DIGESTIBILITY OF RAMON (BROSIMUM ALICASTRUM), LEUCAENA LEUCOCEPHALA, BUFFEL GRASS (CENCHUS CILIARE), SISAL PULP AND SISAL BAGASSE (AGAVE FOURCROYDES)

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Five intact male lambs of the Peliquey breed, weighing approximately 35 kg and aged 8 months were used in a 5 x 5 latin square design to determine digestibility and voluntary intake of the following feeds: Ramon, leucaena buffer grass, and sisal pulp and bagasse. Minerals were given with all the feeds and, in addition, the pulp and bagasse were supplemented with urea at the rate of 5 g/kg fresh matter. The experimental periods were of 20 days with collection of faeces and urine during the last five when the animals were in metabolism cages. Voluntary consumption index (kg DM/100 kg live weight/d) differed significantly between feeds with highest values on Ramon and Buffel grass and lowest values on the sisal by-products; mean values were: 5.89, 4.25, 3.66, 2.17 and 2.48 for the five feeds respectively. Dry matter digestibility showed the same overall pattern of differences except that the values for sisal pulp (63.8%) were higher than for bagasse (48.9). DM digestibility of leucaena wee 59.7, of Buffel 66.7 and of Ramon 67.1% Nitrogen retention was higher for Ramon (16.3 g/d) than for the other feeds (range of 6 to 12 g/d).

Key words: Ramon, Leucaena leucecephala, Sisal pulp, digestibility, voluntary intake.

The sisal growing zone in the Yucatán peninsula occupies approximately 1,119,000 ha, and like other sisal producing regions in the rest of the world has specific conditions of soil and climate which make it difficult to grow conventional forages for livestock production.

It has, however become apparent that there is a need to diversify the use of these areas due to the fact that sisal fibre has Buffered considerable price fluctuations on world markets because of the competition from synthetic substitutes.

From the point of view of animal production, a number of forages appear to offer considerable potential in the Yucatán, in terms of their adaptation to the region, their productivity and acceptability. Among these are the tree Ramon (Brosimum alicastrum), the legume shrub Leucaena leucocephala and Buffel grass (cenchus ciliare). There are also important by-products from the sisal industry: bagasse and pulp. Bagasse is the residue remaining after the traditional long fibre extraction procedure; while the pulp is a new by-product produced after a modified extraction procedure in which some short fibres are also removed while some of the juice is pressed in order to recover steroid substances (Cordemex 1977).

The present experiment was set up to provide information on the proximate composition of these different feeds, their digestibility and voluntary intake when fed to sheep.

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Table 1:
Proximate analysis of the different feeds (x ± SEx)

	Ramon	Leucaena	Buffel	Sisal pulp	Sisal bagasse
Dry matter (DM), %	44.1±6.9	30.5±6.8	34.7±6.8	18.5±.55	12.9±.94
Composition of DM, %					
Nitrogen, %	4.77±.01	4.56±.08	1.41±.01	.886±.003	1.12±.006
Crude fibre, %	27.8±2.3	20.1±2.6	45.1±4.4	26.1±1.6	30.7±3.4
Gross energy kcal/kg	4.74	3.99	3.95	4.04	3.70

Materials and Methods

Treatments and design: The dietary treatments in a 5 x 5 latin square were: Ramon (Brosimum alicastrum), Leucaena leucocephala, Buffel grass (Cenchus ciliare), Sisal (Agave fourcroydes) pulp and Sisal bagasse. All of these forages were supplemented with salt and a phosphorus rich mineral mixture. The sisal pulp and the bagasse were supplemented with urea at the rate of 5 g/kg fresh forage. The experimental periods were of 20 days with collection of faeces and urine during the last 5 when the animals were in metabolism cages.

Animals: These were wethers of approximately 35 kg live weight of the peliguay breed.

Procedure: The forages from Ramon and leucaena were the leaves and small branches. For the sisal pulp and bagasse, a solution wee prepared containing 200 g urea/litre and this wee added at the rate of 25 ml/kg fresh forage. The buffer grass, the leucaena and the Ramon were chopped with a machete into lengths of approximately 25 cm. The three green forages were cut the same day that they were fed to the animals. Feeding wee ad libitum on all treatments.

Measurements: Voluntary intake wee measured tally and on the last 5 days of each period faeces and urine (conserved with sulphuric acid) were collected and weighed daily and a 10% aliquot retained at 4° until the end of each period. When the collection period was finished this sample wee mixed and analysed for DM, fibre and nitrogen. Nitrogen in urine was also determined.

Results

Analytical data on the different forages are given in table 1. There were important differences in the DM content of the different feeds with the highest values being recorded for Ramon (44.1%) and the lowest values for sisal pulp (18.5%) and sisal bagasse (12.9%). Nitrogen content in the Ramon and leucaena wee similar (about 4.5%) and this is equivalent to a crude protein content only slightly less than 30%. The lowest N content was in the sisal pulp (0.9% in DM) with a slightly higher value being recorded for the sisal bagasse (1.1%).

Table 2:
Means for voluntary intake and digestibility of dry matter and for retention of nitrogen

	Ramon	Leucaena	Buffel	Sisal pulp	Sisal bagasse	SEx
Consumption index[1]						
Dry matter (DM)	5.89	3.66	4.25	2,17	2.48	±.42
Digestible DM	3.95	2.19	2.83	1.38	1.21	
Digestibility, %						
Dry matter	67.1	59.7	66.7	63.8	48.9	±3.3
Crude fibre	68.2	28.3	65.4	62.4	50.0	±3.4
N intake, g/d	37.0	25.8	18.1	10.1	13.5	±2.5
N retained, g/d	16.3	12.1	8.8	5.8	10.0	±2.2

[1]Intake of DM(kg)/100 kg live weight

Animal performance data are in table 2. There were significant differences between forages for voluntary consumption index with the highest value being recorded on the Ramon (5.89 kg DM/100 kg live weight/d) and the lowest values on sisal pulp (2.17) and sisal bagasse (2.48). DM digestibility did not differ as between Ramon, leucaena, buffer grass and sisal pulp (60 to 67%); however, the sisal bagasse was significantly poorer (49%). Digestibility of crude fibre was similar on the Ramon, buffer grass and sisal pulp (range from 60 to 68); sisal bagasse was intermediate (50%) with the lowest value being recorded for the leucaena (28%). The leucaena (12 g N retained daily) and the Ramon (16 g N/d) appeared to support higher nitrogen retention than the remaining forages (range from 6 to 10 g N daily).

Discussion

The animal data place the Ramon forage well ahead of all the rest, with both high digestibility and high consumption index. Leucaena and buffer grass were in an intermediary position with the poorest results being recorded for the sisal by-products. Sisal pulp was relatively highly digestible, however voluntary intake was lower for this forage than for any of the others. It has been shown that voluntary intake on sisal pulp can be increased significantly by including in the diet additional long fibres (e.g. by restricted grazing on Star grass pasture) and by giving a supplement providing by-pass protein and starch (Ferreiro et al 1978).

The excellent results obtained with the Ramon forage are supported by the extremely high acceptance by farmers (and relatively high price) of this forage in the Yucatán peninsula. There were no problems on the leucaena forage feeding which could be attributed to mimosine toxicity, however, the changeover nature of the design would have provided some safeguard against this.

References

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