

Impact of Forage Proportion and Particle Length on Supply of Amino Acids

Wen Z. Yang and Karen A. Beauchemin

Research Center, Agriculture and Agri-Food Canada, P. O. Box 3000, Lethbridge AB T1J 4B1
Email: yangw@agr.gc.ca

Forage proportion and particle length are the main factors that contribute physically effective fibre (peNDF) to the diet, which helps prevent ruminal acidosis. It is not clear whether these factors also affect protein metabolism in the rumen, and thus the quantity and quality of protein reaching the duodenum. The objective of this study was to investigate whether the supply of amino acids (AA) to the duodenum and digestibility of those AA in the intestines vary with dietary particle length and forage proportion.

Four ruminally and duodenally cannulated lactating cows were used in an experiment designed as a 4 × 4 Latin square with a 2 × 2 factorial arrangement of treatments. Four diets were formulated using two cuts of alfalfa silage, short (5/16") and long (3/4"), combined with two ratios of forage to barley grain concentrate (35:65 or 60:40, dry matter basis, DM). Intake of AA was not affected by forage proportion although DM intake was higher with low (20.6 kg/d) forage than with high (18.3 kg/d) forage diets (Table 1). Overall, flows of microbial and total AA at the duodenum, and digestibility of AA (% of duodenal flow) in the intestine were higher with low forage than with high forage diets. However, varying forage particle length did not affect the flow and intestinal digestibility of AA.

Table 1. Intake, duodenal flow, and intestinal digestibility of amino acids (AA)

	Forage:grain 35:65		Forage:grain 60:40		SE
	Short	Long	Short	Long	
AA Intake, kg/d	2.81	3.27	3.03	2.91	0.21
Microbial flow ^a , kg/d	1.70	1.86	1.51	1.37	0.22
Total flow ^a , kg/d	3.22	3.34	2.65	2.43	0.26
Digestibility ^a , %	68.2	67.0	64.1	63.0	3.4

^aRatio of forage:grain was significant at $P < 0.05$.

Implications: Increasing forage proportion to increase dietary peNDF reduced overall AA supply because flow and intestinal digestibility of AA were reduced. However, increasing particle length had only marginal effects on AA supply.