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POTENTIAL OF SORGHUM SILAGE AS A ROUGHAGE SOURCE IN SHEEP DIETS

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ABSTRACT

Dry season conditions are a major constraint to ruminant production in the Caribbean region, limiting both pasture quantity and quality. Preservation of forage as silage under favorable growing conditions is one means of stockpiling forage for dry season use. This pilot study compared growth and intake by hair sheep lambs fed sorghum silage with those fed native pasture green chop (predominantly *Panicum maximum* and *Leucaena leucocephala*). The silage samples were pooled from a sorghum variety/alley cropping trial, which were ensiled either with (3%) or without the addition of molasses. Fifteen wether lambs were assigned to the 3 treatment groups (n=5) and group-fed daily a diet of either green chop (GC), silage (S) or silage with molasses (S+M) and coconut meal (CM) at 5 and 2% of body weight on an as fed basis for 24 d following a 4-d adjustment period on a composite diet. Refusal of feedstuffs was recorded daily. Average daily gain was 110, 52 and 84 g/d for GC, S and S+M diets, respectively, and differences approached significance ($P=0.15$). Roughage dry matter intake was similar between treatment groups (263 to 287 g/d), but supplement intake varied from 232 g/d (S) to 364 g/d (GC). Total dry matter intake was 651, 495 and 550 g/d for GC, S and S+M, respectively. Despite the increased CM intake by GC, the gain/feed ratio was higher (0.169) compared to S (0.105) and S+M (0.152). Plasma urea nitrogen (PUN) increased by 9.3, 5.9 and 6.6 mg/dl from d 1 to d29 of the study for animals on GC, S and S+M diets, respectively. These preliminary data indicate that lambs receiving sorghum ensiled with molasses, but not plain sorghum silage, approached the growth rate of lambs receiving green chopped pasture.

INTRODUCTION

The livestock industry in the Caribbean Basin is largely supported by poorly managed pastures which, during the dry season, provide forage that is frequently deficient in both quantity and quality. This usually results in depressed livestock performance in the dry season.

Preservation of forage as silage under favorable growing conditions is one means of stockpiling forage for dry season use. Silage is a widely accepted feed for sheep and is commonly fed to ewes in late pregnancy (Reed, 1979; Wilkinson and Chestnutt, 1988; Orr and Treacher, 1989; 1990). However, there is little detailed information on levels of silage intake that can be expected in growing lambs in the tropics, particularly when fed in combination with concentrates. Data on intakes are needed to formulate rations which supply the recommended allowances of nutrients for sheep.

The objective of this pilot experiment was to compare growth and intake in hair sheep lambs fed sorghum silage with those fed native pasture green chop.

MATERIALS AND METHODS

The study was conducted at the Agricultural Experiment Station of the University of the Virgin Islands, St. Croix, as part of an evaluation of silage production from grass/legume systems in the Caribbean. Experimental details of agronomic evaluation of those grass/legume systems are presented elsewhere in these proceedings (Adjei, 1992). Silage for this feeding trial was pooled across grass/legume varieties, which were ensiled for a 100 d period either with 3% or without addition of molasses. The grasses included three varieties of forage sorghum (*Sorghum bicolor*) and an elephantgrass (*Pennisetum purpureum*) x millet (*Pennisetum americanum*) interspecific hybrid. Legumes consisted of *Leucaena leucocephala* and *Desmanthus virgatus*, which were incorporated at time of ensiling at approximately 10% of dry matter. The native pasture was a predominantly guinea-grass (*Panicum maximum*) and *Leucaena* mixture. Pasture was green chopped using a flail harvester.

Fifteen wether lambs were assigned to the 3 treatment groups (n=5) stratified by liveweight and type of birth. Animals were wormed (ivermectin) prior to the trial and had free choice access to a salt/mineral block throughout the trial. They were group-fed daily a diet of either GC, S or S+M and CM at 5 and 2% as fed of body weight, respectively. Sheep were fed for 24 d following a 4-d adjustment period on a composite diet. Sheep were weighed at 7-d intervals and feed levels adjusted at this point. Refusal of roughage and supplement was separately recorded daily. Blood samples were collected from sheep on d 1, 15 and 29 of the feeding trial for FUN analysis (Marsh et al., 1965).

Animal average daily gain, total liveweight gain, intake of both roughage and concentrate, and feed conversion efficiency were calculated for each diet. Analysis of variance was conducted on average daily gain, total weight gain and PUN using the GLM procedure of SAS (1985).

RESULTS AND DISCUSSION

Total liveweight gain per animal was 3.1, 1.5 and 2.3 kg for the duration of the trial, with an average daily gain of 110, 52 and 84 g/d for GC, S and S+M, respectively (Table 1). Differences in weight change approached significance ($P=0.15$). These data indicate that lambs receiving S+M, but not S, approached the growth rate of lambs receiving GC.

Daily roughage dry matter intake was similar among treatment groups (Table 1), but CM intake varied from 232 g/d for S to 364 g/d for GC. Consequently, total dry matter intake was highest (651 g/d) for GC and least (495 g/d) for S. Differences observed in the intake of CM between roughage sources may be the result of a higher moisture content of the silage (72.0%) compared to GC (59.4%), although there is evidence that sheep are sensitive to some aspects of silage fermentation quality (Wilkins et al., 1971). Despite the increased CM intake by GC, the gain/feed ratio was still highest for GC animals (0.169) compared to S (0.105) and S+M (0.152).

Table 1. Growth performance and intake in hair sheep lambs fed green chop and sorghum silage based diets¹ supplemented with coconut meal² on St. Croix.

	Green Chop	Silage	Silage + Molasses	SE	P
Initial weight (kg)	17.4	16.1	16.1	3.2	0.78
Final weight (kg)	20.5	17.6	18.4	3.0	0.33
Total gain (kg)	3.1	1.5	2.3	1.3	0.15
Daily gain (g/d)	110	52	84	46	0.15
Dry matter intake (g/d)					
Roughage	287	263	284		
Coconut meal	364	232	266		
Total	651	495	550		
Gain/feed	0.169	0.105	0.152		

¹Roughage offered at 5% of body weight on as fed basis.

²Coconut meal offered at 2% of body weight on as fed basis.

³Ensiled with 3% molasses.

The initial PUN concentrations averaged 19.2 mg/dl across diets (Table 2), with final levels of 29.5, 24.4 and 25.2 mg/dl for GC, S and S+M, respectively ($P=0.09$). Both, the general increase in PUN in all groups, as well as the preferential increase in the GC animals is most likely a reflection of the intake of CM, which provided a high level of crude protein (23.5%) and thus nitrogen, and would not necessarily be related to the roughage source in diet.

These preliminary data indicate that sorghum ensiled with molasses, but not plain sorghum silage, could provide a roughage substitute to pasture in diets of growing lambs during the critical dry period.

Table 2. Plasma urea nitrogen concentrations in hair sheep lambs fed green chop and sorghum silage based diets¹ supplemented with coconut meal² on St. Croix.

Days on Trial	Green Chop	Silage	Silage + Molasses	P
1	20.3	18.8	18.6	0.76
15	23.3	21.1	20.8	0.47
19	29.5	24.4	25.2	0.09

¹Roughage offered at 5% of body weight on as fed basis.

²Coconut meal offered at 2% of body weight on as fed basis.

³Ensiled with 3% molasses.

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