THE FLOW OF ENDOGENOUS PROTEIN TO THE OMASUM AND ABOMASUM OF CATTLE

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There are very few published estimates of flows of endogenous protein in the digestive tract of cattle. This information is required for the correction of nitrogen (N) flow measured over a range of dietary intakes. In this experiment endogenous protein flowing to the omasum and abomasum of cattle was measured.

Alkali-soaked oat straw was washed free of digestible crude protein with NaOH and then sprayed with a mineral mixture plus urea at a rate of 13 g N/kg. The diets were also sprayed with indigestible markers (^{52}Cr EDTA and $^{101}Ru(phen)_3 Cl_2$) (McGarrity and Siebert 1977). The flow of endogenous protein N (EPN) to the omasum and abomasum was measured by difference between the total protein N and the sum of the non-protein nitrogen (NPN), microbial protein N (MPN) and undegraded dietary protein N fractions. The NPN fraction was estimated by tungstic acid precipitation and the MPN fraction by ^{15}N. Between 1.70 and 4.08 kg/day of the diet was fed to three steers (300 kg live weight) fitted with rumen and abomasal cannulae. Omasal samples were obtained by suction through a tube passed into the omasum via the rumen.

TABLE 1 Flow of total nitrogen (TN), microbial protein nitrogen (MPN), non-protein nitrogen (NPN), and endogenous protein nitrogen (EPN) to the omasum and abomasum, and the gain in EPN in the abomasum of calves fed alkali-washed oat straw at different dry matter intakes (DMI)

Calf	DMI (kg/day)	N intake (g/day)	N flow (g/day)							EPN gain	
			Omasum				Abomasum			Abomasum	
			TN	MPN	NPN	EPN	TN	NPN	EPN	(g/day)	(g/kg DMI)
2	4.08	59.2	62.4	31.7	12.5	8.4	77.4	9.6	26.3	17.9	4.4
2	3.45	50.0	52.0	22.2	13.7	7.8	69.8	9.4	29.9	12.1	3.5
3	3.11	45.1	44.1	21.8	7.6	7.2	52.2	8.4	14.5	7.3	2.3
1	3.06	44.4	41.8	19.5	7.5	7.5	55.2	6.0	22.4	14.9	4.9
3	2.66	38.6	42.6	24.2	5.8	6.0	60.3	5.8	23.9	17.9	6.7
2	2.42	35.1	28.1	14.0	4.8	3.4	49.6	7.4	22.4	19.0	7.8
1	2.33	35.4	31.6	14.1	7.4	4.4	51.2	7.3	24.1	19.7	8.4
3	1.70	24.7	27.7	14.3	9.0	0.3	42.3	3.0	21.9	16.0	9.4

The mean flow of EPN to the omasum was 5.6 g/day or 2 g/kg DMI and to the abomasum 23 g/day or 8 g/kg DMI. These EPN values do not estimate the total secretions of EPN but the difference between their secretion into the forestomachs and their absorption to the omasum and abomasum. Also, the above estimates of EPN have a large standard error due to their method of calculation by difference.

Kennedy and Milligan (1980), using similar methods of calculation but from ^{15}N studies, found that EPN flow to the abomasum in sheep fed brome grass was about 5 g N/kg DMI of which about 1 g N/kg DMI was from saliva, 1 g N/kg DMI from gastric secretions and the remainder of about 3 g N/kg DMI were due to the sloughing of rumen epithelium. In the present experiment, gastric secretions represented 5.9 g/kg DMI of the flow to the abomasum while saliva and other sources added only 2.2 g EPN/kg DMI to the flow of N at the abomasum.

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