SEROLOGICAL DIAGNOSIS OF *BRUCELLA* INFECTION

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ABSTRACT

The automated complement fixation test (CFT) and the brucellosis card test (BCT) have been widely used as official tests in the New Zealand Bovine Brucellosis Eradication Scheme. During the course of the eradication programme it was observed that a significant proportion of cattle reacted to the BCT yet remained negative to the CFT and this often occurred on more than one occasion for any particular animal.

Twenty cows, from reactor herds, that had been BCT+/CFT- on at least three successive occasions were slaughtered. Despite extensive sampling, attempts at isolating Brucella abortus organisms from tissues of these animals were unsuccessful. Serum from one cow was found to be positive to a wide range of serological tests and it also caused a strong prozone reaction in the CFT, which could easily have been overlooked. The possibility that the automated CFT, which is essentially a one dilution test, was unable to detect such prozoning sera was investigated. It was shown that providing a suitable choice of antigen concentration was made, such sera would be detected by the automated test.

Brucella - specific IgG_1, IgG_2, and IgM levels in prozoning and non prozoning sera were measured using the single radial immunodiffusion test. It was shown that serum containing a high proportion of specific IgG_2 was likely to exhibit prozoning and that various degrees of prozoning could be induced by varying the ratio of specific IgG_1 to specific IgG_2.

Cattle, previously sensitized by calfhood Br. abortus strain 19 vaccination, were experimentally inoculated with killed Br. abortus. It was shown that although serum agglutination test (SAT) and CFT titres appeared for a short period, titres to the BCT in some cattle tended to remain longer thus allowing an animal to be BCT+/CFT-.

An analysis of herd testing data indicated that BCT+/CFT- animals were more likely to exist in infected herds than in non-infected herds. In heavily infected herds up to 16% of CFT- animals were BCT+ whereas in non-infected or very lightly infected herds less than 4% were CFT-/BCT+. It was concluded that in sensitized cattle at least exposure to the organism without true infection is capable of stimulating antibody which is detected by the BCT, but not necessarily able to provoke positive CFT titres.

The performance of the Auto-Analyzer adaptation of the CFT as used in the New Zealand eradication scheme was assessed. Various prozoning sera from known infected animals were tested and the effect of varying antigen concentrations on these and other sera was noted. Significant differences in antigen concentration required for optimal complement fixation were detected. Prozoning sera required more antigen than non-prozoning sera and even sera that did not exhibit prozoning had varying optimal antigen requirements.

By using I^{125} labelled bovine gama-globulin the dilution gradient of serum within the Auto-Analyzer system was estimated. Knowledge of the serum dilution gradient being obtained was essential for proper understanding of unusual traces given by prozoning sera.

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