

Effects of feed additives on rumen fungi. J-S Chang, RE Calza (*Department of Animal Sciences, Washington State University, Pullman, WA USA 99164-6332*)

Several feed additives have been used to enhance animal performance. Research has shown that response to microbial based products is seldom predictable [1]. With detailed information about mode of action it is hoped that less variable products can be developed. Research described here investigates one such product (AmafermTM, Biozyme Inc., St. Joseph, MO) which has increased the production of dairy animals. *Neocallimastix frontalis* EB 188 was used as an in vitro testing system [2].

Secretion of fungal cellulase xylanase, β -glucosidase and changes in morphology were recorded. Calculations suggest the fungal response coefficient remains constant in the presence of varying amounts of additive. A positive correlation between the enhancement of mycelium surface area and enzyme secretion levels is apparent. The additive may also promote leakage of normally intracellular proteins such as malate dehydrogenase. Pilot experiments using organic extractions of this product show that the active component(s) is moderately polar and can be concentrated. Thin layer chromatography separates the extract into inert and intensely stimulating fractions. Wheat bran which serves as carrier for this product caused an acceleration of fungal physiology although it was heat labile.

It has not been possible to suggest a plausible mode of action for this feed additive but the process may involve changes in microbial populations within the rumen [3]. Several grams of AmafermTM is typically fed to each animal per day. We

therefore believe that the active component(s) does not act directly as a nutritional factor or degradative enzyme. It remains feasible that by accelerating fungal physiology, AmafermTM increases the rate or extent of fiber degradation. This, in turn, may be responsible for enhanced animal performance.

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2. Welch RP, Tsai K-P, Harper EG, Chang JS, Calza RE (1996) *Appl Microbiol Biotechnol* 45, 811-816
3. Newbold CJ, Brock R, Wallace RJ (1992) *Lett Appl Microbiol* 15, 109-112

Dietary and chemical manipulation of rumen fermentation. M Baran (*Institute of Animal Physiology, Slovak Academy of Sciences, Košice, Slovakia*)

Fermentation activity in the rumen appears to be the key component of the digestive processes in ruminants. By manipulating rumen fermentation it is possible to obtain improved conversion of feed to animal products. Two approaches are available to increase the efficiency by which ruminants utilise dietary energy. These are firstly increasing the efficiency by which the energy of feed ration is transformed into end-products of rumen fermentation, especially into volatile fatty acids (VFA), and, secondly, increasing the efficiency by which the end-products of fermentation are utilised for the basal physiological processes and synthesis of animal products.

Fermentation processes in the rumen may be increased and the production of undesirable digestion products (methane) suppressed in two ways: 1) by feed ration including feed intake and composition, and