Serological evidence of bovine immunodeficiency-like virus and bovine syncytial virus in New Zealand

There are three lymphotrophic bovine retroviruses. The best studied of these, bovine leukaemia virus (BLV), is the cause of enzootic bovine leucosis. It has been isolated in New Zealand[1] and a small number of infected herds have been detected.[2] A second retrovirus, bovine syncytial virus (BSV), is a spumavirus and has not been associated with disease to date.[3,4] The most recently described bovine retrovirus is bovine immunodeficiency-like virus (BIV), a lentivirus.

BIV was first isolated from a cow with persistent lymphocytosis[5] and has also been called bovine maedi-like virus or bovine visna virus. Inoculation of calves with BIV caused a non-persistent lymphocytosis and lymphoid follicular hyperplasia[5] but, so far, no disease resembling human immunodeficiency syndrome has been reported. Calves infected with BIV produce specific antibodies that can be detected from two weeks to at least two and a half years after inoculation.[6]

There has been much interest lately in BIV because of its structural, genetic and antigenic relationship with human immunodeficiency virus.[7] A large project to investigate BIV as a potential model for the study of AIDS has recently begun in Ames, USA.[8] Because of the implications of BIV when importing live cattle, semen and embryos, it was decided to test New Zealand cattle sera to check for the presence of BIV antibody.

Serological results

Because of an apparent association between BLV and BIV, sera were collected from two herds in which cattle seropositive for BLV had been detected previously. A total of 96 sera were sent to Ames, USA, for testing for BIV antibodies using a newly developed western blot assay.[9] In addition, tests for BLV and BSV were carried out using agar gel immunodiffusion tests. The results of the tests are shown in Table 1. BIV reactors were found in both herds, with 25% of cattle positive for antibody. Even more sera were positive for BSV (42%). Several cattle had antibodies to two of the viruses and one animal had antibody to all three viruses.

Discussion

The reactor rate to BIV in the animals tested was high at 25% and this probably reflected the biased nature of the sample taken. In the USA a prevalence rate of 4% has been suggested.[6,10]

The assay used has been shown to be specific for BIV.[9] No cross reactions occur with BLV and BSV or with four other common bovine viruses (BVD, IBR, PI3 and bovine parvovirus). Similarly, CAE and maedi virus did not cross react with BIV although equine infectious anaemia virus antibody did react with two proteins on the BIV western blot.[9] This suggests that the BIV antibodies detected were specific and that the virus is present in New Zealand cattle.

Table 1: Results of serological tests for antibody to bovine immunodeficiency-like virus, bovine leukaemia virus and bovine syncytial virus on 96 cattle sera

Virus	No. Positive	% Positive
BIV alone	13	13.5
BLV alone	6	6.2
BSV alone	27	28.1
BIV + BLV	1	1
BIV + BSV	9	9.4
BLV + BSV	3	3.1
BIV + BLV + BSV	1	1

Acknowledgement

I would like to thank Dr Cecelia Whetstone, National Animal Disease Center, Ames, USA, for performing the serological tests.

References

1 Parrish, C R, Oliver, R E, Weddell, W, Corrin K C, 1982: Bovine Leukaemia virus infection in New Zealand cattle. *New Zealand Veterinary Journal 30:* 56-58.

2 Chief Veterinary Officer, 1990: Chief Veterinary Officer's annual report 1989. *Surveillance 17 (3):* 11.

3 Malmquist, W A, van der Maaten, M J, Boothe, A D, 1969: Isolation, immunodiffusion, immunofluorescence, and electron microscopy of a syncytial virus of lymphosarcomatous and apparently normal cattle. *Cancer Research 29:* 188-200.

4 Johnson, R H, Oginnusi, A A, Ladds, P W, 1983: Isolations and serology of bovine spumavirus. *Australian Veterinary Journal 60:* 147.

5 Van der Maaten, M J, Boothe, A, Seger, C L, 1972: Isolations of a virus from cattle with persistent lymphocytosis. *Journal of the National Cancer Institute 49:* 1649-1657.

6 Whetstone, C A, Van der Maaten, M J, Black, J W, 1990: Humoral immune response to the bovine immunodeficiency-like virus in experimentally and naturally infected cattle. *Journal of Virology 64:* 3557-3561.

7 Gonda, M A, Braun, M J, Carter, S G, Kost, T A, Bess, J W, Arthur, L O, Van der Maaten, M J, 1987: Characterization and molecular cloning of a bovine lentivirus related to human immunodeficiency virus. *Nature 330:* 388-391.

8 Anon, 1989: $1 million grant funds study of BIV as model for AIDS. *Journal of the American Veterinary Medical Association 194:* 1391.

9 Whetstone, C A, Van der Maaten, M J, Miller, J M, 1991: A western blot assay for the detection of antibodies to bovine immunodeficiency-like virus in experimentally inoculated cattle, sheep and goats. *Archives of Virology 116:* 119-131.

10 Amborski, G F, Lo, J L, Seger, C L, 1989: Serological detection of multiple retroviral infections in cattle: Bovine leukemia virus, bovine syncytial virus and bovine visna virus. *Veterinary Microbiology 20:* 247-253.

G W Horner
Central Animal Health Laboratory