

or another in the past.

The highest percentage of positive tests is found among veterinary surgeons. At a Veterinary Association congress in 1966 it was reported that 63 per cent of 309 veterinary surgeons showed serological evidence of present or past brucella infection.

## Brucellosis in cattle

### Mr H. Davidson (*Veterinary surgeon*)

In this country cattle are the main animals affected with brucellosis. There is little evidence of the disease in sheep and pigs, though it has been reported in dogs which may show almost human symptoms of undulant fever.

In cattle the disease is termed 'contagious abortion' as this is the most important clinical sign of infection.

In 1960 it was suggested that 2.1 per cent of the animals in the national dairy herd were affected with brucellosis; since then the incidence appears to have risen but this may only be because of greater awareness.

In the cow the gestation period is nine months and abortion due to *Brucella abortus* occurs typically after the fifth and up to the eighth month. In subsequent pregnancies the foetus is usually carried to full term but a second or even third abortion may occur.

The organism has a predilection for the pregnant uterus, testes, lymphnodes, joint capsules and bursae. It localizes in one of these sites after a bacteraemia of some 7-10 days duration.

In the bull the lesions are an orchitis and epidymitis with resulting sterility, though in many infected bulls no lesions are seen and the animal may remain fertile. The bull can transmit the organism at coitus but abortus fever is not considered to be a true venereal disease and infection by the bull is not the most important method of transmission. In the cow the chief lesion is placentitis, which leads to expulsion of the foetus. When abortion occurs there is usually a yellow-brown, flocculant, odourless discharge, the placental cotyledons have a yellow necrotic appearance, the chorion is thickened and opaque often with a characteristic leathery texture; and discharges at this stage contain large numbers of *Br. abortus*. The foetal membranes are often retained, predisposing to secondary bacterial infection and this causes an endometritis which interferes with subsequent attempts to get the cow in calf again.

The presence of *Br. abortus* in the mammary gland is not normally associated with any clinical changes and the milk appears normal. The organism has been recovered from bursae and joint capsules; cows tied up in byres frequently bruise their knees on the feeding troughs, and it is important when opening or attending to these lesions that the infection is not spread.

*Diagnosis.* By no means all abortions in cows are due to *Br. abortus*. There are many possible reasons for abortion, probably only about 50 per cent being caused by *Brucella* infection. In suspected *Brucella* abortion the best sources of organisms are the stomach and lungs of the foetus, where an almost pure culture of *Br. abortus* may be found. Where the foetus has been lost smears from the genital tract may provide evidence.

The organisms can be got from scrapings of the chorion, but these membranes

decompose rapidly. The serum agglutination may be used, though in some cases the titre does not rise for some time after the abortion.

*How is the organism spread?* Spread is chiefly by direct contact. The infected cow aborts leaving the foetus, foetal membranes and discharges on the pasture. Cows are notoriously inquisitive licking or sniffing at any unusual object, thus inhaling or ingesting the organism. The discharges on the cow's hindquarters dry up and spread as dust with every movement of the tail, dogs or foxes may remove the material and drag it from one field to another thus spreading it to other farms. Veterinary surgeons and dairymen can spread the infection by the use of unsterilized and contaminated instruments.

In a susceptible herd up to 80 per cent of the cows may abort in the first year, giving rise to what we call an abortion storm. It is quite an alarming experience to go round a field and find 20 or 30 aborted calves. After an abortion storm the herd resistance goes up, and it is only when new stock is brought in as replacements that abortions recur.

In a dairy herd, with calvings arranged right through the year to give a steady production of milk, abortions tend to be sporadic. Loss of milk is probably the most important factor, and it is considered on average that a third of the milk production of that pregnancy will be lost. With the usual goal of over 1,000 gallons per lactation at about 3s.6d. per gallon it is quite a loss. In addition, the death of the calf means loss of herd replacement if it is female, or, if male, of a potential beef or veal producer. There is also the difficulty of getting the cow to conceive again; this upsets the breeding programme and the production of milk, and it also means that the animal has to be fed in an unproductive state for much longer than is usually necessary. In commercial beef herds the main loss is of course the calf. This also upsets the breeding programme, because most owners like all the calves to be born within a short time to facilitate handling, marketings and so on.

*Prevention.* The first (and often forgotten) means of prevention which we try to emphasize to the farmer is good husbandry and hygiene. Infected animals must be isolated, infected material removed at once, and all introductions into a herd checked by serum agglutination tests. I believe that no animal should be sold without having passed this test. The main means of specific prevention to date has been by vaccination using strain 19 *Br.* vaccine brought out by the Ministry of Agriculture. Although by no means 100 per cent effective it is still the best vaccine probably giving about 80 per cent protection overall. Its use is now only allowed between the ages of three and six months. This is because a lasting titre from repeated doses of vaccine could interfere with an eradication programme. If a calf is vaccinated before six months protection lasts in many cases up to the fifth pregnancy, but the serum agglutination test will most probably be negative by the time the animal is two years old. If older animals have to be vaccinated against the disease and this usually happens either with breakdown in the strain 19 vaccination or in unvaccinated herds, the 45/20 strain vaccine may be used. This produces not quite such good protection, but has the advantage that the positive serum agglutination test lasts for only a short time afterwards. Attempting to decide whether a high agglutination titre in a two or three-year-old cow is due to natural infection or to strain 19 vaccine has been helped by use of the complement fixation test, which becomes more rapidly negative as the animal ages. The Government have been pressed for many years to start an eradication scheme, which would probably take the same form as the tuberculosis eradication scheme under which the animal is seized and compensation paid by the Government. It has been calculated that eradication might cost up to £50,000,000, so a voluntary scheme has been started in the hope of providing a pool of brucellosis-free animals, if a national scheme ever came in. The present scheme is purely voluntary, and there are inducements. There will be special

markets for animals found clear by the Ministry of Agriculture and a special premium may be paid on milk production. This will encourage the farmer to raise the standard of his herd and increase his milk production. Dairy herds will be checked initially by what we call the milk ring test, beef herds by the serum agglutination test.

It is not often appreciated that veterinary surgeons have contact with infected animals in a way that no other person, even a doctor, has contact with disease. When calving a cow the vet's nose, ears and eyes are very close to the posterior of the animal. It is difficult to wear adequate protective clothing. We wear gowns and gum boots, and it has been suggested that we should wear face masks as well, but I find this trying.

The only other measure we can take is to douse the cow with water and disinfectant, not to kill off the infection but just to damp down the dust so that we do not inhale it. Veterinary surgeons often get the natural infection, and infection from the use of strain 19 vaccine. Cows do not stand like a human patient, they object and the vet is liable to be kicked; his hands may be injected with a large dose of strain 19.

## Discussion

**Dame Annis Gillie:** Is there anything that the family doctor can do to help solve this mystery of the life history of toxoplasmosis?

**Dr Williams:** It is difficult to define the role of the family doctor in toxoplasmosis, but in some areas he could probably help to solve some problems. His main attack should be on acquired lymphadenopathies; if we had blood submitted from this kind of patient, and were able to show a high—or better still a rising—titre we could confirm the diagnosis. I think this may be worthwhile in these conditions, which frequently cause a good deal of mental anguish to the parents. Children with enlarged glands become irritable and unwell, the disease process dragging on for a very long time. They are frequently suspected of having serious illness, and yet we know that uncomplicated lymphadenopathy is never fatal. If we could assess the incidence of this condition more accurately perhaps we could find the means by which the disease spreads.

**Dr J. W. Ewing Forrester (Glasgow):** In view of what has been said this afternoon, how should a dog bite be treated?

**Dr Elias-Jones:** This is a difficult question because so many things could be involved. I suppose you were thinking of pasteurellosis, and I would advise the usual measures, accompanied if necessary by debridement of the wound, because if the tissues are devitalized there is a greater risk of infection. There is also a good case for prophylactic penicillin.

**Dame Annis Gillie:** Any other views from bacteriologists on this subject? One thinks particularly of small puncture wounds in children—from cat or dog bites. They are the difficult ones to handle.

**Dr Elias-Jones:** There is a risk of tetanus. If we can persuade everybody to be actively immunized with toxoid this anxiety would pass.