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Control of Feed Intake in Ruminants
Continuous Rumen Infusion Studies
(Project 802)

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Since the requirement of animals for net energy for maintenance (NEm) is influenced largely by weight of the animal, feed efficiency and animal performance improve rapidly as feed intake surpasses maintenance requirements. Once that constant "overhead" is satisfied, remaining nutrients are available for growth and production.

The object of the study reported here was to see if ruminants are capable of digesting and metabolizing nutrient intakes in excess of what they normally consume.

Fistulated sheep were the experimental animals. The basal diet is shown in Table 3 . The ingredients were suspended in water, filtered through cheesecloth, held in suspension by continuous agitation, and continuously metered with a peristaltic infusion pump into the rumen, (through the rumen fistula). Continuous infusion was to remove the effect of "meal" eating and to establish constant conditions in the rumen. Animals were adaped to an all-concentrate ration before being switched to the liquid diet.

Results

Sheep have been maintained on the system up to 30 days. In early studies, several sheep died after rapid breathing and increased body temperature. Autopsy showed no abnormal tissues or pathological conditions. Later experience shows the trouble may have been water intoxication. Volume of liquid pumped is now held at four liters per day. The liquid diet maintains nitrogen balance, and holds blood mineral components in the normal range. Although the diet is all concentrate, and almost totally digested, rumen end-products have remained normal and rumen parakeratosis has not developed.

In future experiments, infusion rate will be increased to find out what physiological or biochemical pathways limit the ability of ruminants to utilize nutrients.

TABLE 3. Composition of Liquid Diet Infused into the Rumen

Ingredients	Amount (daily)
Corn starch	230 gm
Cane sugar	115 gm
Purified casein	50 gm
Urea	5 gm
K_2Co_3 1 1/2 H_2O	37.4 gm
CaCl	9.1 gm
Na_2HPO_4	11.9 gm
$MgCl_2$ 6 H_2O	12.9 gm
NaCl	10.0 gm
$FeCl_2$ 4 H_2O	780 mg
$MnSO_4$ H_2O	237 mg
$ZnSO_4$ H_2O	391 mg
Na_2MoO_4 2 H_2O	7 mg
$CoCl_2$ 6 H_2O	1 mg
$CuCl_2$	34 mg
KI	1 mg
$CuK(SO_4)_2$ 12 H_2O	1 mg
Vitamin A	1100 IU
Vitamin D	300 IU
Vitamin E	11 IU
Water to make 4 liters	