

# Changes in Microbial Populations in the Rumen of Sheep after Overfeeding with Wheat

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The microbial populations in the rumen are influenced by the diet. When the ration is rapidly changed from roughage to high energy, lactic acid-producing organisms increase in numbers and lactic acid can accumulate in the rumen as well as blood, which leads to lactic acidosis. This study was conducted to compare changes in ruminal microbial populations after wheat engorgement. Five eighteen-month-old, fine wool Merino wethers were used, each of them was offered 1400 grams of wheat on day 0; 600 grams of wheat on day 1; and then the sheep were fed with lucerne chaff for a period. After 8 hours of feeding on day 0, all animals had eaten all the wheat being offered. The animals showed signs of acute lactic acidosis: runny diarrhoea, loss of appetite in the following days. The ruminal pH reduced from a range of 7.0~7.5 to 4.5~5.3.

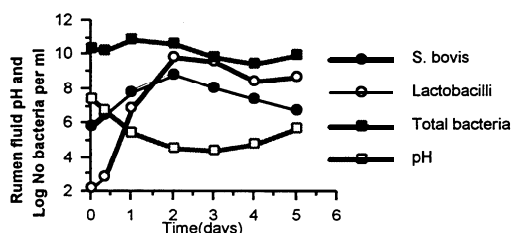
Rumen fluid samples from the rumen of sheep were collected and analysed to determine changes in microbial populations resulting from overfeeding with wheat. The total numbers of bacteria count, which was measured by counting chamber, increased on the following day after overfeeding with wheat and then reduced largely in the later days. After the sheep came back to pasture for several days, the numbers of bacteria increased up again. Before the animals were overfeeding with wheat, more than 70% of the bacteria in the rumen samples of all the sheep were Gram-negative; the predominant organisms would not grow on selective media which were designed to culture *Streptococcus bovis* and lactobacilli. In the following days after feeding with wheat, the proportion of Gram-positive bacteria increased significantly and predominated in the rumen fluid. *Streptococcus bovis* and lactobacilli were the most numerous organisms.

Changes of the numbers of this two organisms were compared by roll tube method. Figure 1 demonstrated the changes of the log numbers of the *Streptococcus bovis*, lactobacilli, and total bacteria; and the change of ruminal pH in one of the sheep.

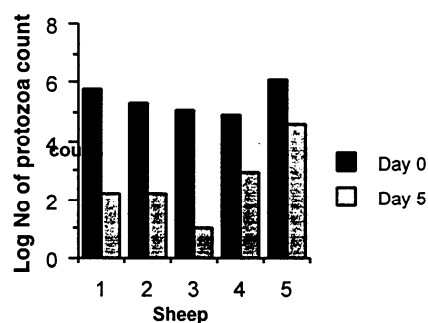
The numbers of ruminal protozoa were reduced significantly. The number of protozoa determined by direct microscopic count were ranging from  $8.8 \times 10^4$  to  $1.2 \times 10^6$  on the beginning of the day 0, while those were only from  $1.0 \times 10^1$  to  $3.7 \times 10^4$  per ml in the

samples of the sheep on the day 5. Figure 2 shows the log number of the protozoa counts for the 5 sheep before and after wheat overfeeding.

**Figure 1** The pH and Log Number of colony counts of *S. bovis* and lactobacilli, and total bacterial count in the rumen of the sheep.



**Figure 2** Protozoa count (per ml) before and after wheat introduced to the sheep.



## References

- Hobson, P.N. 1988. *The Rumen Microbial Ecosystem*. Elsevier Applied Science, London.
- Allison M.J., Robinson, I.M., Dougherty R. W., and Bucklin J.A. 1975. Grain Overload in Cattle and Sheep: Changes in Microbial Populations in the Cecum and Rumen. *Am J Vet Res*, 36: 181-185.