

## FOOT-AND-MOUTH DISEASE IN JAPAN

### **Introduction:**

In March 2000, Japan notified the United States and the Office International des Epizooties (OIE) of the diagnosis of foot-and-mouth disease (FMD) on a farm in the Prefecture of Miyazaki. Prior to this, Japan had not reported a case of FMD since the early 1900s, and the U.S. Department of Agriculture, Animal and Plant Health Inspection Service (APHIS) recognized Japan as free of the disease. Because of the change in Japan's animal health status, APHIS published an interim rule in the *Federal Register* in April 2000 [1] removing Japan from the list of regions recognized as free of FMD. As a result, all FMD-susceptible animals and most products derived from susceptible animals were prohibited importation into the United States from Japan.

In October 2000, Japan submitted a request and supporting documentation [2] for APHIS to again recognize the country as free of FMD. After reviewing the information submitted, APHIS conducted a site visit during which additional data were gathered [3]. In evaluating Japan's FMD status, APHIS considered the following factors in accordance with established regulatory procedures (Title 9, Code of Federal Regulations, Part 92):

- Authority, organization, and infrastructure of the veterinary services in the region
- Disease surveillance in the region
- Diagnostic laboratory capabilities
- Disease status of the region
- Active disease control program, if any, if the agent is known to exist in the region
- Vaccination status of the region
- Disease status of adjacent regions
- Separation of the region from regions of higher risk through physical or other barriers
- Control of movements of animals and animal products from regions of higher risk
- Livestock demographics and marketing practices in the region
- Emergency response capability

A summary of the data relating to each of these factors is presented below.

### **Description of the Disease**

FMD is a highly contagious disease affecting multiple species of animals [4]. FMD causes significant economic losses and is one of the most important sanitary barriers to the international trade of animals and animal products. Susceptible animals include cattle, sheep, goats, swine, domestic buffaloes, and all wild ruminants and suidae. Camelidae (camels, dromedaries, llamas, vicunas) have a low susceptibility. The

## FOOT-AND-MOUTH DISEASE IN JAPAN

mortality rate is generally low in adult animals, but FMD virus often causes high mortality in young animals due to myocarditis. FMD is endemic in parts of Asia, Africa, the Middle East and South America.

The causative agent of FMD is a virus of the family Picornaviridae, genus *Aphthovirus*. There are seven immunologically distinct serotypes of FMD virus: A, O, C, SAT1, SAT2, SAT3, and Asia1. Transmission is by direct or indirect contact. Vectors, both animate (e.g., humans) and inanimate (e.g., vehicles, implements), play a role in the transmission of FMD virus, and airborne spread of the virus can occur, especially in temperate zones.

Sources of the virus include incubating and clinically affected animals. The virus can be recovered from breath, saliva, feces, urine, milk, and semen (up to 4 days before clinical signs). Meat and animal by-products in which the pH has not fallen below 6.0 are also a source of FMD virus. A carrier state may occur in convalescent animals and exposed vaccinates, particularly among cattle and water buffalo. The virus persists in the oropharynx for up to 30 months in cattle or longer in buffalo, and up to 9 months in sheep. African Cape buffalo are the major maintenance host of SAT serotypes.

The incubation period of FMD is 2-14 days. In cattle, the initial clinical signs include pyrexia, anorexia, shivering, and a reduction in milk production. This is followed by the formation of vesicles (aphthae) on the buccal and nasal mucous membranes and/or between the claws and on the coronary band. Vesicles can also occur on the mammary glands. Smacking of the lips, grinding of the teeth, profuse drooling, lameness, and stamping or kicking of the feet are commonly associated with vesicle formation. After about 24 hours, the vesicles rupture leaving erosions of the affected membranes. Recovery generally occurs within 8-15 days, but complications include tongue erosions; secondary infection of lesions; hoof deformation; mastitis and permanent impairment of milk production; myocarditis; abortion; death of young animals; permanent loss of weight; and loss of heat control.

Lesions are less pronounced in sheep and goats. Vesicles are common on the dental pad of sheep, but foot lesions may go unrecognized. Agalactia in milking sheep and goats is a feature, and FMD causes death of young animals. Pigs may develop vesicles on the snout and interdigital spaces. Severe foot lesions may occur when pigs are housed on concrete. High mortality in piglets a frequent occurrence.

### **The authority, organization, and infrastructure of the veterinary services organization in the region.**

The veterinary services of Japan are organized at the national and regional (Prefectural) levels [2]. The Prefectural governments, under the direction and oversight the Ministry of Agriculture, Forestry, and Fisheries (MAFF), are responsible for carrying out disease control activities. Each Prefecture has from one to 14 Livestock Hygiene Service Centers, with a total of 187 Centers nationwide. There are 2,127 veterinarians allocated

to these Centers. In addition, the Prefectural governments employ a number of other veterinarians who are located outside the Centers. Some private veterinarians are also appointed as official veterinary inspectors. In total, there are 5,820 veterinary inspectors nationwide to implement the disease control measures set forth in legislative or administrative documents, e.g., the Domestic Animal Infectious Diseases Control Law and the Malignant Exotic Animal Diseases Control Guidelines.

Diagnosis of domestic diseases is carried out by the Livestock Hygiene Service Centers, while the National Institute of Animal Health, MAFF, conducts diagnostic procedures for FMD and other exotic diseases.

Outside the official veterinary force, farmers and livestock organizations assist in disease control programs through National and Prefectural "Voluntary Defense Associations." These Associations receive advice and guidance from MAFF and the Livestock Hygiene Service Centers. During the FMD eradication campaign, the Voluntary Defense Associations provided farmers with disinfectant, conducted an educational program to increase awareness of the clinical signs of FMD, and promoted the early notification of suspect cases of FMD.

### **The type and extent of disease surveillance in the region.**

Prior to the March 2000 outbreak and following some nine decades of FMD freedom, surveillance for FMD in Japan was passive. Any suspected vesicular condition was investigated as possible FMD. On March 21, 2000, a private veterinarian reported suspicious mouth lesions to the Miyazaki Livestock Hygiene Service Center, and diagnostic materials were subsequently sent to the National Institute of Animal Health where FMD was confirmed. The affected farm was depopulated, movement controls were established, and serological testing was initiated within the movement control area and a surveillance area of 20-50 km radius around the outbreak farm. Surveillance was also conducted on farms that recently introduced animals from premises in the movement control and surveillance areas. In addition, because the source of the infection was suspected to be imported wheat straw, all farms in Japan that were using imported forages as feedstuff were subjected to serological surveillance. In total, serological surveillance was conducted on 27,890 farms (47,177 animals) following the first outbreak in Miyazaki. Two additional farms in Miyazaki Prefecture were found to have FMD-positive animals as a result of this surveillance. These farms were depopulated.

An outbreak also occurred in a feedlot in Hokkaido Prefecture. The animals were slaughtered, movement controls were established, and serological surveillance was conducted on farms in the movement control and surveillance areas and on farms that had shipped animals to the feedlot. In total, 224 farms (5,717 animals) were subjected to serological surveillance in Hokkaido Prefecture. No additional cases of FMD were found.

**Diagnostic laboratory capability.**

FMD diagnosis is carried out by MAFF in its National Institute of Animal Health. This laboratory is responsible for animal disease research and the diagnosis of exotic animal diseases. The Institute's main (research) laboratory is located in Tsukuba-city, Ibaraki Prefecture, while the diagnostic component, the Department of Exotic Diseases, is located in Tokyo.

The laboratory uses internationally recognized procedures for the diagnosis of FMD [5]. The primary test used for detecting antibodies to FMD virus is the ELISA. Antigen detection is accomplished by ELISA and/or PCR testing.

**Disease status - is the disease agent known to exist in the region?**

The last infected premises were depopulated on May 15, 2000, and FMD virus is not known to currently exist in Japan. According to international standards [6], when FMD occurs in an FMD free country where vaccination is not practised, the country may regain the disease free status 3 months after the last case, where stamping-out and serological surveillance are applied.

**The extent of an active disease control program, if any, if the agent is known to exist in the region.**

Japan took swift and decisive action to control and eradicate the recent incursion of FMD. The four affected premises were depopulated and extensive surveillance was conducted to determine if further spread had occurred. Epidemiological investigations determined that the source of the infection for the initial outbreak in Miyazaki Prefecture was most likely wheat straw imported from China. Two nearby farms were found to have FMD during subsequent surveillance activities. The source of the forth outbreak, which occurred in Hokkaido Prefecture, has not been determined conclusively, but the most likely source is considered to be either rice straw from Taiwan or sugar cane from Indonesia. Following depopulation of the affected premises, all feed, bedding, manure, and compost were buried, and the facilities and equipment used to handle the animals were disinfected. The major events of the eradication program are summarized below.

	Diagnosis	Depopulation Completed	No. of Animals	Movement Controls Applied
Farm A (Miyazaki)	25 March	26 March	10	25 March-22 April
Farm B (Miyazaki)	3 April	4 April	9	3 April-25 April
Farm C (Miyazaki)	9 April	10 April	16	9 April-2 May
Farm D (Hokkaido)	11 May	15 May	705	11 May-9 June

**The Vaccination Status of the Region.**

Japan does not vaccinate for FMD.

**Disease status of adjacent regions.**

Japan is not immediately adjacent to regions of higher risk, although FMD occurs in many countries of Asia. Because Japan is an island nation, its trading practices (see below) are of greater importance as a risk factor than its adjacency to infected countries.

**The degree to which the region is separated from regions of higher risk through physical or other barriers.**

Japan is an island nation and is therefore physically separated from regions of higher risk.

**The extent to which movement of animals and animal products is controlled from regions of higher risk; and the level of biosecurity regarding such movements.**

The movement of animals and animal products from regions of higher risk is strictly controlled. There are 71 seaports and airports designated for importation of quarantine material. A total of 265 animal quarantine officials are involved in inspection activities. International garbage is incinerated at the seaport or airport of call. Japan allows animals and animal products to be imported from a limited number of countries. With the exception of Uruguay, none of these countries has reported cases of FMD in recent years, and when Uruguay experienced an FMD outbreak in October 2000, Japan suspended imports from that country. Some additional countries are allowed to export meat and meat products to Japan, provided that the meat or meat product has been cooked or otherwise processed according to standards set forth by MAFF.

Since the source of the recent outbreaks was believed to be imported plant material, regulations were imposed in March 2000 that required formalin treatment of straws and forages imported from countries where FMD exists. As a result, use of imported plant material for feeding purposes was effectively halted, since the forages are inpalatable after formalin treatment. In addition, farmers were instructed not to use imported straws and forages for feeding and bedding. An existing protocol allowed importation of Chinese straw and hay that had been heat treated at 80 degrees C for 10 minutes. In December 2000, this requirement was extended to allow importation of straw and forage from other FMD countries provided that the material was heat treated at 80 degrees C for 10 minutes in the country of origin.

## FOOT-AND-MOUTH DISEASE IN JAPAN

### **Livestock demographics and marketing practices in the region.**

The most recent statistics from MAFF on Japan's livestock population are as follows:

	Number of Farms	Number of Animals
Dairy cattle	33,600	1,765,000
Beef cattle	116,500	2,823,000
Pigs	11,700	9,805,000
Sheep and goats	6,290	44,800

Most production units in Japan are relatively small, and there is no known feature of livestock production (e.g., extreme livestock density) or livestock marketing that increases the risk of disease spread.

### **Policies and infrastructure for animal disease control in the region - i.e., emergency response capability.**

FMD is a compulsorily notifiable disease in Japan. The Ministry of Agriculture, Forestry and Fisheries and the Prefectural governments have the authority, diagnostic capability, and resources to rapidly detect, contain, and eradicate an incursion of FMD. This was amply demonstrated during the recent outbreak of FMD, which was eradicated in May 2000.

### **Conclusions:**

Based on a qualitative assessment of the risk related to FMD in Japan, APHIS has concluded that 1) FMD is not known to exist in Japan; 2) Japan does not vaccinate for FMD; 3) Japan maintains a surveillance system capable of detecting FMD should the disease be introduced; 4) Japan maintains strict control over the importation of animals and animal products from regions of higher risk; and 5) Japan has the laws, policies, and infrastructure to detect, respond to, and eliminate any occurrence of FMD.

## FOOT-AND-MOUTH DISEASE IN JAPAN

### **References:**

1. Change in Disease Status of Japan Because of Rinderpest and Foot and Mouth Disease. Federal Register (65 FR 20712-20713, Docket No. 00-031-1), April 18, 2000.
2. Final Report on the Eradication of Foot and Mouth Disease in Japan. Available at: <http://www.aphis.usda.gov/vs/reg-request.html>.
3. Japan Site Visit Report, January 2001. Available at: <http://www.aphis.usda.gov/vs/reg-request.html>.
4. Foot-and-Mouth Disease. In: Foreign Animal Diseases. United States Animal Health Association, 1998. P. 213-224.
5. Foot and Mouth Disease. In: Manual of Standards for Diagnostic Tests and Vaccines. Office International des Epizooties, Paris, 1996. P. 47-56.
6. Foot and Mouth Disease. In: International Animal Health Code. Office International des Epizooties, Paris, 1999. P. 63-73.