FOOT-AND-MOUTH DISEASE

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Foot-and-mouth disease, a most dreaded malady of animals, is paying the United States its sixth visit. Outbreaks occurred in 1870, 1880, 1884, 1902, 1908 and the last and most extensive of all during the fall and winter of 1914.

Definition

Foot-and-mouth disease, or aphthous fever as it is technically called, is an acute, highly contagious disease, affecting principally cattle: (hogs, sheep, goats and other cloven footed animals and sometimes man are also affected). It is characterized by fever and accompanied by the eruption of vesicles or blisters on the mucous membrane of the mouth and on the skin between the toes and immediately above the hoofs.

Cause

The cause of foot-and-mouth disease is not known; that is, the germ causing it has never been seen or grown outside the animal body as has that of many other diseases, such as typhoid fever and diphtheria of man and anthrax and blackleg of cattle. We do know it is contagious, for we can see it spread from animal to animal, which fact leads us to think that foot-and-mouth disease is caused by a germ, for all other con-
tagious diseases are caused by germs. This germ is different, however, from many others, in that it is so extremely small that our most powerful microscopes do not magnify sufficiently to make it visible. It will also pass through filters or strainers that are so fine as to strain out all known microorganisms that can be seen with our microscopes. The causative agent is present in the clear fluid contained in the blisters found in the mouth and on the feet of cattle suffering from the disease, as has been proven by injecting some of this fluid under the skin of a susceptible cow. Such a procedure is followed by the prompt appearance of typical foot-and-mouth disease after a period of one to two days. It has also been proven that the urine, manure, saliva and, to a lesser degree, the milk, contain the cause of the disease. The blood contains the causative factor only during the period of fever and not after the blisters have appeared. The germ or virus, as it is termed, is a weak affair as compared with many others. A temperature of 165° F. is sufficient to destroy it. The temperature on the interior of deep manure piles, especially where they have been composted, is sufficient to kill the organism. Antiseptics readily destroy it.

The infection usually gains entrance through the digestive tract, (mouth, stomach, bowels) and skin. The virus of the disease can also be breathed into the lungs, and rubbing saliva of an affected cow into the eyes of a healthy cow will transmit the disease.

**Mode of Transmission**

Foot-and-mouth disease is transmitted from diseased to healthy animals either directly or indirectly:

1. Directly by the secretions and excretions of sick animals, namely, saliva, milk. Intra-uterine infection of calves has been observed, namely, calves from infected mothers may be born with the disease. Besides this, animals that have recovered from the disease can transmit it for some months. Spread of the disease through the air may be possible for very short distances.

2. Indirectly the disease can be spread by any number of means. Anything animate or inanimate that comes in contact with the secretions or excretions from a case of foot-and-mouth disease can transmit the disease. Among the things that may spread the disease indirectly, the following suggest themselves: skim milk from creameries, cattle markets, feeding yards, stock cars, auction sales, watering troughs, hay and other fodder, attendants and other workmen about animals affected, cats, dogs, birds, hides, wool, etc. At times perfectly healthy cattle can carry the disease without themselves being affected or at least showing any signs of disease. Smallpox vaccine has been the cause of two outbreaks in this country (1902 and 1908). Recently it has been shown that hog cholera virus obtained from hogs in the incubation stage of aphtous fever has spread the disease.

Animals that have passed through an attack of the disease possess a greater or lesser immunity from one month to several years, depending upon various uncontrollable factors. No permanent immunity is conferred by one attack.

**Symptoms**

Cattle show symptoms of the disease three to six days following exposure (rarely as long as eleven days), hogs one to two days, sheep one to six days.

There are three sets of symptoms or signs by which the disease can be recog-
FOOT-AND-MOUTH DISEASE.

nized, namely: mouth, foot and udder symptoms. All are or may be present at the same time, but for convenience each will be discussed separately.

1. Mouth symptoms. Three to six days after exposure the animal develops a temperature ranging from 104° to 106°. Diminished appetite and careful chewing due to sensitiveness of gums is noticed. Between feeds the animals stand with the mouth closed and do not chew the cud. The mouth is opened now and then with a characteristic smacking sound. Long, sticky strands of saliva drop from the corners of the mouth. In from two to three days blisters make their appearance upon the gums, tongue and inside of cheeks and lips. These vary in size from that of a pea to a silver dollar or even larger and contain a clear, colorless or yellowish fluid which harbors the germ causing the disease. After one to three days the vesicles burst, the fluid escapes, leaving a raw, painful ulcer. The ulcers heal over in from a few days to two weeks, leaving a scar which finally also disappears.

2. Foot symptoms. Lameness and stiff gait is probably the first thing noticed. The lameness is due to the formation of sensitive blisters between the toes and along the upper edge of the hoof. In cattle the mouth symptoms predominate, while in sheep and hogs the feet alone may be affected.

3. Udder symptoms. The udder shows the formation of blisters, especially on the teats. Pain is caused when the cow is milked. Catarrh of the milk ducts causes a decrease in milk yield from 50 to 75 per cent.

Course

Animals usually recover, the mortality being from one to three per cent. At times, however, in individual out-

breaks the disease runs a much more severe course and losses may run as high as 50 to 70 per cent (malignant foot-and-mouth disease). This is exceptional, for recovery in from two to three weeks is the usual course of events (benign foot-and-mouth disease). In calves the death rate runs considerably higher than in adult cattle. Animals are, however, often left with deformities of feet and other abnormalities, which lessen their value.

Treatment.

As a rule, animals respond to medicinal treatment. The actual death percentage of animals does not begin to represent the loss by this disease. Other losses far exceed the actual loss by death. The fever and difficulty of mastication of food cause rapid and extreme loss in flesh and cessation of milk flow; the udders often become inflamed and ruined by abscess formation; the inflammation of the feet may cause the horn to drop from the toes, producing great lameness and permanent injury, and abortion is frequent in pregnant animals. The late Dr. Salmon, formerly chief of the Bureau of Animal Industry at Washington, D. C., placed the loss at from twenty to thirty per cent of the value of the cattle. The disease also spreads to sheep and hogs, causing proportionately severe losses among these animals. In Europe, where the malady is widespread and always present, there is probably no affection of cattle that is dreaded more by stock owners.

Methods of Combating.

Various methods have been used in combating the disease:

1. Isolation and quarantine. In Europe the disease has been combated by isolation and quarantine, but these meas-
ures have proven inadequate, as shown by its continuous existence and widespread distribution in European countries. It has been stated that cattle can transmit the disease to other cattle for five months after recovery from an attack, so that they must be kept in quarantine for at least five months, or perhaps longer, after they have recovered. From this fact it can be readily seen that the holding of infected animals is a serious problem, inasmuch as they are a constant source of danger to the community because of their possibility of starting fresh outbreaks. The length of such quarantine, which must of necessity be a very rigidly enforced one with constant watching by state and government officials, makes the universal adoption of this method prohibitive for pecuniary reasons.

2. Slaughter of affected animals. With a scourge so contagious that it is frequently and easily carried from farm to farm and in which quarantine measures have proven so inadequate, it becomes important to shorten its period of existence as much as possible. Slaughter of affected animals is the only method that has met with success in its control. This method proved successful in 1902, again in 1908 and in every other outbreak in this country. The remark is often heard that in Europe no such drastic measures are taken and that in this country the measures are entirely out of proportion to the importance of the disease. It is true that European countries have not usually employed such drastic measures because the disease has gained such a foothold, is so widespread, as to make it impossible to enforce such measures (slaughter) without jeopardizing the live stock industry. The United State government realizes that it is far better financially to sacrifice the few cattle that are affected at the beginning of an outbreak (.08 of 1 per cent of total animal population have been slaughtered to date in present outbreak or no more than are killed in two or three days at Chicago packing houses) than to suffer a loss of from 20 to 30 per cent of the value of all animals in the country by allowing the disease to spread.

The Present Outbreak.

The disease was discovered in Niles, Michigan, on October 10, 1914, and had probably existed there for some time prior to its recognition. Its origin has not been determined. From here it spread to the Chicago Stock Yards and thence to various parts of the country, until the disease occupied an area extending from the Atlantic coast on the east to Washington on the west and as far south as Mississippi, twenty states being infected.

An unfortunate state of affairs prevailed at Chicago in that the disease broke out among the cattle at the National Dairy Show which was being held there. Some 800 cattle, including animals from some of the best herds in Wisconsin and other parts of the country and valued at thousands of dollars, were thus exposed to the infection. In spite of all precautions the disease spread from animal to animal. The animals were ordered slaughtered, but because of their extraordinary value, the federal authorities allowed the owners to hold the cattle under strictly enforced quarantine regulations with the idea of saving the valuable breeding stock. It has been proven by placing susceptible cattle, sheep and hogs in the quarantine pens that the members of the original herds are incapable of infecting other animals.

Wisconsin was paid her first visit by the disease in the form of feeding cattle shipped from Chicago. All cases in this
HOG CHOLERA CAN BE CONTROLLED.

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If the swine raising industry is to be put on a firm basis, the most serious of all swine diseases, hog cholera, must be controlled.

The fact that this disease year after year devastates whole counties, and also that it may appear on any farm at any place without warning, lends to the swine raising industry an uncertainty which has driven many farmers and breeders from the field.

Hog cholera serum, if properly applied, will obviate all serious losses from this disease. No other agent can be relied upon.

Temporary Immunity

It has been the custom of many men who vaccinate to do so after the disease has made its appearance in the herd. This is a last resort which will usually save enough hogs to more than pay for the serum and its administration, but it must be understood that the serum is a preventive and not a cure. When the disease makes its appearance in the herd, all non-infected hogs can be saved by the injection of serum. It is at times difficult, however, to tell which hogs are infected, in view of the fact that an animal can harbor the virus for several days without showing any physical symptoms, or even any rise in temperature. A considerable loss, therefore, must be expected from this procedure. The injection of serum alone will render a hog immune for three to six weeks.

Permanent Immunity

If permanent immunity is desired, a small quantity of virus or blood from a cholera-sick pig must be injected. It is evident that the injection of blood from a cholera-sick pig is a dangerous procedure, as this blood is capable of producing acute hog cholera and unless potent serum in sufficient quantity is injected at the same time, disastrous results will follow.

There are two methods of producing a permanent immunity; the injection of serum, followed in five to fourteen days with more serum and virus, or the injection of the virus and serum at the same time. In either case, a small percentage of loss must be expected. However, the preliminary injection of serum builds the animal up, so that the subsequent injection of serum and virus does not produce the shock and sometimes serious losses that are attendant on the latter method.

A Permanently Immune Herd

Whatever method is employed to combat this disease, those animals