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ANTHRAX AND BLACK-LEG

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ANTHRAX AND BLACK-LEG

The history of anthrax and black-leg can be traced through past centuries with little difficulty, even though their exact causes were unknown until comparatively recent years. In fact, the former affection is one of the first diseases of which we have a record. Both are almost world-wide in their distribution, usually appearing in isolated outbreaks, although they may be quite common in certain districts.

The determining of the cause of anthrax was a direct result of the improvement and perfection of microscopic lenses; its causative organism, however, was observed as early as 1849, though the objects seen in the blood under high magnification were not directly connected with the disease until 1863. A still further period elapsed before the casual relation of these objects to anthrax was generally accepted.

The discovery of the organism causing black-leg followed the finding of the bacillus of anthrax by some years (1878), and it was not until 1880 that its principal characters were determined and studied.

Anthrax may appear in a severe or mild form among all our domestic animals, being contracted, as a rule, by direct inoculation with material containing the germ, through the skin or the mucous membrane of the mouth, intestinal tract, or the lungs. Human beings are susceptible to this disease, infection, as a rule, resulting from direct inoculation of individuals dealing with diseased carcasses or their products, such as hides, hair, and wool. From the fact that the disease is quite frequently observed among people handling wool, it is called in England "Wool sorter's disease."

Black-leg is seen almost exclusively in cattle, particularly among the younger animals, seldom in those over two, and very rarely in those over four, years of age. Swine and sheep may be affected, but outbreaks are infrequently observed among these animals, and not at all in other animals or in man. Black-leg, like anthrax, is contracted by direct inoculation with material containing its germ, through the skin or the mucous membranes of the mouth, digestive tract, or lungs.

The causative bacilli of anthrax are microscopic in size, and occur in enormous numbers in the blood of affected animals. Their presence in the blood renders it tarry in consistency, very dark in colour, and prevents it clotting after the death of the animal. These germs form themselves into long chains during their multiplication and growth, and, when deprived of favourable surroundings, resting bodies (spores) are formed, these having special resistant powers so that ordinary disinfectants to destroy their vitality unless applied for a considerable time. These resting forms or spores do not form in the carcass of an animal dead of the disease, provided the skin is left whole on the animal, as a large amount of air (oxygen) is required for their development, although they are found in the bloody discharges which exude from the natural openings of the body, such as the mouth, nose, anus, etc.

The reappearance of anthrax on ground once infected is due to these spores or resistant forms which retain their vitality for years, even though their surroundings are unfavourable. The destruction of anthrax germs within the carcass, as above described, is in part due to the presence of other microbes, which, while otherwise harmless, are their natural enemies.

Black-leg is caused by a germ distinctly different from the one causing anthrax, it being much smaller and growing only in the absence of air (oxygen). It also forms resting bodies or spores. The organism of black-leg is not found in the blood, save immediately before or after the death of an animal dying of this disease; even then it is found in very small numbers only. The blood of an animal dead of this disease is normal in colour, and clots quickly when exposed to the air, being entirely different in this respect to the blood from an anthrax carcass, which is tarry and will not clot. The germs, while not numerous in the blood, are present in great numbers in the

bloody serum of the swelling which generally appears on one of the quarters or the side of the neck of an affected animal. This swelling is characteristic of black-leg when a crackling sound is noted on passing the hand over the swollen area. The crackling sound is caused by the presence of gas in the tissues, this being formed during the growth of the black-leg germs. On being cut, the affected muscle is found to be very dark in colour, while gas, having a peculiar penetrating acid odour is seen coming up from the cut surface in very small bubbles. As in the case of anthrax, the germs are killed and spore formation checked by leaving the hide on the dead animal, thus excluding the air.

Anthrax is much the more serious of the two diseases, as it may affect man as well as horses, cattle, sheep, swine, and other animals of any age or breed, and is quickly fatal. One may be led to suspect anthrax by the short duration of the illness. The animal may have been perfectly healthy the night previous, but is found dead in the morning, and is found to have a bloody discharge from the natural openings of the body (mouth, nostrils, anus, etc.) These features should arouse suspicion, and make one exceedingly careful in handling the carcass, so as to avoid infecting himself and others, or distributing the infection over the ground when removing the carcass to a suitable place for burial. If there is still doubt, a few drops of blood placed on a clean piece of note paper, allowed to dry in the air, folded and forwarded to a laboratory, enables a microscopic examination to be made, which should settle all doubts. A post-mortem examination may be performed, but this is not advised, as it is a very dangerous procedure. At a post-mortem on a case of anthrax, bloody stains are noted throughout the tissues and organs of the body. The spleen (milt) is greatly enlarged, very dark or black in colour; the blood is dark in colour, tarry and does not clot after death.

The carcass of such an animal should be destroyed by fire as soon as the diagnosis is made or suspected, care being taken that all discharges and litter about the animal be burned with it, even to the halter. The animal should, under no consideration, be skinned, as this is a most dangerous procedure; nor should it be dragged over the farm with a chain around its neck or leg that a spot may be found where the digging is easy, for by this means the infection is spread, contaminating any enclosure through which the animal may be drawn.

Black-leg is a disease of the ox, and is most often seen in animals from 6 months to 4 years old. The first symptom is usually lameness, and the entire duration of the disease may be slightly longer than anthrax. The quarter in which the animal has shown lameness becomes swollen and the tissue beneath the skin is filled with gas, feeling very much like stiff paper when pressed by the hand. Pressure gives a crackling sound similar to the rustling of paper. The skin covering the affected part is dry and, on post-mortem examination, is found to be very dark in colour, while the mucous membrane or internal lining of the intestines may be reddened or slightly blood stained.

The precautions to be taken in handling the carcass should be similar to those mentioned in the case of anthrax, as the danger of spreading the infection is serious, although human beings do not contract the disease. There should be no more difficulty experienced in determining the existence of black-leg than there is in diagnosing anthrax, but if it is desired to be absolutely certain, a few drops of the bloody material from the affected muscles placed on a clean piece of note paper and dried in the air will determine, when microscopically examined, whether the disease is black-leg.

Where the death is thought to be due to either anthrax or black-leg, and it is impossible to determine which affection caused death, the placing of a small amount of blood in an equal amount of glycerine will enable a positive laboratory diagnosis to be made. A drachm (teaspoonful) of this blood glycerine preparation is sufficient.

An opportunity for treatment of animals affected with either disease is seldom afforded, and when such an opportunity is presented it is usually fruitless, although recovery may occasionally take place.

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their removal from the infected ground will frequently check an outbreak before immunity can be produced with the vaccines of either disease. Low-lying, swampy ground, particularly that lying near sluggish streams of water which receive the drainage from woolen factories, tanneries, or from areas where diseased carcasses have been improperly disposed of, are quite liable to be infected. In the event of animals dying of anthrax or black-leg on such ground, all remaining alive should be removed until they are properly vaccinated. Areas where carcasses have been improperly buried may be considered as "infected areas," and should be fenced.

Preventive inoculation against both diseases is widely practised, particularly in localities where it is known that the infectious agent exists. The vaccine (an attenuated or weakened germ product) for the preventive inoculation is prepared in laboratories especially equipped for the work, and there are many institutions of the kind on this continent, one of which is connected with the Biological Laboratory of this department.

These vaccines, when prepared with care, and properly tested, may be considered reliable. With anthrax vaccine, two inoculations are required, the first protecting against infection by the second and the second protecting against an infection with the virulent germ. The interval between the two inoculations varies with the manufacturer, whose instructions should be followed very carefully, but it is usually from ten to twelve days. Black-leg vaccine is sold in two forms, the single and the double vaccine. On this continent the single vaccine is used almost exclusively, and from its name indicates that but a single application is required. The method of applying black-leg vaccine is usually characteristic of the maker, each firm or manufacturer desiring to obtain a method which will be simple and effective, so that it may with safety be placed in the hands of farmers and cattlemen as well as veterinarians. The results following vaccination against either disease are quite satisfactory, yet it must be borne in mind that vaccine used on an animal already affected with either of the diseases in question will not protect such an animal and may not prevent its death, while, on the other hand, the same vaccine will protect an unaffected animal against a subsequent infection for a limited period.

Vaccination should be performed in the spring before the animals are turned out, but in either case is not considered effective for a period greater than twelve months.

F. TORRANCE,
Veterinary Director General.

March 10, 1915.

CIRCULAR *RE* ANTHRAX VACCINE.

Anthrax vaccines, properly used, afford protection or immunity to a subsequent artificial or natural anthrax infection. The vaccines for protecting against anthrax prepared at this laboratory are dried on braided silk threads, and these braided silk threads are held by a special spring clip to the stopper of their sterile container. Anthrax vaccines are attenuated or weakened cultures of the germ causing anthrax (*bacillus anthracis*). The process of attenuating or reducing the strength of the germ is confined to the laboratory, and cannot with safety be conducted elsewhere.

To protect or immunize an animal against anthrax, two vaccines are required, and protection or immunity is the result of the animal passing through two mild, properly graded attacks of the disease, which, as a rule, cause no inconvenience to the patient save a slight elevation in temperature. During these two mild attacks of the disease it is advisable to take particular care of the animals, protecting them from inclement weather, extremes of heat or cold, etc.

THE FIRST ANTHRAX VACCINE (yellow label), is a very weak virus and is only intended to protect against a subsequent administration after the proper interval (twelve days) of the SECOND ANTHRAX VACCINE (green label), which is a very much stronger virus, and this in turn protects against virulent anthrax. Protection or immunity against anthrax is established in from twelve to twenty days after the administra-

tion of the second vaccine. During this interval, from the administration of the first vaccine until immunity is established in the vaccinated animals, they should be kept from grazing on infected pastures, and no hay from infected lands should be used for feeding.

Vaccine used on an animal already affected with anthrax will not protect such an animal, nor will it prevent its death. The use of anthrax vaccine, during or immediately after the occurrence of an outbreak of anthrax, may be followed by death, in some instances due to the stimulation of the anthrax germs already in the system of the animal, and such accidents cannot be prevented. In the use of anthrax vaccine it is well to take the temperature of the animal to be vaccinated immediately before inoculating and, in the event of the temperature being elevated, vaccination should be deferred until the temperature of the animal is again normal.

METHOD OF VACCINATION.

By using the vaccine prepared at the Biological Laboratory, together with the vaccinating outfit supplied by the department, the method of introducing the vaccine beneath the skin of the animal is very simple. (See special instructions for the use of the outfit.) The site of the inoculation should be prepared by clipping away the hair and washing with alcohol or boiled water.

With the needle properly placed in the needle holder and the braided silk thread of impregnated vaccine on the needle, a fold of skin is grasped with the left hand while the right forces the needle carrying the braided silk through the skin until the silk is lost to sight when the needle is immediately withdrawn and the impregnated silk is left behind.

The most convenient points for inoculating are: the side of the neck in horses, behind the shoulder in cattle, and behind the shoulder or the inside of the thigh in sheep. Any point where the thread can be introduced beneath the skin into the cellular tissue of the animal to be vaccinated is suitable.

Each thread of vaccine constitutes a single dose for the horse, cow, sheep and hog.

In the manufacture of anthrax vaccines at the Biological Laboratory, every possible precaution in their preparation and subsequent testing is taken, but the department can assume no responsibility for untoward effects following their use.

The price of anthrax vaccine is 5 cents per dose, consisting of a thread each, of the first and second vaccines.

The price of the vaccinating outfit is 50 cents.

Anthrax vaccines and vaccinating outfits may be procured by applying to the Veterinary Director General, Ottawa, Canada.

F. TORRANCE,

Veterinary Director General.

March 10, 1915.

CIRCULAR RE BLACK-LEG VACCINE.

Black-leg vaccine, properly used, affords protection or immunity to a subsequent artificial or natural infection. The vaccine for protecting cattle against black-leg prepared at this laboratory is dried on braided silk threads, and these braided silk threads are held by a special spring clip to the stopper of their sterile container. Black-leg vaccine is an attenuated or weakened virus prepared from virulent black-leg material. The process of attenuating or reducing the strength of this virus is confined to the laboratory, and cannot with safety be conducted elsewhere.

To protect or immunize an animal against black-leg we prepare a single vaccine and protection or immunity is the result of the animal passing through a mild, properly graded attack of the disease, which, as a rule, causes no inconvenience to the patient, save a slight elevation in the temperature. During this mild attack of the disease it is advisable to take particular care of the animals, protecting them from

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inclement weather, extremes of heat or cold, etc. Protection or immunity is established in from twelve to twenty days after the administration of the vaccine. During this interval from the administration of the vaccine until immunity is established, vaccinated animals should be kept from grazing on infected pastures, and no hay from infected lands should be used for feeding.

Vaccine used on an animal already affected with black-leg will not protect such an animal, nor will it prevent its death. The use of black-leg vaccine during or immediately after the occurrence of an outbreak of black-leg may be followed by death, in some instances due to the stimulation of the black-leg germs already in the system of the animal, and such accidents cannot be prevented. In the use of black-leg vaccine it is well to take the temperature immediately before inoculating and, in the event of the temperature being elevated, vaccination should be deferred until the temperature of the animal is again normal.

EACH THREAD CONSTITUTES A SINGLE DOSE AND IS READY FOR USE AS SUPPLIED.

The threads should be handled with the needle only.

Method of application.—By using the vaccine prepared at the Biological Laboratory, together with the vaccinating outfit supplied by the department, the method of introducing the vaccine beneath the skin of the animal is very simple. (See special instructions for the use of the outfit.) The site of inoculation should be prepared by clipping away the hair and washing with alcohol or boiled water.

With the needle properly placed in the needle holder and the braided silk thread of impregnated vaccine on the needle, a fold of skin is grasped with the left hand, while the right forces the needle carrying the braided silk through the skin until the silk is lost from sight, when the needle is immediately withdrawn and the impregnated silk is left behind.

The most convenient point for inoculating is behind the shoulder; however, any point where the thread may be introduced beneath the skin into the cellular tissue of the animal to be vaccinated is suitable.

Cattle over four years of age are not, as a rule, susceptible to the disease. Calves under six months are not fully immunized by vaccination, and if vaccinated prior to this age should be revaccinated in three months. It is preferable to use the vaccine in the spring before the animals are allowed access to infected areas, for at this time of the year they are usually less resistant to a natural infection than at other periods, and, unless vaccinated, they are more liable to a fatal infection.

In the manufacture of black-leg vaccine at the Biological Laboratory every possible precaution during its preparation and subsequent testing is taken, but the department can assume no responsibility for untoward effects following its use.

The price of black-leg vaccine is 5 cents per dose, a dose consisting of a single thread of vaccine.

The price of the vaccination outfit is 50 cents.

Black-leg vaccine and vaccinating outfits may be procured by applying to the Veterinary Director General, Ottawa, Canada.

F. TORRANCE,
Veterinary Director General.

March 10, 1915.

CIRCULAR *RE* VACCINATING OUTFIT FOR THE ADMINISTRATION OF ANTHRAX AND BLACK-LEG VACCINES.

The anthrax and black-leg vaccines prepared at the Biological Laboratory are dried on braided silk threads, and require a special instrument for their administration.

The outfit consists of a handle and two inoculating needles. The handle of wood is hollow, and the needles are placed in this recess for protection during shipment and when they are not in actual use. The needle is of special construction, with a bayonet point and a small hook about one-half inch from the sharp end.

METHOD OF VACCINATING.

The needle may be dipped in alcohol before each vaccination, and allowed to thoroughly dry before engaging a thread of vaccine. If disinfectants, such as carbolic acid or creolin, are used on the needle, the virus on the thread will be destroyed, in consequence of which the vaccination will be of no protective value to the animal.

The needle is placed in the holder, the ferrule is screwed down tight to securely hold the needle, and the outfit is ready for use. The stopper of the vaccine container—to which the vaccine is attached by means of a spring clip—is removed from the vial and reversed. The fine hook of the needle is passed through the braiding of the silk and by a slight pressure away from the spring clip, the thread of vaccine is removed from the clip and remains on the hook of the needle. With the thread of vaccine on the hook of the needle, the site of inoculation on the animal having been properly prepared, the skin is grasped with the free hand and the needle carrying the thread is forced under the skin parallel to the body of the patient. When the thread is lost from sight the needle is removed, leaving the vaccine beneath the skin, and the process of vaccination is complete.

The price of the vaccinating outfit is 50 cents.

The price of vaccinating needles separate from the handle is 25 cents for two.

The price of anthrax vaccine is 5 cents per dose.

The price of black-leg vaccine is 5 cents per dose.

Vaccinating outfits and vaccines may be obtained by applying to the Veterinary Director General, Ottawa, Canada.

F. TORRANCE,

Veterinary Director General.

March 10, 1915.