

University of Nebraska - Lincoln

DigitalCommons@University of Nebraska - Lincoln

Historical Circulars of the Nebraska Agricultural
Experiment Station

Extension

2-1938

The Prevention of Anthrax

L. Van Es

Follow this and additional works at: <https://digitalcommons.unl.edu/hcnaes>



Part of the [Veterinary Infectious Diseases Commons](#)

This Article is brought to you for free and open access by the Extension at DigitalCommons@University of Nebraska - Lincoln. It has been accepted for inclusion in Historical Circulars of the Nebraska Agricultural Experiment Station by an authorized administrator of DigitalCommons@University of Nebraska - Lincoln.

The Prevention of Anthrax

L. Van Es

Department of Animal Pathology and Hygiene

The University of Nebraska College of Agriculture
Experiment Station, Lincoln
W. W. Burr, Director

The Prevention of Anthrax

L. VAN ES

Anthrax is a communicable disease, caused by a specific germ known as the anthrax bacillus. Cattle, sheep, horses and swine are susceptible to the infection and in variable degree this susceptibility is shared by other animal species, including man.

The Anthrax Germ

The germ which causes anthrax is possessed of a high degree of virulence and a marked capacity for a rapid distribution throughout the animal body after it has once been introduced. Because of this quality, the disease may manifest itself with great suddenness and cause death within a very short period after the appearance of the first signs of sickness.

The anthrax bacillus is a spore former and this property is of the greatest hygienic importance. Anthrax spores are extremely small, round, or oval objects which form within the body of the bacillus whenever the latter is exposed to conditions adverse to its existence and propagation. Spores do not form within the animal body but their formation is particularly favored by contact with the air. Anthrax spores are remarkable for their viability and for practical purposes they may be regarded as immortal. They resist the action of the disinfectants in common use and prolonged drying does them no harm. They are not readily killed by heat. Anthrax spores have retained their viability after a storage of more than 18 years. There is record of a case in which the accidental opening of a pit in which anthrax carcasses were buried 24 years before, was followed by an outbreak of anthrax among cattle which had access to the earth thus exposed. When the anthrax spores are taken into the animal body and there find conditions favorable to germ life, they develop into bacilli and the latter multiply rapidly in the manner by which bacteria propagate themselves.

Mode of Infection

When anthrax germs find their way into the soil, either through the body wastes, the careless disposal of carcasses, the skinning of the same, or post-mortem examinations, they rapidly form spores and the soil thus contaminated is apt to become permanently infective. This accounts for the fact that, in general, anthrax is essentially a soil-borne malady. The permanency of the spores in the soil is likewise accountable for the existence of anthrax areas where the disease is apt to make its appearance from year to year. Nebraska has such a district within its borders and there anthrax constitutes a more or less perennial problem.

Anthrax does not spread by direct transmission from animal to animal. However, animals infected with the anthrax germs may contaminate the soil or such other parts of the environment as drinking water, feed, hay, or pasture plants and thus endanger other livestock in an indirect manner. Animals which were exposed to anthrax infection and then transported to anthrax-free territory may there introduce the disease. Feedstuffs grown on

infected land may also serve as a vehicle in the transmission of anthrax germs. The latter may likewise be transported by water courses and this has been especially observed when an overflow of infection-free pasture land was followed by an outbreak of the disease among cattle occupying such a pasture.

Animals such as swine which are more or less resistant to anthrax and which occasionally become involved in a chronic, non-fatal form of anthrax may also become responsible for introducing the infection to hitherto exempt territory or farms.

In the majority of the cases of anthrax, the infection is introduced while the animals involved are grazing on foliage growing on, and contaminated by, spore-carrying soil. The same may come about by the ingestion of feed-stuffs grown on infected ground. The fact that outbreaks of anthrax are most apt to occur during the latter part of summer and during the first weeks of autumn, when the pasture plants are becoming shorter and the animals graze closer to the soil, supports this general opinion. Although the infection is most commonly introduced by mouth, this may also take place through wounds and abrasions of the skin. In some regions of this country, biting flies were incriminated in the carrying of the infection from animal to animal when an outbreak was in progress.

The very nature of anthrax and that of the factors which influence its causation tend to explain why, in more or less permanent anthrax territory, the owners of livestock should remain aware of the fact that at almost any time they may become confronted with death losses for which the disorder is responsible. During certain years or even a series of years these losses may be light and the cases more or less sporadic in their occurrence. On the other hand, in the course of other years, anthrax may rage as a major epizootic. As yet there is no way by which the incidence of the malady can be predicted. The causes which contribute to this fluctuation are not at all known and may always remain a subject for guesses and speculation.

Within any anthrax area there is always a sound reason to believe that if the disease, within a more or less remote past, has occurred on a given farm, range, or pasture, there ever is a possibility, if not a probability of its reappearance. On account of the real or potential danger associated with anthrax, it is necessary that the available measures of prevention be taken in order to reduce the financial losses which otherwise may have to be sustained.

Such measures, when consistently carried out from year to year, will not only tend to prevent the greater part of the losses but they have been shown to contribute materially to the eradication of the infection in areas in which the malady had caused severe losses for many years.

Measures for Control

Among the measures designed to prevent anthrax the one of greatest importance is the practice of protective vaccination. Vaccination against anthrax has been practiced in various parts of the world since 1881 when

Pasteur demonstrated the effectiveness of the method of which he was the discoverer. Since this discovery Pasteur's method of vaccination and the preparation of the vaccine have been modified in various ways. Some of these modifications constitute an improvement and others failed to establish any superiority over the one designed by Pasteur.

As far as it is possible to determine from reports pertaining to results obtained in the field as well as those concerning comparative tests with various products, it appears that, on the whole, the best results can be credited to the use of the so-called spore vaccines and of anti-anthrax serum.

Spore vaccines consist of suspensions of anthrax spores, the disease-producing qualities of which have been reduced by various methods of attenuation, to such a degree that they may cause anthrax in small laboratory animals but not in cattle, sheep, or horses. Such spore vaccines in the prescribed doses are either injected under the skin (subcutaneously) or into the skin (intradermally) in accordance with the particular type of vaccine used.

Anti-anthrax serum is prepared from the blood of horses or cattle which have been rendered highly immune against anthrax. Injected into animals during the earlier stages of anthrax, the serum will frequently be effective as a cure. It also has marked protective qualities and will cause animals injected with it to acquire immunity immediately. However, this immunity is of but a short duration. Anti-serum is commonly used in combination with spore vaccines when exposed animals are to be protected while an outbreak is in progress.

In combatting anthrax in areas where the disease is apt to assert itself perennially, the best results can reasonably be expected when the animals concerned are vaccinated from four to six weeks prior to their being turned into pasture. Vaccination then yields an immunity in ample time to develop a maximum degree of resistance before the time when the disease, as a rule, begins to appear.

Furthermore, at that time the vaccination can be done with spore vaccine alone, without the latter being combined with the injection of serum. Hence, the cost of vaccination will be correspondingly reduced. Such vaccination practices should be confined to areas or farms where the disease has previously occurred.

Vaccination at a later period after cases of anthrax have already presented themselves may not save as many animals as when it is practiced earlier in the season. When an outbreak is in progress, a certain number of animals may, at the time, have already been exposed and then it is not always possible to overcome the infection. Owing to the infection hazard already present in a group of animals the vaccination with spore vaccine should then be combined with a simultaneous injection of anti-anthrax serum in order to establish a degree of protection at once.

Vaccination with most spore vaccines alone is not immediately followed by the establishment of a solid immunity. It may require a few days before the latter is sufficiently developed to afford protection and in the meantime a previously exposed animal may come down with the disease. To

a considerable extent such an occurrence can be prevented by the use of anti-serum injected at the same time as the vaccine.

Early vaccinating is always to be preferred to doing so at a time when the infection is already declaring itself. On the whole, early vaccination with spore vaccine alone is followed by a more lasting immunity, which usually endures for one year, whereas there are some indications that the immunity produced by the combined methods is of a less lasting character. In the face of an actual outbreak the simultaneous method appears to be the safest.

In the anthrax area of Nebraska the annual vaccination, early in the season, on farms where the disease has once appeared is the method of choice. It will preserve the greatest number of livestock and, furthermore, is the least expensive.

In the prevention of anthrax the adequate and safe disposal of carcasses, dead with the disease, constitutes a measure the importance of which cannot be overestimated. If at all possible, such carcasses should be disposed of as near as possible to the place where death occurred. It is obvious that dragging or transporting a carcass to other places tends to spread the germs of the disease.

However, if a carcass must be hauled away, such a contrivance as a stone boat should be used in preference to simply dragging the dead animal over the ground.

Any vehicle, ropes, or other utensils used for such a purpose should immediately afterwards be thoroughly disinfected and if it is at all economical to burn them, this would be still better. For such disinfection, a solution of $2\frac{1}{2}$ pounds of commercial lye in $5\frac{1}{2}$ gallons of water has been recommended. Where whitewash is not objectionable, the addition of $2\frac{1}{2}$ pounds of lime may be added to the lye solution in order to render it still more effective. (See Farmer's Bulletin 1736, U. S. Dept. of Agriculture.)

For the disposal of anthrax carcasses, their destruction by fire should be the method of choice. For this purpose, two trenches which cross one another at the middle should be dug, each trench to be 7 feet in length, about 15 inches in width, and 18 inches deep at the intersection, becoming shallower toward the ends. The dirt taken from the trenches is to be piled in the angles found where the trenches intersect and upon this such means of support as an old automobile chassis or pieces of railroad iron should be put in place for the carcass to rest on. The fuel can be placed immediately under the latter and may also be piled around it. The whole, after the fire has been started, may then be covered with damp stable manure, sods or the like in order to promote a rather slow, smouldering fire which permits the greatest heat penetration into the carcass. Fuel and covering are to be added from time to time until the carcass is thoroughly consumed.

If the disposal by burning should prove to be impossible the carcasses must be deeply buried. At least six feet of earth should cover the highest point of the carcass and before the pit is filled the former should be well covered with quick lime.

When dealing with anthrax carcasses, post mortem examinations should be discouraged. Not only is this accompanied by an infection hazard of persons so engaged, but the practice also tends to scatter germs or spores into the environment.

Anthrax carcasses, and for that matter others as well in an anthrax area, should never be fed to hogs. By consuming such material the latter are apt to become infected and may possibly develop into carriers and spreaders of the disease. In addition, the practice is always accompanied by a marked probability that the hog yard and surrounding land may thus become more or less permanently infected.

[10M]