

differ for V groups. Biweekly means for fecal pH and DM for all cows were 6.43 and 16.01, respectively and did not differ between treatments.

KEY WORDS: Enzyme culture, lactating cows, enzyme for cows.

P 31 Ruminal digestion of protein and fiber in duodenally cannulated cows treated with Vitaferm. R.C. Wanderley*, J.T. Huber, C.B. Theurer and M. Poore. Dept. of Animal Sciences, University of Arizona, Tucson.

Two dry and three lactating Holstein cows, fitted with duodenal cannulae, were used to study the effect of an enzyme-producing culture from *Aspergillus oryzae* (Vitaferm) on fiber digestion in the rumen and protein supply to the small intestine. Two of the lactating cows were also fitted with ileal cannulae. The two dry cows were fed a 2:1 roughage to grain diet (R) and the three milking cows a 1:1 ratio of roughage to grain (C) with or without 90 g/day Vitaferm in two periods of 25 days. Four samples of duodenal digesta were collected per day during the last four days of each experimental period. Chemical analyses were performed on samples pooled for each day.

No difference between Vitaferm (V) and non-Vitaferm (N) treatments were observed for duodenal dry matter content (V=4.96% and N=4.98%), or duodenal pH (3.73 vs 3.74). Based on lignin as a flow marker, protein supply to the duodenum was 150 and 154% of intake for V and N, respectively. However, gain in protein was higher for higher concentrate (120 vs 170%). Duodenal to dietary ADF to lignin ratio showed a 9% benefit for V (.81) vs NV (.88), and a large difference between R (.68) and C (.95). There was no intestinal disappearance of ADF or cellulose. Intestinal protein digestion was 60% for V and 68% for NV.

Culture of duodenal digesta indicated passage of *Aspergillus* spores into the duodenum. Microscopic examination of fiber particles reaching the duodenum of V cows showed attachment of *Aspergillus* fungus. Another fungus was also observed colonizing the fiber fragments passing into the duodenum. Partially supported by Biozyme Corp., St. Joseph, MO.

KEY WORDS: *Aspergillus oryzae*, ruminal digestion, enzyme for cows

P 32 Estimation of body composition by deuterium oxide dilution of lactating and dry Holstein cows. F. R. Ehle*, and R. A. Martin. USDA ARS U. S. Dairy Forage Research Center, University of Minnesota, St. Paul.

Body composition measurements, by direct and indirect methods, are relatively routine for feedstuff, plane of nutrition and breed evaluations with beef cattle and sheep. However, there is a lack of similar research information on dairy cows. The objectives of this research were to: compare body composition estimates, via deuterium oxide dilution, obtained from lactating and dry Holstein cows; evaluate several deuterium oxide sampling sites; and compare body composition estimates during lactation of Holstein cows fed three levels of grain in total mixed diets. Results indicated similar body composition estimates for lactating and the same cows that were dried-off and resampled within approximately one week. Slopes of deuterium oxide excretion curves indicated lactating cows turned water over more rapidly than nonlactating cows. However, the sizes of the total body water pools had not changed. Deuterium oxide dilution patterns in milk, urine and feces, but not rumen contents were similar to that in blood. Cows fed 45% grain had more empty body fat than cows fed 25% grain. Empty body water, protein, mineral and fat weights decreased from pre- to postpartum. Gastrointestinal fill of cows increased from prepartum to 5 months postpartum. The deuterium oxide dilution technique appears to be a reliable predictor of body composition of live Holstein cows.

KEY WORDS: Body Composition, Deuterium Oxide, Lactation, Water Turnover.

P 33 Suitability of selected semipurified diets for dairy heifers; growth and digestion. F. A. Martz, R. Nieto Ordaz and M. F. Weiss. Missouri Cluster U.S. Dairy Forage Center, USDA-ARS, University of Missouri-Columbia.

Fifteen Holstein heifers were used to evaluate two semipurified diets for their potential