

ANTIBODY RESPONSES TO LACTIC ACID PRODUCING BACTERIA IN SHEEP IMMUNIZED WITH EXPERIMENTAL ACIDOSIS VACCINES

W.Y.BROWN, J.B.ROWE and D.L.WATSON

Animal Science, University of New England, Armidale, NSW 2351

Acidosis is an economically important disease of ruminant livestock, involving both reduced productivity and serious animal welfare implications. Major lactic acid producing bacteria in sheep were identified by Al Jassim and Rowe (1999) and it is likely that the proliferation of these bacteria, under certain feeding regimes, leads to acidosis. Antibiotic feed additives are currently used in management of acidosis but there are serious concerns about this approach and, consequently, vaccination against acidosis-producing bacteria as a means of preventing the condition is under active investigation in our laboratory. The aim of this trial was to measure antibody responses to a range of acidosis-producing bacteria, following administration of experimental vaccines.

Forty-nine healthy adult merino wethers were used for this study and run together as a single flock throughout the experiment. Animals were randomly allocated into 7 groups, to be immunized with one of six different bacterial isolates, or non-immunized as controls. Vaccines were prepared from pure bacterial isolates (formalin killed), emulsified in Freund's adjuvant, and administered intramuscularly at weeks 0 and 4. Freund's complete adjuvant was used for the primary immunization, and Freund's incomplete adjuvant was used for the secondary immunization. Samples of venous blood were collected before immunisation and every two weeks for ten week. Concentrations of IgG antibodies in serum were determined by ELISA.

Antibody levels produced in response to immunizations with each of the 6 isolates are shown in Table 1. Strong antibody responses were produced by the three streptococcal isolates, with peak antibody concentrations at week 6. There was a 12-fold increase produced by the two *S. bovis* strains, whereas a 57-fold increase was produced by the *S. equinus*. Antibody responses were also produced by *Selenomonas ruminantium*, with antibody levels reaching a peak at week 10. There was a relatively weak antibody response to *Lactobacillus vitulinus*.

Table 1. Mean concentrations of IgG antibodies in sheep serum following immunization with different bacterial isolates, as determined by ELISA (absorbance at 490 nm). Sheep were immunized at weeks 0 and 4.

Week	<i>S. bovis</i> Sb5	<i>S. bovis</i> A2	<i>S. ruminantium</i> R1	<i>S. ruminantium</i> R2	<i>S. equinus</i>	<i>L. vitulinus</i>
0	0.015	0.009	0.070	0.014	0.007	0.063
2	0.045	0.034	0.244	0.110	0.054	0.095
4	0.053	0.051	0.219	0.235	0.144	0.105
6	0.170	0.103	0.287	0.288	0.399	0.151
8	0.145	0.100	0.329	0.291	0.313	0.120
10	0.141	0.109	0.327	0.311	0.315	0.127

Antibody responses do not necessarily give an indication of protective immunity. Therefore, it cannot be concluded from the results of this study that vaccination with any of these bacteria might provide protection from acidosis. The ability to stimulate production of antibodies (or a cell-mediated response) is however the first necessary step towards development of an effective vaccine. All of the bacterial isolates examined in this study induced antibody production, and therefore warrant further testing for their ability to provide immune protection in situations where these bacteria are likely to be the causative agents in fermentative acidosis. Earlier studies by Gill *et al.* (2000) demonstrated that immunization against *S. bovis* can provide protection against lactic acidosis in sheep. It remains to be seen how these additional bacterial isolates compare in their ability to confer protection.

AL JASSIM, R.A.M. and ROWE, J.B. (1999). *Recent Adv. Anim. Nutr. Aust.* **12**, 91-7.

GILL, H.S., SHU, Q. and LENG, R.A. (2000). *Vaccine* **18**, 2541-8

Email: wbrown@metz.une.edu.au