Tetanus in farm animals

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The disease tetanus occurs in practically all of the animals and man. It is caused by the tetanus bacillus (Clostridium tetani) and results from contamination of wounds and raw surfaces with materials such as earth or dust containing these organisms.

The tetanus bacillus is widely distributed in nature and frequently occurs in the soil of cultivated land, in stockyards and in animal manure. Upon gaining access to a wound tetanus bacilli show no tendency to invade the body by way of the blood circulation and set up a general infection, but remain localised at the site of infection where they multiply and in the process elaborate an extremely potent toxin.

Tetanus toxin is one of the most powerful of the known poisons. It has a special affinity for nervous tissues by which it is readily absorbed and which it stimulates to produce the spasmodic muscular contractions so characteristic of the disease. The tetanus bacillus is an anaerobe which thrives in the absence of air. Consequently deep punctured wounds from which air is excluded are more dangerous than large superficial ones. Any wound, however, may become infected and particularly if it contains dead or necrotic tissue or has become covered over by accumulated discharges and scabs. The incubation period of the disease, i.e. the period which elapses from the infection of the wound until the appearance of symptoms, ranges from 3 to 21 days but is usually about 7 days.

Of the domesticated animals the horse is the most susceptible but under the conditions which obtain in Western Australia the most frequent and most serious losses from the disease occur among sheep. Cases occurring in horses are for the most part isolated ones and are sometimes a sequel to nail punctures in the feet, stake wounds, harness galls, or castration. Among sheep, mortalities involving the loss of a considerable number of animals are from time to time encountered and are generally associated with marking and shearing. The disease occurs much less frequently in cattle and pigs. The mortality rate is high; 75 to 80 per cent. of horses and cattle which become affected die of the disease while in the smaller animals such as sheep and pigs, recovery rarely occurs. Treat—
ment of the disease is not usually attended by satisfactory results and is only worth attempting in horses and cattle.

**TETANUS IN SHEEP**

The majority of the outbreaks of tetanus which occur in sheep are associated with marking or shearing and result from the infection of castration, tailing and shear cut wounds. Such mortalities may be serious resulting in the death of a considerable number of animals. In newborn lambs infection of the navel cord may take place before healing has occurred.

Serious mortalities from tetanus have also been encountered in sheep following upon inoculation with vaccines for the prevention of other diseases, and these may be attributed to careless methods, including the contamination of vaccine exposed in open containers to dust containing tetanus spores or failure to sterilise syringe and needles before use.

**Symptoms in Sheep.**

With the onset of symptoms the gait becomes stiff and stilted and the animal is soon unable to stand. Sheep affected by tetanus are almost invariably found stretched out on their sides with the legs rigidly extended and the head and neck bent backwards (but sometimes downwards or to one side). Characteristically the muscles are in a condition of rigid contraction and the body is stiff and board-like. This will be particularly noticeable upon lifting the affected animal from the ground. In many cases due to contraction of the masticatory muscles the jaws are locked together and the mouth cannot be opened, this condition being known as trismus or "lock-jaw." A moderate amount of tympanitis or bloating is a constant feature of the disease. Tetanus in sheep is almost without exception, fatal, death occurring within a few days from the appearance of symptoms.

**Prevention.**

**Hygienic precautions.—**Since the disease results from the contamination of wounds with tetanus bacilli or spores contained in the soil, hygienic precautions should always be adopted whenever the likelihood of such infection exists. These will be particularly applicable in connection with lamb marking.

Old sheep yards which are likely to be heavily contaminated should be avoided and marking operations should be conducted in a well-grassed temporary enclosure, erected in a convenient corner of the paddock, from hurdles or other suitable material. Instruments should be sterilised by boiling before use and when not actually in use they should be placed in an antiseptic such as a 2 per cent. solution of lysol (lysol 1 fluid ounce, water 2½ pints).

Following marking, lambs should be set down carefully so that the wounds do not come into contact with the ground. Prior to the commencement of shearing, sheds should be given a thorough cleaning and shearcuts should be dressed with tincture of iodine or some other suitable antiseptic. Following shearing or marking, sheep should be released into clean, well-grassed paddocks. Since infection of the wounds may subsequently occur in yards or paddocks by contamination with earth or dust, the application of hygiene precautions may not always succeed in preventing the disease and upon properties where recurrent losses from tetanus have occurred other methods of control must be employed.

**Immunisation with Tetanus Toxoid.**—Vaccination with tetanus toxoid provides the most effective means of preventing the disease. Inoculation with this product confers upon the treated animal, a strong and lasting immunity which develops after an interval of about 14 days from the time of injection. The dose of tetanus toxoid for the sheep is 1 c.c., given subcutaneously (beneath the skin) and the cost of treatment is about 2½d. per head. Tetanus toxoid will be found especially valuable for the prevention of outbreaks of tetanus associated with shearing. Vaccination must be completed not less than 14 days prior to the date upon which shearing is timed to commence and may thereafter be relied upon to afford a high measure of protection.

Tetanus toxoid might also be employed for the protection of lambs following marking. Since lambing, however, is usually spread over a period of six to eight weeks during which time lambs are dropping irregularly and vaccination must be carried out at least 14 days in advance.
of marking, this method of prevention may not generally be found practicable.

**Tetanus Anti-toxin.** — Alternatively lambs may be protected against the disease by the injection of tetanus anti-toxin given at the time when marking operations are performed which will immediately provide them with a passive immunity of two to three weeks’ duration. Tetanus anti-toxin is a serum prepared from horses which have been immunised by repeated injections of tetanus toxoid. Blood from such immunised horses is drawn from the jugular vein into a sterile container and allowed to stand for 24 hours. The clear fluid or serum which separates upon standing is drawn off, suitably preserved and standardised. This serum contains immune bodies or anti-bodies which are able to neutralise tetanus toxin. The immunity conferred by tetanus anti-toxin becomes effective within a few hours after the injection of the serum but it is of short duration lasting only two to three weeks. It is a passive immunity which will last only until the anti-toxin has been eliminated from the body. It, however, serves to protect the animal during the period while the healing of the wound is occurring.

The dose of tetanus anti-toxin for sheep and lambs is 100 units given subcutaneously. This product is available from the Commonwealth Department of Health, Perth, in bottles of 100 c.c., each c.c. containing 100 units of anti-toxin. An injection of 1 c.c. will therefore provide the prescribed dose and the cost of treatment is slightly less than 2½d. per head.

If it is desired to prolong the duration of the immunity simultaneous inoculation with tetanus anti-toxin and tetanus toxoid may be practised 100 units of anti-toxin being injected beneath the skin of the brisket on one side and 1 c.c. of toxoid being injected on the opposite side. By this means both an immediate and enduring immunity will be obtained which should protect the lamb from any ordinary infection to which it may become exposed and should tide it over the first shearing.

**TETANUS IN THE HORSE**

Tetanus in horses is most frequently associated with wounds of the lower portions of the limbs such as nail punctures in the feet or penetrating wounds caused by stakes and other objects. The disease is a not infrequent sequel to castration particularly when this operation is performed in stable yards. It may also result from the infection of saddle and harness galls and other surface wounds.
Symptoms in the Horse.

As in the other animals, tetanus in horses is characterised by spasmodic contraction and stiffening of the body musculature. This usually commences in the muscles of the head and neck but rapidly extends to other groups of muscles. In an advanced case the affected animal stands stiffly with the forelegs spread widely apart; the neck is extended, the tail is held rigidly and somewhat elevated and the abdomen is tucked up. The nostrils are dilated and trumpet-like; the ears are erect and the lips are drawn back exposing the teeth.

Protrusion of the membrana nictitans (third eye-lid or haw) from the inner corner of the eye is a characteristic feature of the disease and this will become very pronounced when the head is elevated by a hand placed beneath the lower jaw. Affected animals feed slowly and seem to have difficulty in swallowing. In many cases due to contraction of the masseter muscles the mouth cannot be opened and although the appetite remains good the animal is unable to feed. This closure of the jaws is known as trismus.

The muscles of the body are hard and boardlike to the touch and this will be very apparent when the hand is placed upon the rump of the affected animal. The animal moves with a stiff straddling gait and has great difficulty in turning and backing. The joints are stiff and can only be flexed by the application of considerable force.

Horses affected by tetanus are very sensitive to sound and light and when suddenly disturbed the muscle spasms may be increased to such an extent as to cause the animal to fall to the ground. The mortality rate is very high, the disease terminating fatally in from 75 to 80 per cent. of cases. Death usually occurs in from 3-10 days but should the animal survive for a fortnight the prospects of ultimate recovery are reasonably good.

Prevention.

In localities where tetanus is prevalent, wounds should receive special attention and should be regularly cleansed and dressed with an antiseptic preparation. When operations such as castration are to be performed, aseptic precautions should be observed. Instruments should be sterilised by boiling and the skin at the site of the operation swabbed with an antiseptic. The horse should be cast on a clean well-grassed area, stock yards and stable yards being avoided.

The injection of 500 units of tetanus toxoid shortly after a wound has been sustained or when an operation is about to be performed, will in most cases protect the animal from infection during the ensuing period of 2-3 weeks while the wound is healing. As in the case of sheep, vaccination with tetanus toxoid produces in the horse a strong and enduring immunity and this might well be adopted as a routine procedure on all properties upon which the disease occurs. The dose of tetanus toxoid for the horse is 10 c.c. given subcutaneously. A second injection of 10 c.c. given after an interval of a year will confer upon the animal a life-long immunity.

Treatment.

The treatment of tetanus in horses does not offer very favourable prospects of success. In the first place the wound should be sought and thoroughly disinfected. All discharges and dead or necrotic tissue should be removed and this should be followed by regular dressings with an antiseptic preparation rich in oxygen such as potassium permanganate or hydrogen peroxide. The animal should be placed in a quiet dark loose box and disturbed as little as possible. The diet should consist of soft easily digested food such as green stuff, bran mashes or boiled oats or linseed. When the animal is unable to masticate, liquid foods such as thin gruel or sloppy bran mashes should be made available. The bowels should be regulated by the administration of magnesium sulphate (Epsom salts) in the drinking water. Treatment with one of the tranquillising drugs which have recently become available may prove helpful but would require the services of a veterinary surgeon.

Tetanus anti-toxin is sometimes used in the treatment of the disease but since this product can have no effect upon the toxin which has already combined with the nervous tissues and can only neutralise toxin which may continue to be produced at the site of infection, its value as a curative is extremely doubtful. Very large doses of anti-toxin repeated at
frequent intervals must be employed and since this is expensive its use can only be justified in the treatment of very valuable animals. The treatment of the disease is always difficult and whenever possible veterinary assistance should be obtained. Some recoveries will occur with treatment but the outlook cannot be generally regarded as very hopeful.

TETANUS IN OTHER ANIMALS

Tetanus is not very frequently met with in other animals. In cattle it sometimes occurs after calving when it may be associated with retention of the afterbirth or metritis (inflammation of the uterus), while in calves it may be a sequel to castration. The symptoms in cattle are very similar to those exhibited by horses and include general muscular stiffness, trismus (locking of the jaws), protrusion of the membrana nictitans and bloating.

Tetanus is uncommon amongst pigs but may occur as a sequel to castration, and is rarely seen in dogs. In these animals the symptoms follow much the same pattern as those shown by other animals and the disease is nearly always fatal.

NEW RESEARCH STATION AT BADGINGARRA

Considerable progress has been made in the development and preparations for equipping of the new light lands research station situated some 5 miles north of Badgingarra townsite. The Minister for Agriculture (Mr. C. D. Nalder), in commenting on this referred to the purpose of the station in investigating the problems of developing and utilising the light lands west of the Midland railway and including those north and south of the Hill River.

The station comprises some 3,060 acres acquired as undeveloped country and includes soil types largely representative of the area which it is to serve. An area of approximately 600 acres was ploughed last year and is in course of being fire-harrowed and will be cross-ploughed ready for planting in the coming season. The fallowed land will be soil-surveyed to enable the satisfactory siting of the cereal and other experiments which are being designed as part of this year's programme. The major portion of this fallow will be planted to wheat, oats and barley and will include a range of experiments to determine the performance of different varieties of the three cereals and responses to fertiliser and other treatments. Fertilisers will be applied at the rate of 180 lb. of mixed super-copper-zinc for main crop on new land and a sufficient quantity of this mixed fertiliser has been ordered for delivery in April.

A further 500 acres has been logged and burned in preparation for ploughing towards the end of the coming winter in preparation for cropping in 1961. It is anticipated that the first area will be fenced by the middle of 1960 and commencement will then be made on the fencing of the second area.

The Mines Department has put down an exploratory bore on the station as part of its general investigation of the water supply in the Badgingarra area. The bore is to be handed over for the use of the station and arrangements can then be made regarding equipping and reticulation.

Tenders have been called for the erection of a pre-fabricated machinery shed 100 ft. x 28 ft. and also a large lockup workshop. Interim caravan accommodation will be provided for a limited staff pending the construction of two new houses on the property.

A new 3-5 ton truck is being ordered and hand tools and other small equipment have been purchased for use on the station. A tractor, plough, cultivation and planting machinery are being purchased for use during the coming planting period, and subsequently.

Mr. Nalder said that the arrangements were well in hand for commencing effective utilisation of the new station and hoped that even by the end of the year, the Department would have some useful information following the first cropping season, and could then make further progress in the investigation of the problems of cereal and, eventually, pasture and stock production under the conditions applying to the extensive area of land to be served by the research station.
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