Ramon (*Brosimun alicastrum*) Foliage as Supplement for Lactating Dual Purpose Cows

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Abstract

The objective of the present study was to asses the value of ramón *(Brosimun alicastrum)* foliage as a N-source in replacement of soybean-N in lactating dual purpose cows (*Bos indicus* x *B. taurus*). Four lactating cows were used in a latin rectangle design. Ramón was included to replace 0, 33, 66 and 100 % of the soybean-N contained in the supplement. Basal diet was fresh "Taiwán" a cultivar of Elephant grass (*Pennisetum purpureum*) fed *ad libitum*. Basal and total dry matter intake, digestibility (total fecal collection), saleable and calf suckled milk yields, and milk composition (fat, protein and lactose) were measured over 15 d periods. Ramon increased the yield of milk constituents ($P<0.05$) over those obtained with Taiwán-grass alone, but was inferior ($P<0.05$) when soybean was the N source. Total milk yield was reduced 18% in Ramón supplemented cows compared with those supplemented with soybean.Digestibility of dry matter, organic matter and fiber was reduced by Ramón inclusion probably due to its higher fiber and ash content as compared with soybean meal. It was concluded that, altough animal performance was not achieved as with soybean meal, supplementing with Ramón is a better strategy than relying on grass alone.

Keywords: *Brosimun alicastrum*, milk production, dual purpose cows, forage tree

Introduction

Ramón (*Brosimun alicastrum*) is a tropical forage tree native from Southern Mexico and Central America. It is commonly used in South México for supplementing lactating cows instead of grain based commercial concentrates, which are more expensive. Although indigenous to moist forest, Ramón is extremely tolerant to drought. It keeps its leaves throughout the year, and, therefore, it is an important source of forage for any tropical area that suffers feed shortages during the dry season (N.A.S. 1975). Ramón foliage yield may reach 2 t DM/ha/year. Despite the fact that small-scale dairy farmers have a long tradition on its use, no information is available regarding its nutritional value for milk production.Consecuently, the objective of this experiment was to asses the potential replacement value of Ramón-N in lactating dual purpose cows.

Material and Methods

Four *Bos indicus* x *B. taurus* cows were used in a 4 x 5 latin rectangle (Mead *et al.*, 1993) (5 treatments and four periods) with. Each period consisted of 10-day adaptation to the diet, and 5-day for measurements where total feces collection was undertaken in order to estimate dry matter (DM), organic matter (OM), neutral detergent (NDF) and acid detergent fibre (ADF) digestibility (D). At the commencement of the trial, the cows had a mean of 86 days (s.d.22.8) on lactation, mean LW of 453 kg (s.d. 22.2) and a saleable milk yield of 4.6 kg (s.d. 1.42). The animals were fed *ad libitum* with chopped Taiwán (*Pennisetum purpureum)* grass, and at milking time were offered 2.0 ± 0.1 kg DM of one of the following supplements (treatments): A).- Sorghum/soybean (14% CP); B).- Like A, but with Ramón providing 33% of the supplement N; C).- Like A, but with Ramón as 66% of the supplement N; D).- Ramón 100% of the amount of N given by diet A; E).- Was a negative control, representing a diet without supplements, with 0.5 kg sorghum to homogenize management at milking

time. Total milk yield (TMY) was taken as the sum of saleable milk (SM), recorded at milking time, and calf suckled milk (CS); CS was measured (Weight-suckle-weight) at least three times in each period after the morning milking, and during the afternoon when cows were not milked. SM samples were taken during tree days and analized for fat, protein and lactose. Basal (grass), as total diet, intake was recorded every day through the trial.

Results and Discussion

The substitution of soybean-N for Ramon-N caused a reduction in milk yield ($P<0.05$), which was 1.5 $kg.d^{-1}$ with total substitution (18% TMY and 25% SM) (Table 1). However, there was the trend (significant at 0.10 level of probability) that, TMY with Ramón was higher (by 22%) than with no supplementation (diet E). There were no clear effects on milk composition by the addition of Ramón. However, when expressed as yields of fat, protein and lactose, then yields were greater ($P<0.05$) with soybean than with Ramón supplemented cows, which in turn were greater ($P<0.05$) than with the unsupplemented cows.

Basal diet intake (Taiwan grass), DMD and OMD of the diets were reduced by Ramón inclusion probably due to its high fibre and ash contents (*c.* 467 g NDF, 323 g ADF and 142 g Ash/kg DM). Total DMI was higher with soybean and the low level of Ramón inclusión (Table 2).The lack of statistical difference between grass alone (diet E) and Ramón supplemented diets was probably due to the higher basal diet intake in treatment E, which allowed a partial compensation for the lower nutrient content of the grass (*c.* 60 g CP, 450 g ADF and 788 g NDF/kg DM). The superiority of soybean may rest on the nature and site of digestion of its protein. Ramón is highly degradable in rumen and not a good source of UDP as soybean, which is a very good source of rumen undegradable protein (by-pass). On the other hand, Ramon CP *in situ* rumen degradation has been reported as A=

0.374, a= 0.199, b= 0.759 and c= 0.063 (Sandoval *et al.,* 1999), which makes it rapidly available at ruminal level.

The use of *B. alicastrum* instead of soybean/sorghum based diet caused a reduction in milk yield. However, Ramón leaves might be incorporated in the diet without major effects in milk quality. Supplementing with Ramón is a better strategy than feeding cows with grass alone, and it results in higher yield of fat and protein. On the other hand, it was not possible to assess the effects of treatments in the cows LW change, and this fact must be considered before final conclusion is drawn.

References.

Mead, R., Curnow R.N. and Hasted A.M. (1993). Estatistical methods in agriculture and experimental biology. (2nd. Ed.) Chapman and Hall, London.

N.A.S. (1975) Underexploited tropical plants with promising economic value. National Academy of Science. Washington, D.C. USA. pp: 114-118.

Sandoval Castro, C.A., Anderson S. and Leaver J.D. (1999). Influence of milking and restricted suckling regimes on milk production and calf growth in temperate and tropical environments. Anim. Sci. **69:** 287-296.

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Table 1 - Saleable (SM), calf suckled (CS) and total (TMY) milk yield (kg.d $^{-1}$), composition (g.kg $^{-1}$) and yield of milk constituents (g.d $^{-1}$) of cows fed Taiwan grass *ad libitum* plus supplements containing different levels of Ramon foliage.

	Supplements*					
Items	A	B	C	D	E	sed
SM	4.4a	3.4b	3.3b	3.3b	2.9b	35
CS a.m.	0.8ab	0.6a	1.0b	0.9ªb	0.8ab	17
CS p.m.	3.0a	2.5ab	2.7a	2.6ªb	1.8b	35
TMY	8.2a	6.5bc	7.0ab	6.7bc	5.5c	67
Milk composition						
Fat	31.7ab	31.4ab	30.6b	32.0ab	32.7a	68
Protein	265	248	253	249	244	1.11 NS
Lactose	560	554	558	561	543	1.12 NS
Yield of constituents						
Fat	250a	203bc	210b	208bc	174c	167
Protein	212a	162b	176b	165b	133c	108
Lactose	460a	361b	390a	378a	297b	429

Means within a row followed by the same letters do not differ at the 0.05 level of probability by LSD multiple range test.

* A) Sorgum/soybean; B) A+ 33% Ramon; C) A + 66% Ramon; D) 100 Ramon; E) Taiwan grass alone.

Table 2 - Basal (BDMI) and total DM intake (DMI), Digestible organic matter intake (DOMI), N intake ($kg.d^{-1}$) (NI), ME intake ($kJ.kgW^{0.75}d^{-1}$) (MEI), DM, OM, NDF and ADF digestibility of cows fed Taiwan grass *ad libitum* plus supplements containing different levels of Ramon foliage.

	Supplements*					
	A	B	C	D	E	sed
BDMI	9.8a	9.4ab	8.5b	8.4b	9.6a	48
TDMI	11.8a	11.4ab	10.5bc	10.4bc	10.1c	48
DOMI	5.2a	5.0ab	4.1bc	3.9c	4.1bc	27
MEI[#]	864a	823a	679b	650b	676b	46
NI	0.90a	0.87a	0.81b	0.80b	0.63c	22
DMD	0.55a	0.53ab	0.51bc	0.51bc	0.53ac	17
OMD	0.47a	0.45ab	0.41c	0.40c	0.43bc	14
NDFD	0.45ab	0.46b	0.41a	0.41[a]	0.45ab	18
ADFD	0.38ab	0.37a	0.31c	0.34c	0.40b	17

ME calculated as 15.4 $MJ.kg^{-1}$ DOM

Means within a row followed by the same letters do not differ at the 0.05 level of probability by LSD multiple range test.

* A) Sorgum/soybean; B) A+ 33% Ramon; C) A + 66% Ramon; D) 100 Ramon; E) Taiwan grass alone.