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RUMEN DEGRADABILITY OF SOME TROPICAL STUFFS

A Parra, J Combellas y R Dixon

Instituto de Producción Animal, Facultad de Agronomía, Universidad Central de Venezuela, Maracay, Venezuela.

Different concentrate feeds and fresh and fresh or stove dried roughages were incubated for 8 and 24 hours in the rumen of cattle fed elephant grass (*Pennisetum purpureum*), using nylon bags. The sources of energy studied showed a high N degradability, with the exception of sorghum. The sesame byeproducts and soya flour showed the highest degradability among the protein sources analysed. The N degradability of the different roughages was reduced by stove drying and, in the case of the two forages, fell with the age of the plant.

Key words: N degradability, DM degradability, nylon bags, stove drying.

The new systems of protein evaluation for ruminants (ARC, 1980; INRA, 1978) require knowledge of the rumen degradability of the nitrogen (N) in the ration's components for their application. Little information is available on this subject under tropical conditions, yet it is essential if the N requirements of the rumen microorganisms and the animal's protein requirements are to be met correctly.

The purpose of the present study is to determine the rate of degradation of the dry matter (DM) and the N of some feeding stuffs commonly used in Venezuela.

Materials and Methods

The nylon bag technique described by Ørskov *et al.* (1980) was used to determine the rate of disappearance of the DM and N of the energy and protein feeds shown in Tables 1 and 2, as well as of elephant grass (*Pennisetum purpureum*), swazi grass (*Digitaria swazilandensis*), a sorghum silage and brewers grains.

Sample preparation: Half of the samples of elephant grass, swazi grass, brewers grains and sorghum silage were dried in a stove at 70°C during 48 hours and was milled using a 3 mm screen. The rest of the samples were chopped fresh using a Moulinex household chopper, and then stored in a freezer. The samples of the concentrate materials were milled using a 3 mm screen. Then, 10 g samples of the fresh chopped forage and 5 g of the other materials were placed in nylon bags of approximately 15 x 11 cm (pore size 12 µm, nylon filter HS013 Henry Simon, Cheshire, UK).

Incubation: All samples were incubated in duplicate during 8 and 24 hours in the rumen of two zebu bulls of 255 and 272 kg liveweight, fitted *able 1:*

Rumen degradability (%) and half time of disappearance (T 1/2) of the DM and N in some protein and energy feeding stuffs

	DM degradability					N degradability			
	0 h	8 h	24 h	T 1/2(h)	CP(%)[1]	0 h	8 h	24 h	T 1/2 (h)
Energy feeding stuffs									
Sorghum grain	2.8	3.8	13.3	139	12.0	10.2	13.8	31.7	58
Ground sorghum	19.8	47.7	73.5	15	12.0	22.5	56.0	85.3	10
Sorghum flour	11.2	45.1	63.5	20	10.4	13.8	47.8	76.7	13
Wheat bran	32.2	69.2	75.5	18	19.0	37.1	87.4	94.6	7
Maize flour I	10.3	61.3	88.6	8	11.2	26.7	74.2	94.5	7
Maize flour II	29.7	78.8	90.0	5	9.2	25.7	81.2	96.2	6
Rice grain	0.8	82.9	98.9	4	11.2	13.2	83.8	99.7	3
Ground rice	4.1	94.9	99.2	4	11.2	24.5	95.6	99.6	3
Protein feeding stuffs (vegetable origin)									
Sesame cake	11.4	50.8	73.7	14	46.9	16.9	94.7	95.6	7
Sesame flour	16.8	57.4	82.2	15	46.9	21.9	92.9	97.3	5
Soya flour	25.3	55.1	97.5	5	47.0	25.8	59.5	98.5	4
Cotton seed cake	32.3	39.2	60.9	29	45.0	47.0	55.3	75.8	21
Canavalia[2]	35.6	51.6	65.9	27	25.9	48.0	69.7	80.5	18
Winged bean[3]	30.0	50.0	85.2	10	34.9	23.3	53.8	90.6	8
Protein feeding stuffs (animal origin)									
Fish meal	22.1	35.5	38.9	75	64.7	22.8	37.3	42.4	62
Meat meal	32.8	35.8	54.3	41	50.0	41.6	44.6	75.7	18
Poultry meal I[4]	41.9	61.9	62.9	43	83.9	44.7	82.9	83.9	16
Poultry meal II[4]	31.6	48.4	68.5	35	65.8	40.1	84.1	88.7	12

1) CP: Crude protein. 2) Canavalia grain (*Canavalia ensiformis*). 3) Grain of *Phosocarpus tetragonolobus*, ground. 4) Poultry meal I and II: meat and bone meals with low and high proportions of feathers, respectively.

Table 2:

Rumen degradability (%) and half time of disappearance (T 1/2) of the DM and N in some roughages.

		DM degradability					N degradability			
		0 h	8 h	24 h	T 1/2(h)	PC(%)	0 h	8 h	24 h	T 1/2(h)
Brewers grains (fresh)		6.2	46.1	56.6	23	27.9	19.1	71.9	79.8	13
Brewers grains (dry)		5.3	24.8	43.9	26	27.9	8.5	44.8	64.2	19
Sorghum silage (fresh)		20.8	40.6	48.5	42	9.2	33.4	51.7	56.9	42
Sorghum silage (dry)		10.4	23.3	35.2	53	9.2	32.3	36.1	51.4	48
Elephant grass (fresh)	(25 days)	14.4	35.2	62.1	20	11.7	40.0	61.8	81.8	14
	(35 days)	13.3	41.5	56.0	26	7.7	29.9	58.9	74.0	18
	(50 days)	12.9	28.5	52.2	28	7.6	30.1	38.4	67.0	21
Elephant grass (dry)	(25 days)	12.8	33.2	61.8	20	11.7	26.1	48.2	77.9	14
	(35 days)	10.3	40.1	53.2	27	7.7	21.7	56.2	70.2	18
	(50 days)	11.3	25.9	50.2	29	7.6	29.2	35.1	64.3	23
Swasi grass (fresh)	(25 days)	16.4	43.8	62.9	21	9.6	32.1	56.1	76.9	16
	(35 days)	21.0	31.6	52.6	33	8.5	43.0	57.9	73.2	22
	(50 days)	17.7	28.4	51.6	31	6.8	29.7	42.9	67.3	25
Swasi grass (dry)	(25 days)	14.8	41.3	60.3	23	9.6	37.7	49.8	71.5	21
	(35 days)	12.9	25.1	50.7	29	8.5	30.7	50.2	71.3	19
	(50 days)	19.7	30.2	49.2	36	6.8	22.0	40.0	60.8	24

with rumen cannulae. Once the bags were removed, they were rinsed with water, then drained and dried at 70°C for 48 hours. The degradability of the MS was estimated by difference. The N content of the samples before and after introduction into the rumen was estimated (AOAC, 1965) and degradability calculated by difference. Solubility was determined at zero hours in a saline solution of 9 g NaCl/litre of water. The bulls were fed a diet of elephant grass of about 65 days' regrowth ad libitum, as their only ration. The half time (T 1/2) of the degradability of the insoluble DM and insoluble N was calculated according to the method described by Kempton (1980).

Results and Discussion

The crude protein content and rumen degradability of the DM and N of the concentrate and roughage feeds analysed are shown in Tables 1 and 2. Although the frequency of sampling was very low for the purpose of describing the degradation curve of the materials studied, the results obtained do permit a general estimate for feed stuffs used under our conditions, for which information is extremely scarce. The T 1/2 values of degradation of insoluble DM and N were also calculated, and these have the same limitations. In any case, the degradability cannot be expressed by a single value since it varies considerably with the outflow rate (Ørskov et al 1983).

The N degradability of the energy feeds was high at 8 as well as at 24 hours, with the exception of the whole and ground sorghum. Other work at this Institute (Rivero *et al.*, 1984) has shown a low digestibility of diets based on sorghum silage, with a large proportion of grains being excreted directly in the faeces without being digested. The degradability of maize flour is higher than that obtained in other studies revised by the ARC (1980). This is probably due to the fact that, under Venezuelan conditions, the maize flour used as animal feed is a very fine milling byeproduct chiefly made up of the floury endosperm and the cuticle, while the main part of the product is destined for human consumption.

In the protein feeds, the high degradability of the N of the sesame meal and cake and of the poultry meat meals is notable. The local fish meal gave the characteristic curve with a low content of degradable insoluble protein described by other workers (Miller, 1982).

Stove drying reduced the DM and N degradability of the brewers grains and sorghum silage considerably. The reduction was not so marked in the two forages studied. These results are similar to those obtained by Payano and Ponce (1978) and indicate the desirability of using fresh material for these determinations. The degradability of the N at 8 and 24 hours in both the elephant and the swazi grass tended to fall with age of the plant.

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