

# NITROGEN UTILIZATION AND PERFORMANCE IN RUMINANTS FED OSCILLATING DIETARY PROTEIN LEVELS

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(ABSTRACT)

Nitrogen excreted by ruminants may negatively impact the environment, and N not retained is not utilized for growth and production. Experiments were conducted to examine the effect of 48 h oscillation of two levels of low ruminally degradable dietary CP on N metabolism in lambs and performance of steers. In Exp. 1, a metabolism trial was conducted with 28 lambs (31 kg), allotted to four different diets: 8% CP, 10% CP, 12% CP, and 8% and 12% CP diets oscillated every 48 h. After adaptation, transition, and preliminary periods, feces and urine were collected for 10 d. Ruminal fluid and blood samples were taken at the end of collection and again 2 d later. In Exp. 2, 24 crossbred steers (228 kg) were allotted to four diets: 1) 7.5% CP, 2) 9% CP, 3) 10.5% CP, and 4) 7.5% and 10.5% CP diets oscillated every 48 h. Feed intake was measured during the 112 d study, and ADG and gain to feed ratio were calculated. Cattle were weighed every 14 d and blood samples were taken every 28 d. In Exp. 1, N retention was lowest ( $P < 0.05$ ) for the lambs fed the 8% CP diet, with no differences among lambs fed the other diets. Differences in urinary N excretion accounted for most of the differences in total N excretion. Ruminal  $\text{NH}_3\text{-N}$  and BUN levels were greater in animals fed higher amounts of CP. Ruminal pH and VFA concentrations were not affected by diet. In Exp. 2, feed intake did not differ among

steers fed different diets. Average daily gain was lowest for cattle fed the 7.5% CP diet. No significant difference was evident for ADG between steers fed the 7.5/10.5% CP oscillating diet and those fed the 9% or the 10.5% CP diet. Gain to feed ratio was lower ( $P < 0.05$ ) for steers fed the 7.5% CP diet compared to steers fed all other diets. Blood urea N level was higher for cattle fed the 10.5% CP diet than those fed the two lower CP levels, and differences were usually significant ( $P < 0.05$ ). No consistent significant difference in BUN levels existed between steers fed the 7.5/10.5% CP oscillating diet and those fed the 9% and 10.5% CP diets continuously. Oscillating two levels of low ruminally degradable dietary CP every 48 h had no significant effect on N retention in lambs nor on the performance of steers compared to animals fed the same level of CP daily in these experiments.

Key Words: N retention, Protein, Daily gain, Ruminants, Environment