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Effectiveness of the New Zealand brucellosis control scheme for sheep

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ABSTRACT

The basis and protocol of a national industry-based scheme aimed at controlling the spread of brucellosis in rams is described. It was designed by representatives of the Sheep and Beef Cattle Society of the New Zealand Veterinary Association, the Animal Health Division of the Ministry of Agriculture and Fisheries and sheep breed societies. As a national scheme it involves co-operation between veterinarians, sheep breed societies and farmers as well as the Ministry of Agriculture and Fisheries.

Before official adoption of the scheme a considerable number of ram flocks had already been freed from brucellosis by field veterinarians using the highly sensitive and specific complement fixation test (CFT) for diagnosing carrier animals. With the establishment of the scheme results to date indicate that the majority of ram breeding flocks are now brucellosis free with a low overall national prevalence of the disease.

Keywords Sheep; *Brucella ovis*; national control scheme.

INTRODUCTION

Brucellosis of sheep, causing epididymitis of rams emerged as a significant disease in New Zealand some 35 years ago. Extensive observations at that time and subsequently have shown that under some circumstances large numbers of rams in individual flocks can become infected and significantly effect the reproductive performance of such flocks.

This reduced fertility is the direct result of an irreversible epididymitis caused by *Brucella ovis*, an acid fast organism with distinct characteristics from other members of that genus. In infected flocks the prevalence of disease varies considerably, but levels of infection of over 70% have been recorded. In New Zealand the level of infection appears to have declined over the past 30 years as various control measures have been applied to both ram breeding and commercial flocks.

Between 1956 and 1964 39% of specific pathogens isolated from ram testicles submitted to New Zealand diagnostic stations were *Br. ovis*. At that time no reliable national data were available from which an estimate of the overall prevalence could be made. However, a survey conducted in 1982 suggested that the overall prevalence of brucellosis in rams in New Zealand was about 3% with an average prevalence of 5% on infected stud properties and 11% on infected commercial properties.

EFFECTS AND CONTROL OF BRUCELLOSIS

The effects of brucellosis on sheep production have been described by a variety of sources but while the direct effect on the fertility of the national sheep flock is probably relatively small the effect on individual flocks may be quite significant.

Brucellosis affects stud or ram breeding flocks primarily through wastage, particularly in the 2-tooth or sale flock. It may also interfere with the export of rams due to disputes which may occur when brucellosis infected rams have been sold for high prices both privately and at auction. To the commercial farmer who has a high level of infected rams in his mating flock, both experimental work and field observations have demonstrated that losses occur by conception failure, embryonic death and under some circumstances abortion or the birth of weak lambs. A spread in the lamb drop has also been reported in heavily infected flocks.

Until recently the control of brucellosis has been based on a number of approaches, mainly at the discretion of individual veterinarians. The methods used in the control have been, the detection and culling of infected rams by physical palpation of the genitalia, the detection of carrier rams by the use of the complement fixation test (CFT) and the vaccination of non-infected rams with a double dose saline-in-oil killed vaccine of *Br. ovis*. This latter method has been used extensively for rams subsequently sold to commercial farmers.

Early in the 1980s as a result of pilot schemes aimed at eliminating the disease entirely from infected flocks, members of the Sheep and Beef Cattle Society of the New Zealand Veterinary Association moved to introduce a national voluntary scheme of control for brucellosis in sheep which would be administered by the Ministry of Agriculture and Fisheries and lead ultimately to reducing the prevalence of that disease to an insignificant level. That such a scheme was feasible and likely to be successful was supported by a number of factors. Firstly, the disease is essentially one of rams only —

the infection of ewes is transient and not believed to be significant in the spread of disease other than during the mating period. Secondly, data from a number of sources indicated that in some sheep farming districts the prevalence of the disease was already low. In fact many flocks within New Zealand were completely free of the disease. Thirdly, a serological test was available (CFT) which had undergone considerable refinement and trials at Wallaceville Animal Research Centre and elsewhere, and been proven to be both highly specific for detecting *Br. ovis* and highly sensitive in detecting positive cases of the disease. In addition the microbiological examination of ram semen had proven valuable and reliable in supporting and confirming a diagnosis of brucellosis. Subsequently the development of an enzyme-linked immunosorbent assay (ELISA) test for brucellosis had added a further diagnostic refinement used to interpret some suspicious or questionable results from the CFT.

The majority of rams used by commercial sheep farmers are purchased annually from stud breeders. In setting up the scheme it was believed that this traditional 2 tier system of sheep farming could be exploited such that if the disease could be eliminated from the ram producing (stud flocks), then in time the prevalence of the disease in commercial flocks would decline to an insignificant level. Also several Australian states had introduced voluntary control schemes for brucellosis of rams and the success of these was a stimulus to promoting a New Zealand national accreditation programme.

PRESENT NATIONAL CONTROL SCHEME

The New Zealand industry-based scheme is voluntary and known as the *Br. ovis* flock accreditation scheme. The fact that it is industry based has led to the support of all the major sheep breeding societies, including the New Zealand Romney Sheep Society, the Perendale Sheep Society, the Coopworth Sheep Society, the United Breed Society and the Black and Coloured Sheep Breeders Association. Through these organisations it has become obligatory for members to have their flocks accredited free from brucellosis and in general most members have proceeded towards accreditation.

The scheme has been designed by a committee with representatives from the Sheep and Beef Cattle Society of the New Zealand Veterinary Association, the Animal Health Division of the Ministry of Agriculture and Fisheries and the sheep breed societies representing the industry. On the basis of available technical advice the committee is responsible for managing, implementing and modifying the scheme as required.

A veterinarian's responsibility in the scheme involves advising a farmer about the programme and

carrying out all testing of rams. A good history and accurate flock records are needed. It is also essential that all rams and teasers are identified and tested. Depending on the results of testing the veterinarian can then recommend accreditation of the flock. The accredited status applies for 1 year only. Reaccreditation demands annual testing of all mating sires of the flock and the entry of only brucellosis free rams into the flock.

Accreditation Procedure

Briefly the accreditation procedure is carried out as follows:

1. Initial test: All rams and teasers on the farm that are 15 months of age or over must be bled for the CFT, and their scrotal contents palpated to detect epididymal lesions. Any rams and teasers less than 15 months of age which have been used for mating must also be tested with the CFT and their scrotal contents palpated to detect epididymal lesions.
2. Second test: These same rams must be bled for the CFT a second time not less than 60 d and not more than 180 d after the first test. All rams must be identified and accounted for at both tests.
3. All rams less than 15 months of age which have not been used for mating must be palpated for epididymal lesions, and any with lesions should be bled for the CFT.
4. In the case of sale rams, scrotal palpation must be conducted and the certificate of accreditation duly issued within 3 months of sale.
5. If no reactors to the CFT are found at any of these tests, the flock may be accredited free of any evidence of *Br. ovis* infection. The date of accreditation to be entered on the certificate will be the date of the last examination (CFT and scrotal palpation) of rams for *Br. ovis* infection. Accreditation will be valid for a period of 1 year from this date.

The veterinarian issues a certificate of accreditation to the flock owner and notifies the Animal Health Division of the Ministry of Agriculture and Fisheries of the accreditation on the form attached to the certificate.

The sheep breed societies have an active role in the scheme to promote *Br. ovis* free accreditation amongst their members, educate their members and generally persuade the industry of the value of a national brucellosis control scheme for both the local sheep industry and the export industry in live sheep.

The Animal Health Division of the Ministry of Agriculture and Fisheries' main involvement is through the Central Animal Health Laboratory at Wallaceville which conducts all the serological tests and reports to the submitting veterinarian. This serves as a main cornerstone of the scheme as it is

upon the accuracy of this operation that the success of the scheme is dependent.

Progress to Date

Finally it is appropriate to present a brief summary of the results of the scheme to date. At the peak of testing in the 1985-86 season over 200,000 sera were processed at the Central Animal Health Laboratory. So far in the 1986-87 season 51,000 sera from stud breeders and 30,000 sera from commercial farmers flocks have been processed. Of these only 3,500 (4.3%) were positive tests and 370 were either suspicious or gave uncertain results. One thousand five hundred and seventy one flocks were non-infected and in 472 some infected animals (as assessed by the CFT) were present. A total of 140,000 rams were palpated over this period with only 1.7% having lesions of epididymitis. It would be reasonable to assume that a significant proportion of these latter, probably more than half, were caused by the gram-negative pleomorphic organism *Actinobacillus seminis*.

In the stud flocks alone only 631 samples out of 51,000 submitted were sero-positive for *Br. ovis* (1.1%). One hundred and eleven thousand rams were palpated and 1.1% had epididymitis principally caused by *A. seminis*.

These data already indicate a low level of brucellosis infection in New Zealand stud flocks and with the data also supplied on specific sale tests

suggest that the scheme is proving successful. Among 8,500 specific sale tests only 65 positive reactors were recorded (0.8%) while with specific sale tests on stud rams only 25 positive titres were recorded from 7,500 samples (0.3%). The latter figure is close to the limit of sensitivity of the CFT.

Among commercial flocks which have entered the accreditation scheme there were 2,800 positive results from 30,000 rams tested (9.3%). There was also a higher prevalence of epididymitis of unidentified cause in the 29,000 rams palpated in this group (4.1%).

CONCLUSIONS

The interim data presented suggests that the National *Br. ovis* control scheme as described is working and that *Br. ovis* infection in stud (ram breeding) flocks is now at a very low level. It is believed that provided the economic climate is satisfactory and the scheme is pursued with diligence it will be possible to reduce the national prevalence of *Br. ovis* infection to insignificant levels.

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