

los que se hacen cruzar una depresión poco profunda y llena del desinfectante. Las autoridades europeas en zoonosis se muestran muy insistentes en el cumplimiento estricto de los baños desinfectantes para personas y para automóviles.

Para concluir, pueden recomendarse los siguientes requisitos cuarentenarios para impedir la introducción de la glosopeda:

(1) No se permitirá ningún movimiento de ganado bovino, de otros rumiantes y de cerdos entre las zonas infectadas y las indemnes. El tráfico de otros animales será vigilado cuidadosamente.

(2) No se permitirá la importación de productos de origen animal procedentes de zonas infectadas. Si es necesario importar tales productos para impedir privaciones, deben ser tratados al calor o con productos químicos antes de exportarlos.

(3) Prohíbese la entrada de desechos de procedencia animal, y si es necesario hacer excepciones, debe disponerse que sean quemados en el punto de entrada.

(4) No se permitirá la entrada de productos de fibras vegetales.

(5) Vigílese cuidadosamente el tráfico humano. La limpieza absoluta de la ropa, el calzado y otros artículos personales es esencial. Hay que estar a la mira de casos humanos aunque la enfermedad sea rarísima en el hombre.

FOOT AND MOUTH DISEASE (APHTHOUS FEVER)

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Foot and mouth disease is a highly contagious infection of cattle, other ruminants and swine. Human infections occasionally occur especially in children. The disease is caused by a filterable virus. In cattle the malady is characterized by increased temperature, stomatitis, udder and interdigital lesions. Control methods are of two types: (1) slaughter of all affected and exposed animals, and (2) local quarantine with or without the use of convalescent serum or vaccine. Successful control depends on effective quarantine procedures for animals, and products of animal origin as well as careful scrutiny of human travellers.

Foot and mouth disease has been recognized as a serious contagious disease of animals since the middle of the 18th century. The first report of the disease in the western hemisphere occurred in the United States in 1850. Since then there have been 10 outbreaks in the United States. Canada has had similar outbreaks during that period. The disease first appeared in South America in the 19th century and has remained enzootic. The southern countries were the original foci of infection which has spread northward to invade at sometime all the countries south of Panama. Foot and mouth disease has never before been reported in Central America and Mexico.

The disease affects mainly cattle and swine. Sheep, deer and other ruminants are sometimes infected. Carnivorous animals are usually very resistant, but a few cases have been reported in dogs. No doubt where infection has been present for many years other animals may be accidentally infected. An important characteristic early symptom in all infected animals is lameness due to the inflammation and the occurrence of vesicles between the digits and beneath the coronary band. Vesicles occur mainly on the mucous membrane of the mouth, tongue, lips, the skin of the muzzle, or snout, the abomasum and the intestines. The mortality from foot and mouth disease is not high except in very young animals or when the mouth lesions are so painful as to interfere with feeding. The loss of milk production and loss of weight are the most serious consequences of a foot and mouth disease epizootic.

There are three known types of virus: Type A, the A standing for Allemand the French word for Germany; Type O, the O stands for Oise, a region of northeastern France; and Type C which was described in Germany while the former were first described in France. A number of other viruses have been reported which fall in between the accepted types. Cattle, swine, and guinea pigs can be infected with all three of these viruses in quick succession since one does not protect against another. There is no cross protection between the different types of foot and mouth disease virus. This lack of cross immunity is an important fact to be remembered by government authorities who are responsible for quarantine and disease control.

The infection in man is rare and occurs only sporadically, but man, next to infected animals, is the most important factor in the spread of the disease. It is generally thought that man carries the virus by mechanical means; that is, he carries the virus on his clothing, shoes, other belongings, and person. There are some medical authorities who have advanced the theory that man can act as a true carrier of the disease, by latent infections of the mucous membranes of the mouth, nose, throat and alimentary canal. Most authorities are not in accord with this theory and believe that man's most important epidemiological role is as a mechanical carrier of the virus.

Human symptomatology is as follows: fever, vomiting, painful swallowing, inflammation of the mouth, followed by an eruption of vesicles on the mouth, lips, and tongue. Interdigital vesicles may also occur on the hands. Headache, vertigo, back pain, gastroenteritis, and diarrhea accompany some cases. There are no authentic reports of fatal human cases.

The infection of man has been reported from many parts of the world but there are only records of three human cases which were confirmed by animal inoculation. Direct inoculation through the broken skin is also possible and has been reported by laboratory authorities. The first human infections attributed to the use of infected milk were reported in 1870 in the United States. Other milk borne infections were reported in 1902, 1908, and 1914 in the United States. Similar observations have been made in Peru and Argentina. Children appear to be much more susceptible to the disease than adults and therefore when they ingest infected milk, they are much more likely to become infected. Pasteurization or souring of the milk inactivates the virus.

The control of foot and mouth disease in the United States has been achieved by the drastic slaughter method. All infected and exposed animals are slaughtered and disposed of by burning or burial with lime. A rigid quarantine is maintained around infected premises. No people except those who are responsible for the control of the disease are allowed to go and come from the infected areas. The area of active infection is surrounded with a chicken-wire fence which prevents dogs, cats, chickens and other domestic and wild animals from wandering on and

off infected premises, thereby spreading the virus. The shoes and clothing of individuals whose duties require them to traverse the infected area are disinfected with sodium hydroxide. The quarantine of this area is not lifted until 80-90 days after all evidence of the disease has disappeared, the premises have been thoroughly cleaned, and the establishment has been found free of disease by animal test, such as bringing in susceptible young animals which are permitted to roam freely about. After animals have been exposed for four to five weeks and have developed no signs of infection, the farm may be released from quarantine.

The most important preventive measure is to prevent the disease from entering a country, or a group of countries, or a continent, or even a hemisphere. Such efforts require clear rational planning and international cooperation. The Pan-American Sanitary Bureau is an agency which can implement and expedite such agreement in the western hemisphere. A rational foreign quarantine system must give consideration to the following essential points:

- (1) animal traffic
- (2) trade of products of animal origin
- (3) waste products of animal origin
- (4) vegetable fiber products from areas where animal infection exists
- (5) human traffic

Animal traffic of cattle, other ruminants, and swine must be stopped at once to prevent introduction of hoof and mouth disease from infected areas to areas free of the disease. Other animals which come from infected countries must be scrutinized very closely. Animals that have been on infected premises should be in quarantine for 15-30 days. Horses, other equidae, dogs and cats are usually the type of animals that may be mechanical carriers although they, themselves, are resistant to foot and mouth disease. Before release from quarantine the animals should be thoroughly bathed or groomed and carefully inspected. In horses and equidae the coronary band area above the hooves should be carefully cleaned and examined. For dogs and cats suspected of being mechanical carriers a thorough grooming is satisfactory. Occasionally pet animals do have foot and mouth disease but the veterinary examination will determine that possibility.

Products of animal origin such as meat, meat products, hides, bone and blood meal, hoof and horn products, fat and grease, hides, etc., are possible mechanical transmitting agents and for that reason they must not be imported from areas where foot and mouth disease exists to areas free of the disease. Trade between areas where foot and mouth disease is known to exist is a different problem and must be handled with due consideration for the economic needs of the respective countries. Products of animal origin that are known to have originated in infected areas should always be suspected of harboring infectious virus material.

Waste products of animal origin consist chiefly of various types of garbage such as that found on ships, and common carriers. Animal manure is also so classified. Garbage from ships should not be allowed to put ashore or dumped in tide waters. The outbreaks in the United States in 1929 and 1932 were suspected of having arisen from infected garbage from ships. The garbage that may be moved from one country to another by trains, buses and planes is a dangerous source of infection. Garbage under such conditions should be placed in containers that will be burned as soon as the carrier reaches its destination. An oil treated paper container is excellent for holding small amounts of garbage. Where large amounts of garbage are involved, it is better to dispose of it before it leaves the country of origin. Any animal food products such as meat, milk, and related products should be disposed of as soon as entry is made into the disease free country where it can be replaced. The movement of manure is never allowed. The virus can survive for an indefinite period in manure.

Vegetable fiber such as straw, hay, and grasses are known to be a favorable environment for the virus to survive in and should be prohibited in movement from infected areas to disease free areas. United States authorities report that the virus can live for as long as one year in straw piles.

Human traffic is the most complex quarantine problem to handle. The most important role of man is the mechanical transmission of the virus. The virus under certain ideal conditions can be very tenacious. International quarantine authorities have stressed the necessity of clean clothing, shoes and belongings. It is not necessary to sterilize such clothing and belongings because routine measures of laundering, dry cleaning, and polishing leather goods will destroy the virus except when large amounts of inorganic material protect it. Dirty clothing, shoes, and leather goods are the most dangerous items that may transmit the virus by mechanical means. Quarantine authorities should be reasonably strict in the regulation of human traffic.

One other measure used for the control of the movement of foot and mouth disease is to provide foot baths for people. The bath is usually made up of a 2% sodium hydroxide solution. To be effective the solution must be constantly changed to keep it free of turbidity which inhibits the chemical action. Such solutions are also used for road baths for trucks and automobiles. The cars drive through a shallow depression filled with the disinfectant. The European animal disease authorities are very insistent on the strict enforcement of foot and automotive disinfecting baths.

In conclusion we can recommend the following quarantine requirements to prevent the entry of foot and mouth disease:

- (1) No movement of cattle, other ruminants and swine between infected and none infected areas. Close supervision of other animal traffic.
- (2) No importation of products of animal origin that originate in disease infected areas. If it is necessary to import products of animal origin to prevent privation, they should be heat treated or chemically treated prior to exportation.
- (3) Entry of waste products of animal origin are prohibited. If it is necessary to make exceptions, provision should be made for them to be burned at the point of entry.
- (4) No vegetable fiber products are allowed entry.
- (5) Human traffic is watched closely. Clean clothing, shoes and belongings are essential. Human illness should be watched even though the disease is very rare in man.

Ingeniería sanitaria.—El Ingeniero Sanitario debe colaborar incesantemente en mantener ciertos servicios públicos, como el abastecimiento de agua potable; disponer la forma adecuada para el desecho de las aguas residuales a fin de que éstas no constituyan estorbos públicos ni puedan contaminar alimentos y bebidas; supervigilar las habitaciones para que reúnan las condiciones necesarias en cuanto a instalaciones higiénicas, ventilación, luz, protección contra las inclemencias del tiempo y contra los insectos dañinos; el control de los mosquitos, las moscas, las ratas y cualesquiera otras alimañas que puedan poner en peligro la salud pública; y mantener la pureza del aire, evitando su contaminación con gases deletéreos, humos nocivos y otros elementos que puedan afectar la salud pública. Finalmente, la ingeniería sanitaria es la ciencia llamada a planear adecuadamente urbanizaciones, parques, y demás sitios públicos dedicados a diversiones convenientes para la higiene mental o para el desarrollo corporal, y también cementerios y otros sitios que deben mantenerse higiénicos.—LUIS F. THOMEN: Primer Instituto de Salud Pública, Ciudad Trujillo, Santo Domingo, 1946.