. Without the commitment and leadership of management in the implementation and maintenance of the program, it will not stand up to the strict internal monitoring process. Management is defined as the one person who has the ultimate authority for ensuring the success of the production in the facility. Responsibility is delegated down to others in the management structure.

There is a requirement for a documented quality assurance policy. This policy must address the philosophy of the organization in meeting and exceeding customers demands.

The focus of the IP program is the contract. Supplier contracts must provide a clear understanding of what the customer requests and expectations are. Suppliers must establish and maintain the procedures for reviewing contracts and handling or marketing of residual production.

Documentation is the process control of the IP program. Each facility will be responsible for establishing and maintaining the control of all documents, data and material relating to the contract.

The customer can be accommodated by an addition of products or materials. Procedures must be established to allow customers to supply materials, product or services to the facility to be incorporated into the IP contract.

The IP program must ensure identification and traceability of the grain. As all non-conforming products will be subject to recall, it is imperative that the industry develop specialized procedures for IP movement that will ensure traceability of all product.

The production process is the initial step in the IP program and must be controlled. Production contracts must stipulate the required quality level under farmer control. Contingency arrangements, agreeable to both farmers and contractors, must be developed for quality differences that are outside the control of the production process.

Provision has been made for Inspection and testing of quality of grain within the IP programs. There must be a planned, coordinated, documented system for inspecting and monitoring of the product through the whole IP process.

Standards for calibrating and maintaining equipment are established. There must be a documented provision for the calibration, record keeping, and maintenance of the critical equipment, which allows for the objective assessment of the contracted product.

Control of the quality system process includes plans for non-conforming product. Non-conforming product must be prevented from entering the primary system. The liability or loss incurred due to non-conforming product is the same, whether the product is deliberately or inadvertently admitted to the system.

Procedures for corrective and preventative action for non-conforming product are established. To minimize associated liability and loss, non-conforming product must be detected, reported and dealt with at the earliest stage possible. In the event that it occurs, the IP program and contracts must offer alternatives for the disposition of non-conforming product (i.e. alternative markets).

Quality records are maintained as an essential part of the documentation process. Documents pertaining to the IP program must conform to certain proscribed requirements and must be maintained, controlled and retrievable on request, by all parties involved.

Status of IP programs is confirmed by internal quality checks. Internal quality checks may be the major elements used to prove or disprove the proper functioning and effectiveness of an IP program.

People involved in the IP programs are qualified; training needs are identified, essential training is provided and documented. Management must ensure that the training requirements for personnel involved in the IP program meet the current industry standards and future IP standards.

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Statistics plays a useful role in the quality assurance management of IP programs. Suitable statistical techniques should be used to verify acceptability of process capabilities or product characteristics.

The costs of the quality management process for the IP product are returned in value by the customer and in the potential for efficiencies to the provider. Additional costs of a concurrent IP system need to be borne by the end-user/customer. The following principles are appropriate in addressing the costs of IP systems:

- By supplying quality, the system should receive the maximum value from the marketplace and return this value to those who created it.
- The system must have perceived value to the customer and serve to increase customer's value and confidence level.
- The IP program must add cost effective value to the output system.
- Each step in the process should be self sustaining and economically viable with no cross subsidization occurring.

Appendix 2: Variety Registration and Kernel Visual Distinguishability (KVD)

Variety registration is administered by the government of Canada, with the cooperation of the industry. It is unique to Canada. Before a variety can be registered for production in Western Canada, it must undergo careful scrutiny for end-use quality, agronomic performance and disease resistance, and be proven to be equal to or better in all these criteria than the reference variety for its class. It must also be shown not to conflict with the visual distinguishability rule that is used to separate wheats of different classes. The end result is to ensure that buyers receive wheat continuously with consistent end use performance characteristics (e.g. milling and baking) and high inherent quality regardless of which class or grade they purchase.

Kernel Visual Distinguishability (KVD) is one of the key components in the Canadian registration system and its impact moves right through the whole grading and quality control system. There are two important aspects of KVD.

First, each of the seven wheat classes has been assigned a combination of seed-coat color and physical kernel configuration that is different and distinctive. The differences have to be great enough so that grain inspectors can readily distinguish one type of wheat from another as wheat moves from farms to primary elevators and into terminals and then ocean vessels. This allows complete separation of these seven different types of wheat as they move through the transportation and distribution channels. This is crucial to assuring consistency in end use quality. Contamination of one type of wheat with another would be probable without KVD and, in fact, it might not have been possible to even consider many different classes of wheat.

The second aspect of KVD is just as important. This specifies that a variety of wheat with the kernel shape of one of the wheat classes will have certain quality characteristics. The association between kernel shape and quality is direct and automatic. A variety with a Canada Western Red Spring (CWRS) kernel will possess the quality characteristics expected of that class. Similarly, a variety that looks like a Canada Western Amber Durum (CWAD) wheat must possess the established agronomic, disease resistance, and end-use quality characteristics in terms of semolina yield, protein content, gluten properties, color, etc. or it will not be registered. Without such a guideline there would be much less or no uniformity. The same principle holds true for the other wheat classes because consistency and uniformity is just as important for these wheats as they are for the hard red springs and the durums.

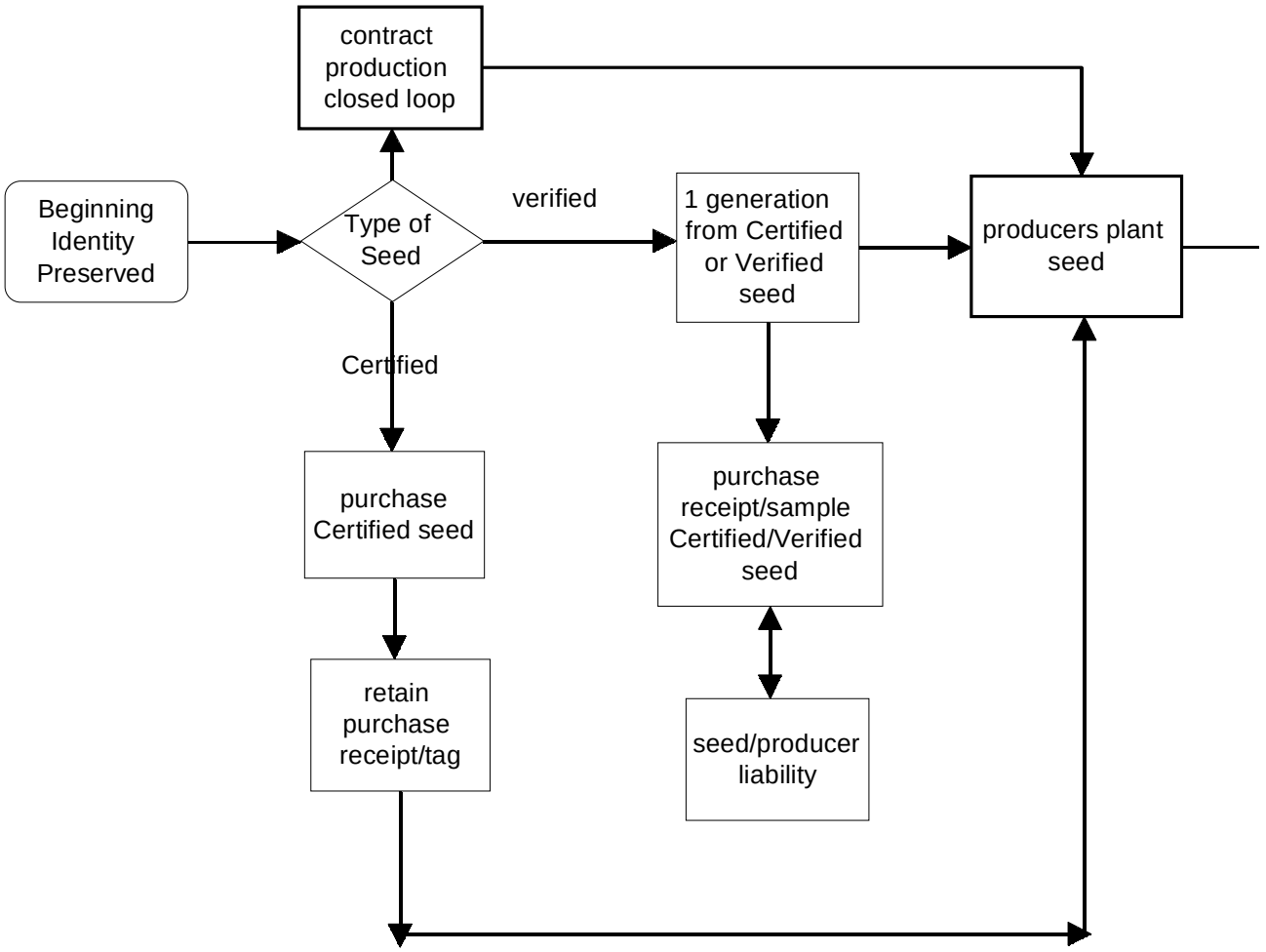
Due to the well-established and successful characteristics of the more important CWRS and CWAD classes, there are specific varieties that have been designated as *reference standards* – Neepawa for the CWRS class and Hercules for the CWAD class. This means that any new variety being developed must equal the agronomic, disease resistance, and

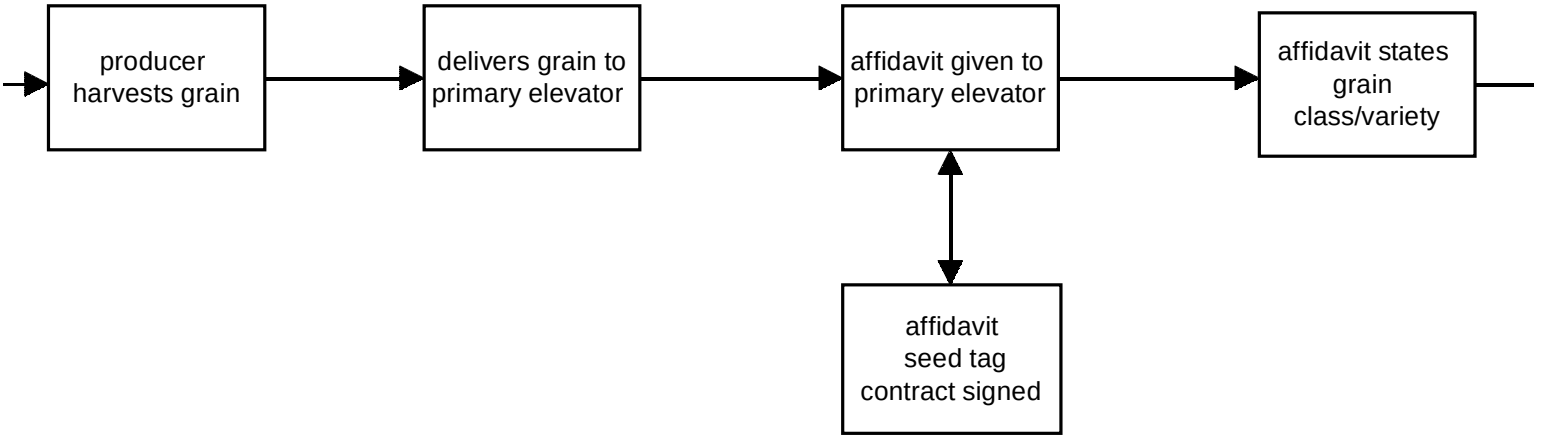
end use quality characteristics of the standard. 'Equal' does not have to mean 'identical'; rather, the requirement is not to be unacceptably different. This is a vitally important concept since a new variety with superior performance in one area, such as a significant crop yield advantage, resistance to a disease such as smut, or a better flour color MUST also meet the minimum requirements of ALL the other characteristics of the standard and must maintain the KVD for the class. To compromise on this would result in end use quality variability and would undermine the characteristics that are desired and accepted by both farmer and customer.

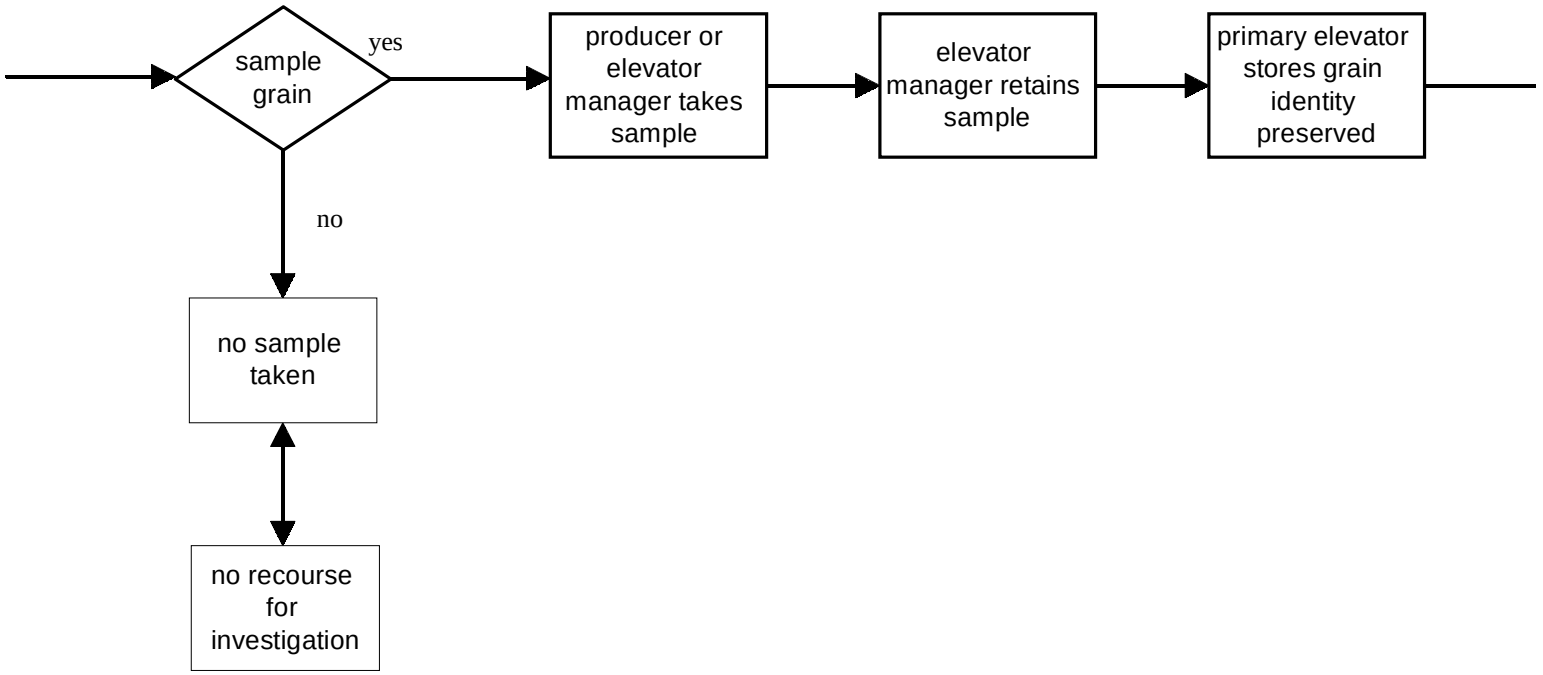
The development concept is the same for the smaller wheat classes only using *reference varieties* that have been shown to exhibit good characteristics for the class. If newer varieties can be developed that demonstrate significant improvement in the class, then they, in turn, could become the reference varieties for future breeding efforts.

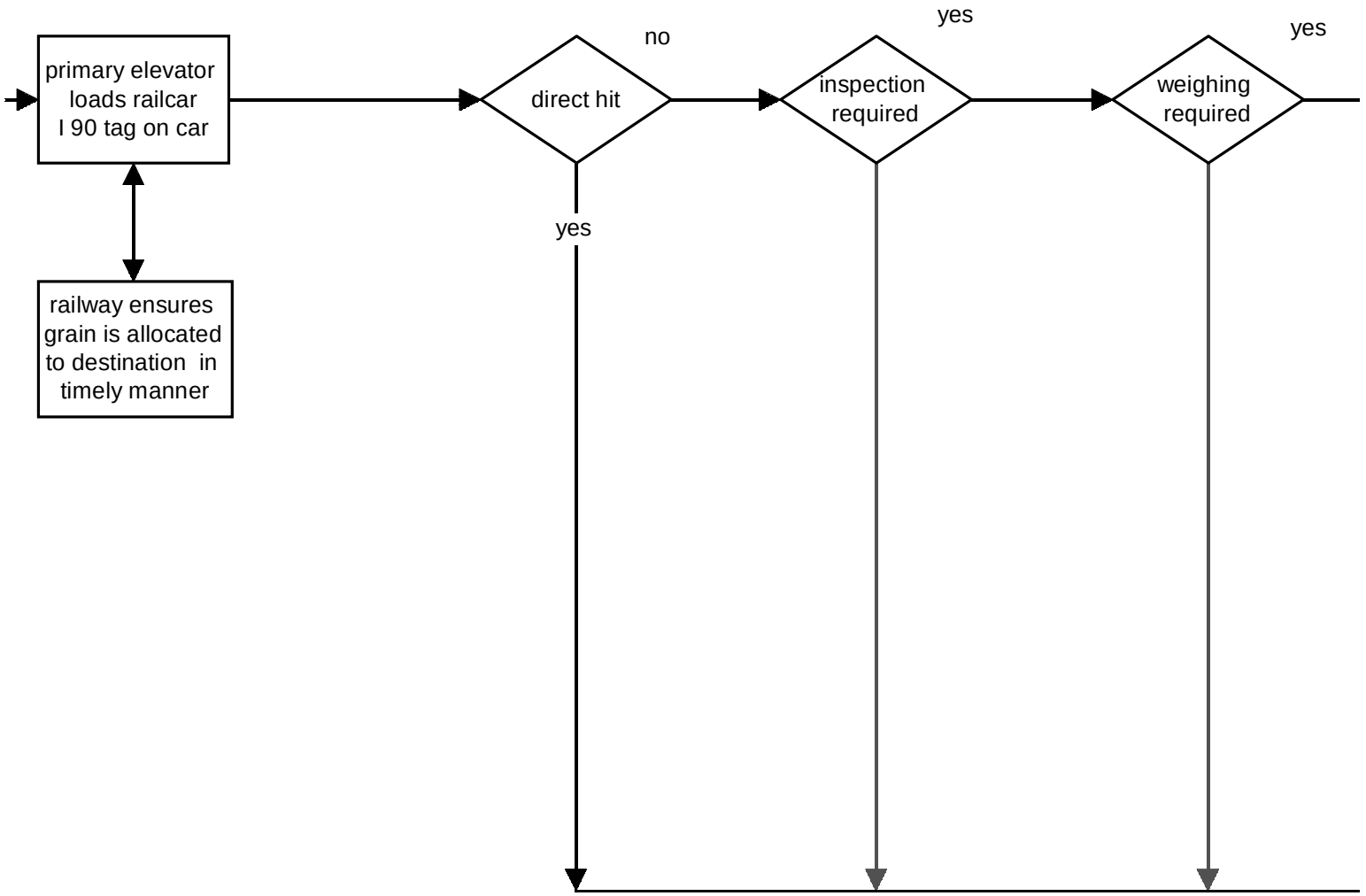
By contrast, non-KVD systems, such as exist in the United States, require customers to use a series of tests at unload to ensure that the shipment meets the contracted quality. The United States does not have a central system of evaluation to ensure that new varieties meet specific end use quality requirements. To satisfy farmer needs, breeding programs will often place emphasis on yield improvements and disease resistance at the expense of quality characteristics. Many varieties within a particular class (e.g. DNS) with different end use quality characteristics can be loaded in the same cargo, or different mixes on different cargoes to the detriment of consistency in quality on the same cargo or between cargoes.

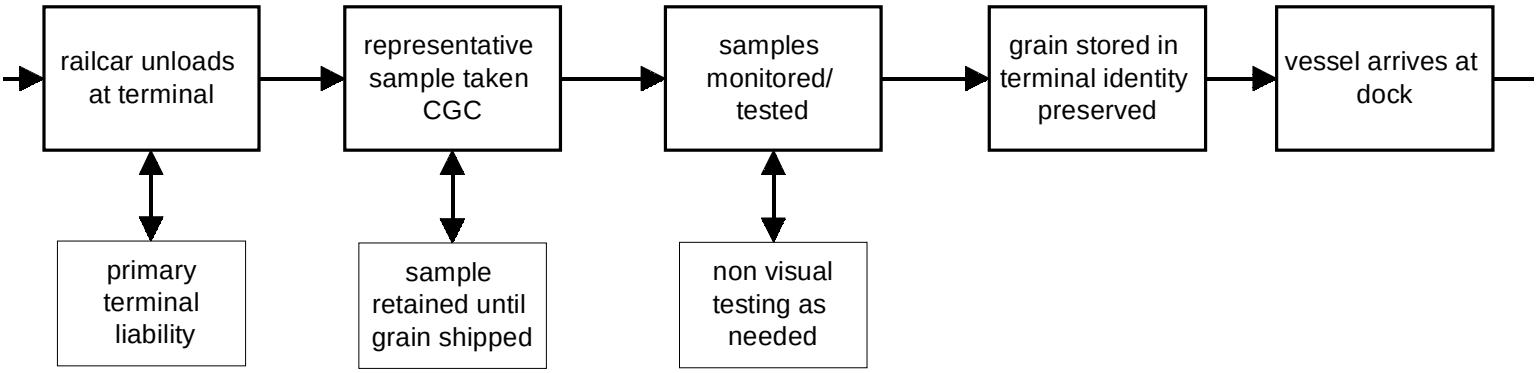
Appendix 3: IP System Flow Chart

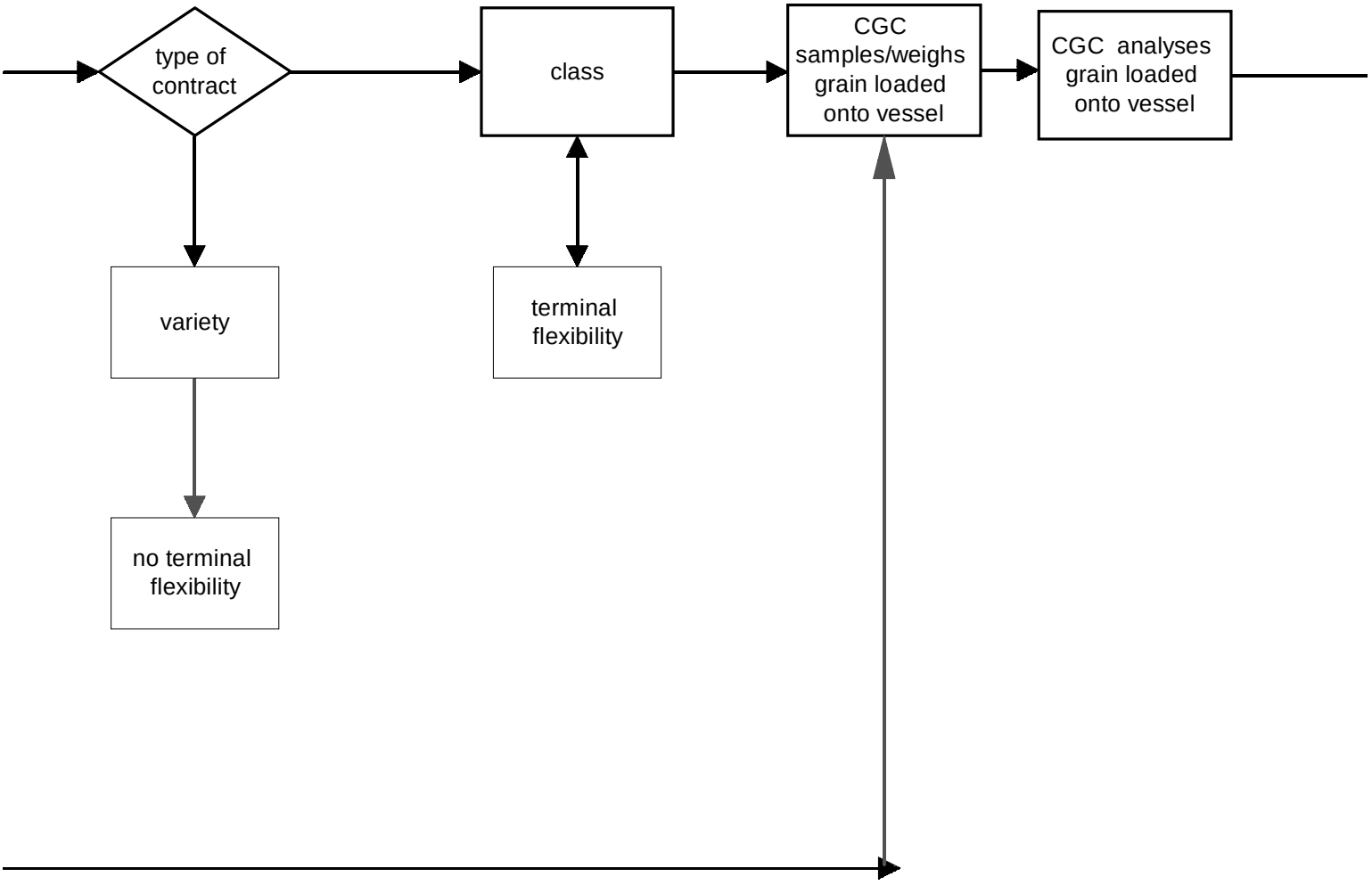


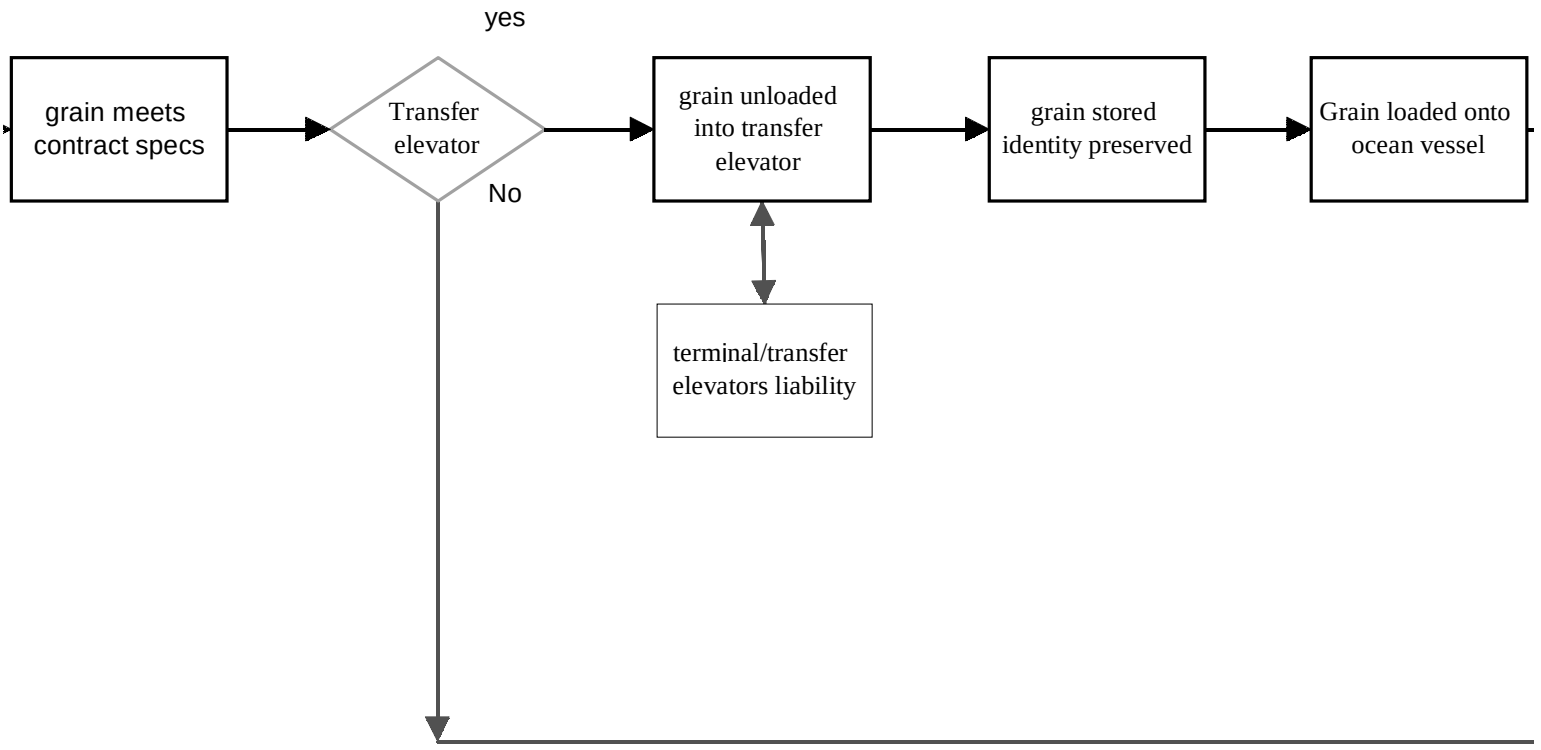

producer harvests grain
delivers grain to primary elevator
affidavit given to primary elevator
affidavit states grain class/variety
affidavit seed tag contract signed

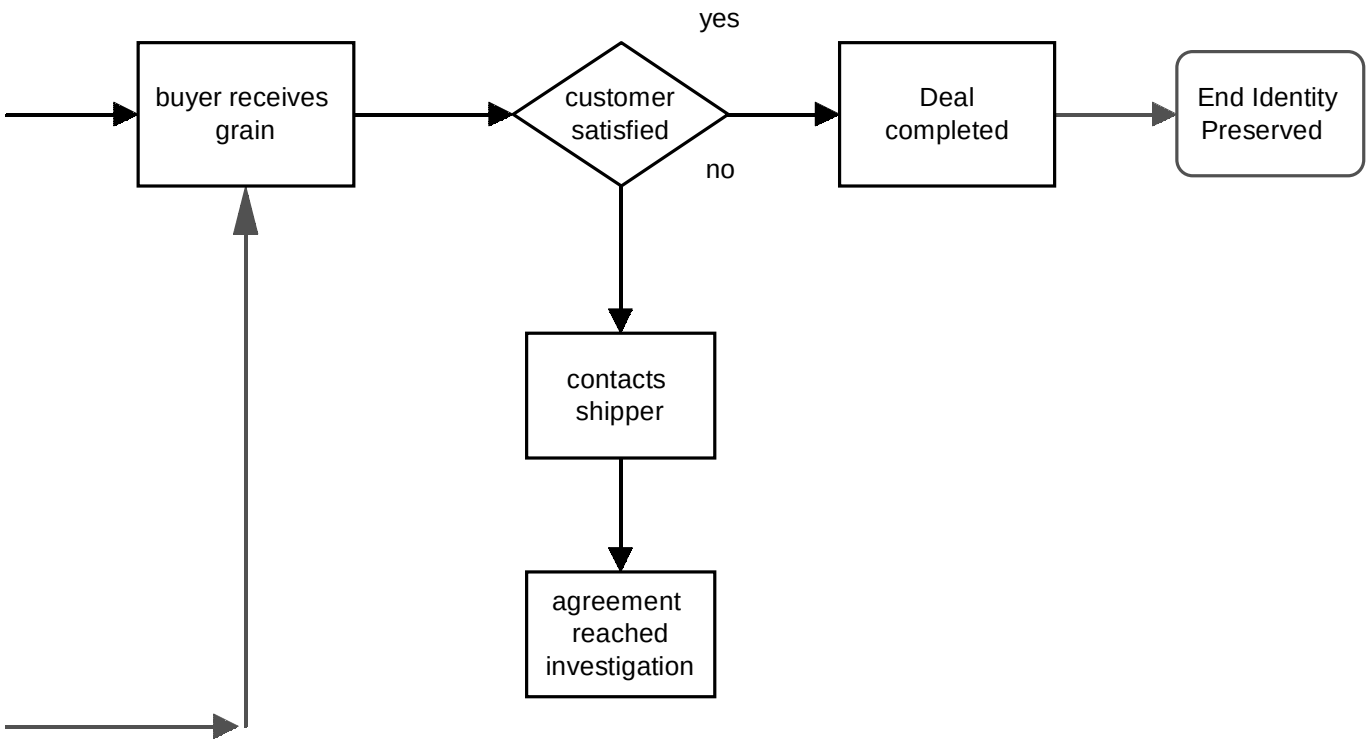

sample grain
yes
no
producer or elevator manager takes sample
elevator manager retains sample
primary elevator stores grain identity preserved
no sample taken
no recourse for investigation


primary elevator loads railcar I 90 tag on car
railway ensures grain is allocated to destination in timely manner
direct hit
no
yes
inspection required
yes
weighing required
yes


railcar unloads at terminal
representative sample taken CGC
samples monitored/ tested
grain stored in terminal identity preserved
vessel arrives at dock
primary terminal liability
sample retained until grain shipped
non visual testing as needed


type of contract
class
CGC samples/weighs grain loaded onto vessel
CGC analyses grain loaded onto vessel
variety
terminal flexibility
no terminal flexibility


yes
grain meets contract specs
Transfer elevator
No
grain unloaded into transfer elevator
grain stored identity preserved
Grain loaded onto ocean vessel
terminal/transfer elevators liability


yes
buyer receives grain
customer satisfied
Deal completed
End Identity Preserved
no
contacts shipper
agreement reached investigation

Appendix 4: Summary of Liabilities or Responsibilities

Location of Grain	Pedigreed Seed Supplier	Producer	Primary Elevator	Railway	Terminal Elevator	Transfer Elevator	CGC	Contractor
Initial seed – Must insure pedigreed seed supplied meets the IP contract requirements	◆							
On farm – Producer signs a declaration attesting to correct IP procedures.		◆						
Delivery to Primary elevator – Upon delivery, the producer signs a declaration. Legal sign off is the affadavit/declaration – the primary elevator manager is responsible for ensuring that the document is in order.		◆	◆					
Primary elevator – Must document where grain is binned, etc.			◆					
Shipping/railcar – Primary elevator must fill out the I-90 documentation correctly (can serve as a legal sign off). Railway must deliver it to appropriate terminal with attached tag.			◆	◆				
Unloading at terminal elevator – Terminal elevator must not receive car if I-90 is not in order.					◆			
Terminal Elevator – CGC must retain unloading samples for a defined period of time. Terminal elevator must bin grain appropriately or ship it out on vessel.					◆		◆	
Terminal to Transfer elevator – Transfer elevator must bin and ship grain appropriately.					◆	◆		
Market – Responsible for finding alternate markets when product fails to make delivery specifications.								◆

1998-99 Crop Year
IDENTITY PRESERVED GRAIN DELIVERY DECLARATION - FARMER

PLEASE PRINT

Farmer's Name		Farmer I.D. No.
Address		Telephone No.
		File No. (office use only)
Station Name	Company Name	Telephone No.
Company/ Delivery Point Code	Train Run	Bin No.

Please complete the appropriate section(s).

Proof of Certified Seed

ATTACHED as proof of purchase is the BULK PEDIGREED SEED statement or (if not Bulk), the INVOICE and Certified Tag or VENDOR Declaration: _____
Name and Address or Seed Vendor (PLEASE PRINT)

I declare that the above Farmer purchased _____ tonnes, kg. or bu. (circle one) of Canada Certified No. _____
seed that was tagged / invoiced as: _____ _____
Crop Certificate No. Lot No.

_____ _____
Seed Vendor's Signature Date

Proof of Eligible Farm-Saved Seed

Farmer Declaration: I declare that:
a) I produced the Eligible Farm-Saved seed that was planted to produce this Identity Preserved crop;
b) this Eligible Farm-Saved seed did not become mixed with any other variety while in my possession;
c) this seed was produced from the Certified seed declared above; and
d) this Eligible Farm-Saved seed was either (circle one): cleaned by myself, or cleaned by

_____
Name and Address of Registered Seed Establishment (PLEASE PRINT)

_____ _____
Farmer's Signature Date

This Section for Audit or Optional Use Only
LAB DECLARATION: If genetic purity can be otherwise verified by a lab.

_____ confirms that the variety of the sample, identified as:
Name & Address of Variety Verification Lab

_____ submitted by _____
Sample No. Name & Address of Approved Sampler (PLEASE PRINT)

is the variety _____ .

_____ _____
Lab Technician's Name & Signature Date

Contract Code	Grain and Grade
Gross Accountable Tonnes	Net Tonnes

Farmer Declaration: I declare that all of the above information is correct and that:
1. I am delivering _____tonnes, kg. or bu. (circle one) of _____, progeny of the Certified seed (declared above) and have harvested and stored this Identity Preserved grain separately from any other production; and
2. this Identity Preserved grain has not become mixed with any other variety while in my possession.

_____ _____
Farmer's Signature Date

_____ _____ _____
Elevator Manager's Signature Elevator Manager (PLEASE PRINT) Date