NOTA BREVE

COMPARATIVE RUMEN DEGRADABILITY OF FORAGES, AGRICULTURAL BY-PRODUCTS AND BAOBAB BARK IN SHEEP

DEGRADABILIDAD RUMINAL COMPARATIVA DE FORRAJES, SUBPRODUCTOS Y CORTEZA DE BAOBAB EN LA OVEJA

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ADDITIONAL KEYWORDS

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PALABRAS CLAVE ADICIONALES

Oveja Ouda. Degradabilidad *in saco*

SUMMARY

Rate and extent of degradability were higher ($p<0.01$) and faster in Wheat offal (80.7 percent), *Stylosanthes hamata* (70.9 percent) and *Tephrosia bracteolata* (54.1 percent), respectively, than Baobab (*Adansonia digitata*) bark (27.7 percent) and Rice bran (26.5 percent) and increased ($p<0.05$) progressively as incubation periods increased.

RESUMEN

La velocidad e intensidad de la degradabilidad fueron mayores ($p<0,01$) en residuos de trigo (80,7 p.100), *Stylosanthes hamata* (70,9 p.100) y *Tephrosia bracteolata* (54,1 p.100), que en la corteza de baobab (*Adansonia digitata*) (27,7 p.100) y salvado de arroz (26,5 p.100) y aumentaron ($p<0,01$) con el tiempo de incubacion.

INTRODUCTION

The dry matter degradability allows the description of the quantity of nutrients effectively degraded in the rumen of livestock and the outflow rate of food from the rumen (Susmel *et al*., 1990). The effective percentage degradability of dry matter is dependent among other things, on the course of degradation of the dry matter particles in the rumen and time distribution of the dry matter stay in the rumen. The dry matter will decrease if there is an increase in the rate of passage of the particles (McDonald, 1981).

The nylon-bag technique involves incubating samples of feeds in the rumen of fistulated animals for periods from 6 to 120 hours and subsequent determination of disappearance of the different feed components (Osuji *et al*., 1993). The present study estimates the extent and rate to which the dry matter degradation of *Tephrosia*, *Sylosanthes*, Baobab bark, Rice bran and Wheat offal would take place in the rumen of fistulated rams using the nylon-bag technique (Orskov *et al*., 1980).

MATERIALS AND METHODS

Weighed fresh samples of *Tephrosia bracteolatea* and *Stylosanthes hamata* leaves as well as *Adansonia digitata* (Baobab) bark were collected from the Pasture Seed Multiplication plot of the Teaching and Research Farm, University of Agriculture, Abeokuta while rice bran and wheat offal were collected from the Small ruminant feed store. *Tephrosia* and *Stylosanthes* were cut at 8 weeks of age while the age of Baobab could not be ascertained. The samples were thereafter oven-dried at 80^0C to constant weight. After drying the samples were weighed again to determine their moisture content and then milled.

Three Ouda rams weighing between 24 and 25 kg, fitted with rumen cannulae were used. The degradation experiment was carried out at the Small Ruminant section of International Livestock Research Institute (ILRI) Ibadan, Oyo State, Nigeria. The animals were fed with cowpea husk and sorghum residue *ad libitum*.

Five grams of each milled feedstuff (2mm particle size) were placed in nylon-bags measuring 65mm x 140mm with pore size of 45µm. One bag of each feedstuff was inserted into the rumen of each of the three rams through the cannula. Each bag was tied with a fishing line twine before insertion into the rumen. The 48hrs degradation bags were inserted first, followed by 24hr, 12hrs and 6hrs incubation periods respectively. At the expiration of the respective hours of interest, the bags were evacuated from the rumen and rinsed immediately under running cold tap water until the rinse water was clear. The residual samples were oven-dried at 65^0C to constant weight to determine the dry matter content of the residues (Dzowela *et al*., 1995).

Statistical Analysis

The degradation coefficients of the dry matter for each feedstuff at 6, 12, 24 and 48 hours incubation periods were determined by the difference between the 5 g samples and the weight of the residue. Regression analysis (SPSS, 1999) was performed using the data obtained for the dry matter disappearance of each feedstuff.

RESULTS AND DISCUSSION

Table I contains the average dry matter (DM) disappearance (percent) of the different feedstuffs. The average amount of soluble fractions (percent) at zero hour of incubation

Table I. *Average dry matter disappearance of different feedstuffs (percent).* (Desaparición promedio de materia seca en diferentes alimentos en porcentaje).

Degradation period	*Tephrosia*	*Stylosanthes*	Rice bran	Wheat offal	Baobab bark
0 (hrs)	28.7	38.0	16.3	40.9	20.8
6 (hrs)	27.4	33.0	19.9	59.0	19.9
12 (hrs)	34.7	46.3	23.4	62.9	24.4
24 (hrs)	38.7	59.1	26.1	74.5	26.9
48 (hrs)	54.1	70.9	26.5	80.7	27.7

when the samples were washed in warm water only was lowest in rice bran (16.3 percent), followed by Baobab bark (20.8 percent), Tephrosia (28.7 percent), Stylosanthes (38.0 percent) and wheat offal (40.9 percent), respectively. The rate of disappearance of each feedstuff increased progressively as incubation period increased in general although the rate was significantly ($p<0.05$) faster in forages and wheat offal than in others. This agrees with the observation of Babayemi *et al.* (2002). After 48 hours incubation period dry matter disappearance increased more significantly ($p<0.01$) in all the feed materials than in the zero hour. However, wheat offal exhibited the highest significant ($p<0.01$) degradability (80.7 percent) followed by Stylosanthes (70.9 percent), Tephrosia (54.1 percent), Baobab (27.7 percent) and rice bran, respectively. The degradability after 48 hours in Tephrosia and Stylosanthes were lower than the values reported (Akinlade *et al*., 2001) for *Ficus capensis* and *Alchornea cordifolia* (85.7–86.2 percent) while the degradability in wheat offal is close to the reported values above. The dry matter release from rice bran and Baobab bark were significantly lower the other test feedstuffs but close to the values reported for Alfalfa (Keyserlingk *et al*., 1996). These observations suggest that different forages have different degradability coefficients given the same incubation periods and that the rate of release of nutrients in the rumen also varies among different feedstuffs. The variations in the degradability observed for the different feed materials could be due to differences in fibre content (Smith *et al*., 1989). Stylosanthes was more degraded than Tephrosia though both of them are leguminous shrubs. This suggests that Tephrosia, at the same age with Stylosanthes (8 weeks) contain more fibre. Baobab bark exhibited very low degradability. This could be due to high fibre content in the bark. The rice bran was the least degraded of all the feedstuff incubated and therefore seems to contain the highest fibre level. This agrees with the observations of Smith *et al.* (1989). On the average, the forages (*Tephrosia* and *Stylosanthes*) are better degraded (62.5 percent) than agricultural by-products (rice bran and wheat offal)(53.6 percent) suggesting that agricultural by-products contain higher fibre than forages. This could be understood from the fact that the forages were young and tender (at 8 weeks) and as such the fibre content would not have reached a tough level as found in the agricultural by-products. Furthermore, it suggest that at 8 weeks the forage quality was higher than the by-product and ruminants will benefit more in terms of nutrient release. However, since the means were not significantly different, a balanced selection of forages and agricultural by-products for use as supplements may increase livestock productivity.

The cubic function achieved a better fit for the prediction of the degradation characteristics of the different feedstuffs at various incubation periods as evidenced by their coefficient of determination (R^2)**(table II)**.

Since the extent and rate of degradation of dry matter determine the degradable part available for the

Table II. *Predictive cubic functions for degradation of different feedstuffs in Ouda rams.* (Ecuaciones cúbicas de predicción para la degradación de diferentes alimentos en ovejas Ouda).

Feedstuff type	Predictive equations	R^2	p
Tephrosia	$Y = 26.54 + 0.5251T - 0.0009T^2 + 0.00004T^3$	0.956**	<0.05
Stylosanthes	$Y = 34.26 + 0.0407T + 0.0707T^2 - 0.0012T^3$	0.954**	<0.05
Rice bran	$Y = 16.01 + 0.8134T - 0.0200T^2 + 0.0002T^3$	0.907**	<0.05
Wheat offal	$Y = 43.52 + 2.5311T - 0.0689T^2 + 0.0007T^3$	0.946**	<0.05
Baobab bark	$Y = 19.45 + 0.2690T + 0.0063T^2 - 0.0002T^3$	0.751**	<0.05

rumen microbes (Orskov and McDonald, 1979), the result of this study revealed that when Stylosanthes and Tephrosia are fed to ruminants as basal diets the Stylosanthes is more likely to be readily digestible than Tephrosia while wheat offal nutrients will be more readily available for utilization than rice bran. Baobab bark will require some form of treatment and/or nutrient supplementation from feedstuff that are low in fibre content to complement the required nutrients by the animals.

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