

that it can be prevented by vaccination of ewes before lambing.

The other types of navel infection are less common and cannot be prevented by vaccination. When pus forming bacteria enter the navel cord they usually form a local abscess just inside the body and then spread to the liver and often the lungs and joints; in the liver and lungs there may be dozens of small abscesses. Lambs affected with these organisms usually die at one to three weeks, but some live longer and a few even thrive and are eventually killed as fat lambs. Only then are the signs of infection (multiple liver abscesses) found. Treatment of lambs with this type of infection with penicillin is most unlikely to be successful, so that losses from this cause simply have to be written off as a natural hazard.

Post-marking Infections

The next wounds which all lambs must suffer are those that occur at marking time; the same type of organisms that infect the navel cord infect marking wounds. There are a number of different methods of marking lambs, but I do not intend to enter into an argument on which is the best. There are champions for each method, and my advice is to stick to the one you like best.

It is as well to remember, however, that all of these methods cause wounds through which bacteria can enter the body. Again we have the clostridial type which causes blackleg and malignant oedema (blood poisoning) and another member of the same group which causes tetanus.

The same remarks, as far as treatment and prevention of blood poisoning are concerned, apply here. Some can be saved by penicillin, while those from ewes which have been vaccinated will still have a fair degree of protection.

With regard to tetanus I think it fair to say that the use of rubber rings does seem to favour the development of this disease; only occasionally does it become a problem. Though tetanus is easily prevented, it is notoriously difficult to cure. Occasionally success may be obtained by the use of penicillin and tetanus antiserum, but generally it is a waste of time and money.

If you use the knife for marking your lambs, there is little danger of infection with blackleg or tetanus organisms because the wounds are large, well drained, and open to the air. Pus forming and certain other organisms can, however, still gain entry through these wounds and often set up infection in the limb or spinal joints.

By your own efforts you can do much to reduce the incidence of these infections by using clean methods at marking time. Don't mark your lambs in the sheep yards and don't use dirty instruments. The soil of sheep yards

LAMB LOSSES FROM BIRTH TO 6 MONTHS

is always heavily contaminated with bacteria, so you would be wise to set up temporary yards for marking in a well grassed paddock.

If you use instruments and particularly a knife, make sure that you thoroughly clean and boil it before use; then during marking keep a tin of disinfectant beside you and wash the knife in it frequently. It wouldn't be such a bad idea, you know, if you were to have two knives and change them after about every tenth lamb, keeping the spare one in disinfectant.

If you are unlucky enough to strike an outbreak of joint infection (arthritis) after docking, you must get in quickly with penicillin if you want to save the lambs. If the infection localises in the spinal joints, you won't notice anything wrong with a lamb until it becomes paralysed, by which time it is too late to save it.

Enterotoxaemia or Pulpy Kidney

An infection which enters through the mouth and the only one which we will discuss is enterotoxaemia or pulpy kidney, an important, if not the most important, cause of death in lambs. Some understanding of how this disease develops will help you to appreciate the methods of prevention and control.

Basically pulpy kidney is the result of the rapid multiplication in the small intestine of an organism which is normally present after being picked up by the lamb from the pasture. This organism produces a powerful toxin or poison which is absorbed from the lower part of the small intestine. If this is so, you will ask then why all lambs don't get pulpy kidney.

The reason is that normally there are insufficient organisms present to produce enough toxin to do any damage, but if for some reason the passage of the contents through the intestine is slowed down, the organisms multiply rapidly and produce sufficient toxin to set up the disease. Unfortunately for the fat lamb producer this set of circumstances occurs more often in the best lambs than in the tail of a mob. The disease is usually more prevalent on the best pastures and can occur at any age from birth onward, though in our experience in the Auckland Province it is most common these days at 10 to 15 weeks.

In the most common form of the disease death occurs in a matter of hours after the onset of symptoms, so that rarely do you ever see an affected lamb alive; most are found dead. If you do find an affected lamb before death, it is obviously in pain, may be scouring a little, and finally goes into a convulsion with head thrown back, frothing at the mouth, and paddling of the legs.

When you open a lamb which has died from pulpy kidney there are fairly characteristic changes to be seen, but only if it has been dead for a few hours; if it has just died or been killed in the final stages, very few changes are present and a diagnosis is difficult, but if it has been dead for a few hours quite characteristic changes are usually present.

The sac around the heart is filled with a clear, slightly yellowish fluid which often has changed to a thick jelly-like clot; the kidneys are soft and mushy, hence the name pulpy kidney, and have obviously degenerated much more than the other organs, which are still firm. The intestines are very fragile and cannot be run out, as they break with the slightest pull; they are also much thicker than normal and the chain of associated lymph nodes is swollen and juicy and up to about four times normal size. Remember that these changes and particularly the pulpy state of the kidneys are not present until a few hours after death.

Prevention and Control

The methods of prevention and control of this disease are from your point of view the most important aspect. It is not my intention to go into careful detail, but to give you the general principles of prevention and control. Likewise it is not my intention to say that you must use this or that method. I believe that the disease must be considered finally as it applies to each farm and that can only be done by you in discussion with your veterinary adviser. Now the prevention of pulpy kidney is by vaccination either of the ewes or the lambs; but which you vaccinate depends on the age at which the lambs are affected.

If from previous experience it is known that you can expect most of your losses in lambs up to about 6 weeks old, you must vaccinate the ewes, but if most losses are after this age, you must vaccinate the lambs at marking time.

If losses occur both before and after 6 weeks, you must vaccinate both the ewes and the lambs.

Vaccination of the ewes transfers protection to the lambs by means of antibodies in the first milk or colostrum; this type of immunity lasts for only a few weeks and, of course, if for any reason a lamb does not get colostrum, it is not protected. If the ewes have never been vaccinated before, even as lambs, they have to be injected with the vaccine twice; the first dose can be given at any convenient time providing it is given at least a month before the second; the second should then be given as near as possible to 2 weeks before lambing.

As lambing is spread over a few weeks, it is advisable to divide the