

EFFECT OF VARIOUS RUMEN DEGRADABLE PROTEIN SOURCES ON THE RATE OF FIBRE DIGESTION OF VARIOUS FORAGES IN CATTLE CONSUMING SPEARGRASS HAY

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Rumen degradable protein (RDP) is an important determinant of the rate of fibre digestion. Inadequate RDP supply can inhibit fibre digestion (Dijkstra et al. 2002), while RDP rich in amino acids, nucleic acids or polyphenols may enhance it (Atasoglu et al. 1999; Dijkstra et al. 1998). This study investigated the effect of a range of N sources on the rate of digestion of fibre of forages varying in quality.

Rumen-cannulated, Brahman, crossbred steers (n=7, 304 ± 19 kg LW) were used in a 7 treatment x 3 run, incomplete latin-square design. Steers were fed speargrass (*Heteropogon contortus*; 2.9 g N, 746 g NDF/kg DM) hay alone (Control) or with casein, algae, yeast, cottonseed meal (CSM), amino acids (AA) or urea-sulphate solution (US) as supplementary sources of RDP. The ration provided 0.5 kg DOM/100 kg W with an RDP/DOM ratio of approximately 170 g RDP/kg DOM except for the control (35 g RDP/kg DOM). Supplements were administered through the cannula except for the US solution, which was mixed with the basal diet. Three forages, speargrass, Flinders/Mitchell grass (*Iseilema vaginiflorum*, 55%/Astrebla spp, 36%; 4.7 g N, 603 g NDF/kg DM) and ryegrass (*Lolium aristocratum*; 31.1 g N, 599 g NDF/kg DM) were incubated in nylon bags in the rumen of each steer for 3, 7, 10, 14, 24, 48, 72 and 96 hours. Dry matter disappearance data from the incubated samples was fitted to the degradation curve equation, $Y = a + b(1 - \exp^{-ct})$, where 'a' is the immediately soluble fraction, 'b' is the slowly fermentable fraction, 'a+b' represents potential degradability, 'c' is the degradation rate (%/hour) and 't' is the incubation time (hours). Results are shown in Table 1 for main effects of forage type and supplement.

Table 1. Dry matter degradation parameters of a range of forages and N supplements (main effects)

Feed type	a (g/100 g DM)	b (g/100 g DM)	a+b ¹ (g/100 g DM)	c (h ⁻¹)	ED ² (g/100 g DM)
Forage incubated					
Speargrass	6.3 ^c	49.6 ^c	56.9 ^c	0.027 ^b	34.9 ^c
Flinders/Mitchell grass	16.0 ^a	54.1 ^b	70.1 ^b	0.030 ^b	48.1 ^b
Ryegrass	9.5 ^b	76.4 ^a	85.9 ^a	0.092 ^a	72.6 ^a
SEM	1.79	0.8	1.33	0.003	1.08
Supplement					
Control	12.2	60.2	72.5 ^a	0.036 ^b	49.3 ^d
Casein	11.4	60.0	71.3 ^{ab}	0.051 ^a	52.7 ^{ab}
Algae	9.1	62.0	71.1 ^{ab}	0.057 ^a	53.3 ^a
Yeast	11.9	59.0	71.1 ^{ab}	0.053 ^a	53.6 ^a
CSM	11.0	59.9	70.8 ^{ab}	0.051 ^a	52.7 ^a
AA	9.8	59.2	69.0 ^b	0.052 ^a	51.1 ^{bc}
US	8.8	59.8	68.9 ^b	0.050 ^{ab}	50.4 ^{cd}
SEM	2.0	1.3	1.4	0.004	1.2

¹potential degradable fraction; ²effective degradability at rumen outflow rate 0.02/h. Within feed types, different superscripts in a column indicate significant differences between forages or supplements (P<0.05).

As expected, the higher quality ryegrass had a much higher potential degradability, degradation rate and effective degradability than those of the 2 tropical forages. All N sources increased the rate of degradation and effective degradability of the forages with no significant interaction between substrate and supplement type. This finding indicated an effect of RDP inclusion in the speargrass-based diet on digestion characteristics consistent across all incubated forages. Furthermore, inclusion of nutrients such as amino acids, degradable protein and nucleic acids in the diet provided no additional benefit compared with non-protein N in altering the rate of digestion.

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