2. Authorities and Principles of Control

2.1 Statutory Authority

Statutory authority for control of FMD is contained in the *Health of Animals Act* 1990.

2.2 Policy Statement

An outbreak of FMD would result in an immediate cessation of trade. The Minister of Agriculture and Agri-Food Canada would make a policy decision to adopt this eradication strategy to eliminate FMD as swiftly as possible to limit the economic impact. Canada's primary strategy for FMD is stamping-out, including pre-emptive slaughter pursuant to *Section 48* of the *Health of Animals Act*. Emergency vaccination *may* be used under certain geographic situations and management practices as an adjunct to stamping-out and pre-emptive slaughter to temporarily control the production and spread of the virus until stamping-out is capable of eliminating the presence of FMD virus. Legal restrictions by Canadian court actions preventing the immediate carrying out the policy to depopulate infected and exposed herds could also lead to emergency vaccination (Paragraph 4.7 of this document). Regionalization/zoning considerations are critical to the decision on the use of vaccination due to trade ramifications.

For an effective eradication, the overall purpose is to swiftly identify all exposed premises, to destroy all infected or potentially infected animals and materials, to decontaminate the environment and vehicles to avoid further spread and regain FMD country freedom-without vaccination status without delay.

2.3 Principles of Control and Eradication

The basic principles used in eradicating exotic diseases are:

- prevent contact between susceptible animals and the disease agent
- stop production of disease agent by the infected animals
- increase the resistance of susceptible animals

Elaboration of these principles into procedures for control and eradication in terms of FMD are listed below, and are discussed in the following sections:

- eradicate the sources of infection by slaughtering infected and exposed animals on positive FMD infected places and by disposing of carcasses preferably by burial or burning (stamping out)
- stop the spread of infection by issuing suspect infected place declarations (quarantines) for premises within five km of positive FMD infected places and traced premises; (Article 22 of the Health of Animals Act)
- eliminate the virus by decontamination of premises, vehicles, equipment and materials, or disposal of contaminated materials
- impose strict movement control in the infected zone surrounding the positive FMD infected places

- take measures involving pre-emptive slaughter of high-risk animals (known exposure) prior to clinical expression of the disease
- investigate all movements of susceptible animals and potential contaminated fomites onto or off positive FMD infected places (tracing) since the estimated introduction of FMD—generally a period of 14 days before the estimated onset of the oldest lesion—based upon the case history
- surveillance of all suspect infected premises by clinical, virological, genetic or serological evaluation
- establish immunity by emergency vaccination if necessary as an interim measure
- define disease free zones by zoning/regionalization to permit international negotiation for the continuance of trade. The EU considers that regionalization should be based on at least the administrative units. In Canada, the zones will be defined on the basis of the *Health of Animals Act*.

2.3.1 Stamping Out

Clinically affected animals on positive FMD infected places will have slaughter priority to eliminate virus multiplication. All known exposed susceptible livestock will also be ordered destroyed. Positive animals are targeted to be euthanized within 24 hours and other exposed susceptible animals within 48 hours. In most circumstances unexposed susceptible animals on a positive FMD infected place will be slaughtered.

2.3.2 Quarantine and Movement Controls

FMD is highly contagious and spread can only be prevented by rapid slaughter of affected animals and strict movement control measures. All epidemiologically linked premises must be quarantined as suspect FMD infected premises and subject to strict movement controls. A CONTROL AREA will be declared to enforce movement control, to establish infected zones as well as define Disease Free zones within Canada.

2.3.3 Pre-emptive Slaughter

Pre-emptive slaughter is defined by the OIE as the killing—under the competent authority—of susceptible animal species in herds on premises, which have been exposed to infection by direct animal-to-animal contact, or by indirect contact of a kind likely to cause the transmission of FMD virus. Section 48 of the Act permits ordering the disposal of animals or things known to be infected or suspected of being infected; contacts to animals or things known to be infected or suspected of being infected or known to be a vector or suspected of being a vector with/of a disease. The EU protocol has expanded the concept of pre-emptive eradication to include high density of animals of susceptible species, intensive movement of animals and/or persons in contact with animals of susceptible species, delays in suspect status notification or insufficient information on the possible origin and transmission of the virus.

2.3.4 Tracing and Surveillance

Tracing investigations include those epidemiologically linked to the positive FMD infected place. Movement of animals *from* the positive FMD infected place (trace out) since the estimated introduction of FMD as well as movement of animals *into* the infected place (trace-in) for a critical period before the estimated first case must be investigated. This is a critical period and is generally 14 days for cattle and pigs (OIE Code) and 21 days for sheep and goats (EU Directive

2003/85) before the oldest lesion, based on the case history. Priority must be given to animal movements, although the possibility of contaminated fomites such as transport vehicles and human traffic must also be investigated.

Immediate surveillance is required to determine the extent of the outbreak so that an appropriate CONTROL AREA can be defined. Prior to the declaration of a Control Area with its area movement restrictions, all premises within 5 km of an infected place may be individually quarantined under Section 23 of the Act. After the establishment of the Control Area, all premises within a 3-km radius of an outbreak must be individually identified, inventoried and placed in quarantine.

2.3.5 Vaccination

Emergency vaccination for FMD is discussed at length in Section 4.7. Emergency vaccination includes both suppressive and protective vaccination. Canada may employ selective FMD vaccination of susceptible species in the face of an outbreak in designated Vaccination Zones as a temporary measure. All FMD vaccinates will be permanently identified and subject to movement restrictions until a decision on their fate is made. The long-term objective of the CFIA is to vaccinate to live and work with international organizations toward developing tests and procedures to reach that goal. International acceptance of a discriminatory test for FMD vaccination so that there is no trade distinction between FMD country freedom without vaccination and FMD country freedom with vaccination will allow vaccinates to fulfil their productive lives.

Blanket vaccination, as practised in FMD-endemic countries, would only be considered in consultation with industry in the unlikely event that stamping out/pre-emptive slaughter, movement controls, and emergency vaccination were insufficient to control the outbreak of FMD. Conditions of blanket vaccination are not described in the current strategy as the economic consequences preclude serious consideration.

2.3.6 Treatment of Animal Products and By-products

FMD may survive in fresh meat or meat products. Restrictions for fresh bovine meat are outlined in the OIE *Animal Health Code.* The Code allows for deboning bovine carcasses with the removal of major lymphatic glands and maturation above 2^{o}C for a minimum period of 24 hours following slaughter, providing the pH value falls below 6.0. Such treatment would only be considered within the VACCINATION ZONE following termination of the outbreak. Treatment of animal products and by-products in the INFECTED ZONE would follow OIE standards for the destruction of FMD virus outlined in Appendix 3.

2.3.7 Decontamination

The persistence of FMD in the environment must be considered. Confirmed FMD infected places as well as vehicles and equipment must be thoroughly cleaned and disinfected. Organic matter may prevent the action of disinfectants so cleaning before disinfection is critical. If disinfection cannot be achieved effectively and quickly, then contaminated materials, equipment and buildings should be destroyed. Animal fluids and excreta should be treated to eliminate infectious virus or buried, incinerated or composted. Disinfectants should be selected specifically for the purpose at hand (see Appendix 2).

2.3.8 Wildlife and Vector Control

FMD was reported in deer depopulated in California in the 1920s. Experimental studies on Plum Island in the 1970s confirmed susceptibility of white tailed deer to FMD through contact. Red, fallow and roe deer are experimentally susceptible and exhibit lesions similar to sheep.

Persistence of the virus beyond 14 days was uncommon in red or roe deer but isolated from experimentally infected fallow deer at 63 days. In the 2001 UK outbreak, no positive deer were detected in over 50 samples submitted from farmed as well as wild deer. It was concluded that deer do not generate significant aerosol infection and offer a low risk to other species.

Vector control is targeted at eliminating the limited potential for mechanical transmission by rodents or insects and is discussed in further detail below. The potential of infection of wildlife that may behave as a host vector for livestock is discussed in Section 3.6.

2.3.9 Zoning/Regionalization

International acceptance for the principle of zoning for FMD was first achieved by the OIE in 1992, then by GATT/WTO in 1993. The *Terrestrial Animal Health Code* outlines the requirements for establishing "free" and "infected" zones (see Glossary). FMD-free zones of Canada will be defined following a thorough epidemiological assessment of the origin and spread of FMD virus and establishing the extent of the outbreak within the legislated Control Area. After the containment of the FMD outbreak, the parts of Canada not included in the declared Control Areas may be considered disease free. Surveillance to establish disease-free status and negotiation for recognition of such with international trading partners should be undertaken as soon as possible and according to Appendix 3.8.7 of the *Terrestrial Animal Health Code 2005*.

Provision of documentation to support the validity of the established OIE infected zone (equivalent to CFIA Control Area) and OIE free zones will be critical to subsequent international negotiation, as outlined in FAD-MOP C.5. The use of geopolitical boundaries such as provinces may provide the most acceptable zones initially from an international perspective. Trade and movement of animals, animal products and goods, and means of transport as potential carriers must be strictly controlled. International acceptance of zoning is crucial in the decision to apply emergency vaccination.

2.4 Case Definition

For the purpose of immediate field action: **(Presumptive diagnosis)**

Subsequent to the *index case*, diagnosed as described under Paragraph 1.6.4 (Laboratory Diagnosis), the presence of clinical signs of a vesicular disease and either epidemiological link to a confirmed or suspected case or suspicion of previous contact with FMD virus will be used as the case definition in the control area to initiate eradication measures. Collection of specimens is important for the detection of viral antigen by DAS-ELISA, virus isolation or nucleic acid determination by the NC-FAD laboratory in Winnipeg in view of subsequent epidemiological investigations (see Appendix 5). Field action will not be dependent upon receiving laboratory results.

For the purpose of official confirmation: (Confirmed diagnosis)

To be considered positive for FMD, a case must meet at least two of the following criteria:

(1) FMD virus has been isolated from an animal, any product derived from that animal, or its environment

(2) clinical signs consistent with FMD were recognized in an animal of a susceptible species or viral RNA specific to the sero-type in question has been detected and identified in samples from the animals or animals of the same epidemiological group

(3) clinical signs consistent with FMD were observed in an animal of susceptible species and the animal or its cohort was positive for antibodies to FMD virus structural or non structural proteins, provided that previous vaccination, residual maternal antibodies or non specific reactions can be excluded as possible cause of seropositivity

(4) viral antigen or viral RNA specific to the sero-type of FMD virus in question has been detected and identified in samples collected from animals of susceptible species and the animals are positive for antibodies to FMD virus structural or non-structural proteins, provided that in the case of antibodies to structural proteins, previous vaccination, residual maternal antibodies or non-specific reactions can be excluded as possible causes of seropositivity

(5) an epidemiological link has been established to a confirmed FMD outbreak and at least one of the following conditions apply: (a) one or more animals are positive for antibodies to FMD virus structural or non-structural proteins, provided that previous vaccination, residual maternal antibodies or non-specific reactions can be excluded as possible cause of seropositivity; (b) viral antigen or viral RNA specific to the serotype involved in the outbreak has been detected and identified in samples collected from one or more animals of susceptible species; (c) serological evidence of active infection with FMD by detection of seroconversion from negative to positive for antibodies to FMD virus structural or non-structural proteins has been established in one or more animals of susceptible species, and previous vaccination, residual maternal antibodies or non-specific reactions can be excluded as possible causes of seropositivity. Where a previous seronegative status cannot be obtained, this detection of seroconversion is to be carried out in paired samples collected from the same animals on two occasions at least five days apart, in the case of structural proteins, and at least 21 days apart, in the case of non-structural proteins; (d) clinical signs consistent with FMD were observed in an animal of susceptible species.

Use of kinetic (real time) PCR will be incorporated to control the outbreak as it will become validated. Such tests are currently supplemental to clinical and epidemiological assessment.

The confirmation of a new case outside the Control Area will require the use of the DAS-ELISA or virus isolation or PCR, but eradication procedures may be initiated if quarantine is deemed insufficient to control spread. The Director of Field Operation Centre will make this decision. Such confirmatory testing is essential prior to modifying the disease control zones or extension of the control area.

2.5 Emergency Organization

When a high-risk FMD specimen is submitted for confirmation of diagnosis, the Area and National Emergency Response Teams are alerted. Once the diagnosis is confirmed, control and eradication procedures are initiated, as described in the FAD-MOP and in this FMD strategy. The protocol for decision-making and notification is provided in FAD-MOP C.4.

A control area is defined in the Ministerial declaration with provisions for the establishment of zones to facilitate control and eradication operations (FAD-MOP C.5). A control area may be declared prior to the confirmation of FMD in a high-risk situation under extraordinary circumstances.

A Field Operation Centre is set up at the discretion of the Area Field Operations Director to deal with the field activities. Satellite control centres will be established as necessary. An emergency operations centre (EOC) is established at the Area office and at Headquarters in Ottawa. The centres will support the field activities in terms of disease policy, legal aspects, communications,

consultations with industry, international relations, inter-regional liaison, etc. as described in Part A, Section 2 and 3 of the FAD-MOP.