Effectt of Supplements on Forage Degradability of *Brachiaria brizantha* cv. Marandu Grazed by Steers

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EFFECTT OF SUPPLEMENTS ON FORAGE DEGRADABILITY OF *Brachiaria brizantha* cv. Marandu GRAZED BY STEERS*

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Abstract

The supplementation effect was evaluated using crossbred rumen-fistulated steers maintained in a *Brachiaria brizantha* cv. marandu pasture. The animals received energy supplementation (corn-COR); low degradability protein supplementation (corn gluten-GLU); and high degradability protein supplementation (soybean-SBM) at two levels N1 (± 0.5 kg/an/day) and N2 (± 1.5 kg/an/day); or no supplementation (Control). The factorial (3x2), plus the control, was studied according to complete randomized block design with three replications. The supplementation did not affect (P> 0.05) the potential degradability (POD), the effective degradability (EFD), and the degradation rates (DR) of the forage (extrusa). The GLU supplementation provided higher (P< 0.05) EFD of the NIDN fraction than the SBM, and both did not differ (P> 0.05) of the COR treatment. The data allowed to conclude that the supplementation used did not provide alterations in the forage degradability, probably due to the low N-NH_3 level and the non-variation of the ruminal pH.

.**Keywords:** Beef cattle, Brachiaria, degradability, grazed, forage, supplements

Introduction

The animal performance is limited during the dry season and weight loss is observed in many cases. Small quantities of energy and available nitrogen can increase the digestibility and intake of low quality forage. Feed with protein of low degradability in the rumen can increase the tissue metabolism and forage intake. The transference of the rumen protein depends of the protein characteristics and protein-energy availability (Hunter, 1991). Forage with CP below 100 g/kg of DM may reduce the microbial protein synthesis, probably due to the deficiency of aminoacids, ammonia and energy deficiency to the rumen microorganisms. The diet should contain a minimum of 170 g of CP/kg of fermentable OM to allow maximum microbial protein synthesis (NRC, 1996).

The objective of the study was to evaluate the supplementation effect on forage degradability utilizing bovines that were maintained in *Brachiaria brizantha* cv. Marandu pasture.

Material and methods

This experiment was conducted at the UNESP, in Jaboticabal-SP, Brazil, utilizing seven crossbred steers, rumen-fistulated, with an average weight of 480 kg. The animals were maintained in *Brachiaria brizantha* cv. Marandu pasture with an availability of total DM of 9000 kg/ha. The following treatments were evaluated: forage without supplementation (Control) or supplemented with energy (corn-COR), low degradability CP (corn gluten-GLU), and high degradability CP (soybean-SBM), at two levels N1 (± 0.5 kg/day) and N2 (± 1.5 kg/day). The forage used to evaluate the degradability was collected utilizing two animals with esophageal fistula. The potential degradability (POD) of the different feed fractions was calculated using the mathematical model of Mehrez and Orskov (1977). The effective

degradability (EFD) was calculated using the model of Orskov and Mcdonald (1979). The rate of passage was determined utilizing chromium oxide as marker, according Pereira et al. (1997). The ruminal pH values were determined using a pH meter. The ammoniacal nitrogen concentration ($N\text{-}NH_3$) was dosed according to Freeman et al. (1992). The contents of dry matter (DM), crude protein (CP), neutral detergent fiber (NDF), neutral detergent insoluble nitrogen (NDIN), acid detergent fiber (ADF), acid detergent insoluble nitrogen (ADIN), lignin, cellulose, hemicellulose, and minerals were determined according to AOAC (1990) methods. It was used a complete randomized block design with three replications, being the treatments arranged in a factorial scheme (3 x 2), compared with the control.

Results and discussion

The supplementation did not affect ($P > 0.05$) the degradability of DM and NDF of the extrusa (Table 1). Changes in forage quantity and quality can affect the animal grazing activities, and eventually affect supplementation responses (Hunter, 1991).

In the present study the forage grazed presented low N content, below 1%, which according to Hunter (1991) would limit the rumen microbial synthesis.

The energy supplementation did not affect the degradation rates of the DM and NDF (Table 1). Feed with a high starch content can reduce the fiber degradation due to the low ruminal pH, and lower activity of the cellulolithic bacteria. In this study it was not observed a significant alteration in the ruminal pH, which varied between 6.25 and 6.93. The average pH value (6.48) can be considered appropriated to the rumen enzimatic process (Valadares et al. 1997). Mertens and Loften (1980) showed that higher starch intake increased the lag time of the forage particles, and did not affect the fiber degradation rate.

The POD, EFD, and DR of the CP extrusa were not affected by the treatments (Table 2).

The supplementation affected (P< 0.05) the EFD of NIDN (Table 2). The GLU supplements increased the NIDN effective degradability (57.15%) in relation to the SBM (49.11%). It was observed the same degradability of NIDN for the COR and GLU. However the supplementation level did not affect the effective degradability of NIDN.

The NIDN effective degradability, and DR values observed in this study were higher than 3%/h, related by the NRC (1996) for high quality forage.

The SBMN2 increased the ruminal N-NH_3 content (P < 0.05); the average value observed was 14.5 mg/100 ml. The N-NH_3 values observed for the other treatments were 4.90 (SBMN1); 2.73 (GLUN1); 4.28 (GLUN2); 2.68 (CORN1); 2.78 (CORN2), and 3.64 mg/mol (Control).

The supplements resulted in N-NH_3 lower than 5 mg/100 ml, and according to Hunter (1991) and Valadares et al. (1997) this level is appropriate to maximum fiber degradation. Freeman et al. (1992) observed that the supplementation with protein (0, 132, 264, and 260 g/animal/d) increased N-NH_3 ruminal levels. These authors observed levels of N-NH_3 below 5 mg/100ml in the ruminal fluid.

The data allowed to conclude that the supplementation used did not provide alterations in the forage degradability, probably due to the low N-NH3 level and the non-variation in ruminal pH.

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Table1 – Potential (POD) and effective (EFD) degradabilities and degradation rates (DR) of the dry matter (DM), and neutral detergent fiber (NDF) of the extrusa.

Treatments	POD (%)	EFD (%)	DR (%/h)
		DM	
Control	61.15	38.66	3.74
CORN1	54.17	36.91	3.22
CORN2	52.12	35.87	2.76
GLUN1	59.25	43.34	3.70
GLUN2	58.24	38.12	3.47
SBMN1	57.91	35.27	3.99
SBMN2	58.55	37.70	3.50
Means	57.34	38.03	3.48
		NDF	
Control	62.87	34.08	3.55
CORN1	55.67	33.05	3.10
CORN2	52.28	31.54	2.65
GLUN1	60.86	40.31	3.49
GLUN2	60.93	34.86	3.38
SBMN1	60.70	31.13	3.98
SBMN2	60.57	33.83	3.44
Means	59.12	34.19	3.37

Table 2 – Potential (POD) and effective (EFD) degradabilities and degradation rates (DR) of crude protein (CP), and neutral detergent insoluble nitrogen (NDIN) of the extrusa.

Fractions	Control	CORN1	CORN2	GLUN1	GLUN2	SBMN1	SBMN2
				CP			
POD (%)	85.48	86.64	81.98	88.24	83.69	84.41	88.82
EFD (%)	56.16	61.51	56.80	66.12	56.29	52.39	59.70
DR (%/h)	3.89	4.41	3.23	4.19	3.71	3.95	4.53
				NDIN			
POD (%)	77.81	70.26	69.73	74.31	75.23	64.87	70.06
EFD (%)	55.70	50.15	54.13	59.36	55.93	46.18	51.44
Means	-	52.11 ab		57.15 a		49.11b	
DR (%/h)	4.04	3.35	3.36	3.95	4.22	3.03	3.05