Silages from Tropical Forages: Nutritional Quality and Milk Production

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Introduction

There is a need for silage making technology under local conditions, especially in those areas experiencing drier months or where monsoonal conditions restrict the routine cutting of forages. The need for silage making is even more significant in dairy cattle feeding, where the demand for uniform and high quality feed is of great importance. The tedious daily harvesting of green forages throughout the year also posed problems with smallholders, particulary when family labour is not sufficient.

The objective of this paper is to evaluate the performance and suitability of six tropical grasses and three forage crop for silage making and a feeding trial for milk production.

Methods

Six grasses viz. setaria (*Setaria sphacelata* var. splendida), signal (*Brachiaria decumbens*), humidicola (*B.humidicola*), MARDI Digit (*Digitaria setivalva*), Napier (*Pennisetum purpureum)* and three crops viz. (*Zea mays*) forage sorghum (*Sorghum vulgare* x *S. bicolor*) and *S. almum* were planted. The grasses were cut at 6 weekly intervals. Corn was harvested at 75 days, forage sorghum at 70 days and *S. almum* at 63 days after planting.

Fresh samples were taken for DM% and water-soluble carbohydrates (WSC) (Dubois *et al.* 1956) and for silage making in the laboratory. The silage samples were analysed for pH, lactic acid analysis (MAFF 1973) and physical characteristics. In the second experiment, six multi-parous Sahiwal-Friesian cows in mid-lactation were used to test three dietary treatments in a double switch over experiment (Cochran *et al.* 1941). Treatments were levels of silage in the diet in direct substitution for cut fodder as follows a) fodder *ad libitum*, b) fodder+silage (50:50) *ad libitum* and c) silage *ad libitum.* In addition each animal received six kg of concentrate once daily. Feed samples were taken once weekly and composited by cow-period. Feed intake and milk production were recorded daily.

Results and Discussion

The mean value of the WSC and the DM% in the crops and quality of silage produced (pH and lactic acid content) are shown in Table 1. Corn and forage sorghum produced good silage with pH <4.0 and lactic acid level with the values of 2.72 and 3.7%, respectively (Table 1). For the grasses, it was found that without additives, setaria and Napier can be turned into acceptable silage with pH of 4.07 and 3.96, respectively. The pH of the grass silage was reduced with the addition of 4% molasses (Table 1).

The nutritional composition of sorghum silage and guinea grass used in the second experiment are shown in Table 2. Treatment means for feed DMI, milk yield and feed efficiency are in Table 3. Intake of DM from roughage was higher ($P<0.05$) on treatment B than either A or C. The higher roughage intake of treatment B appears to be attributable to a stimulatory effect of silage on intake. The difference in the total DMI reflects differences in roughage DMI. Expressed as percent body weight, total DMI on the respective treatments were within the range 2.0

to 2.4%. Average daily milk yield was higher (P<0.5) for cows fed sorghum silage compared with control. The difference in milk yield was 13% between treatments C and A. Mean feed efficiency value of cows on the silage-based diet was nearly twice as good as either treatment B or the control group A (Table 3).

Of the crops, forage sorghum and corn can be made into excellent silage without additives. Grasses are suggested to be cut at about 6 weeks regrowth. Napier and setaria can be ensiled into reasonable silage, but the quality can be improved with the addition of 4% molasses before ensiling. As for the second experiment, sorghum silage appears to be a better feed than the average guinea grass commonly fed to lactating cows in this country. This is reflected in its effect on milk yield and feed efficiency.

Table 1. Silage Made from Tropical Grasses and Forage Crops

Crop Species	Silage		Silage 4 % molasses		Quality		
	DM%	WSC %	pH	lactic acid (%)		pH	lactic acid (%)
Grasses							
S. splendida	15.30	6.17	4.07	2.47	Good	3.64	1.96
B. decumbens	20.37	8.64	5.07	1.08	Poor	3.37	1.87
B. humidicola	20.85	2.35	5.32	1.26	Poor	3.31	2.03
D. setivalva	18.21	1.26	4.32	1.46	Poor	3.31	2.83
P. purpureum	15.77	9.88	3.96	2.53	Good	2.98	nd
P. maximum	19.35	3.03	4.71	1.84	Moderate	3.27	2.74
Crops							
Z. mays	21.20	22.99	3.72	2.72	Very good		
S. vulgare x *S. bicolor*	21.35	11.69	3.68	3.75	Very good		
S. almum	18.40	nd	4.40	nd	Moderate		

nd – not done

Table 2. Chemical composition of feedstuffs (%)

Feedstuff	DM	CP	TDN	CF	EE	NFE	Ash	Ca	P
Guinea grass	24.1	11.7	61.6	33.6	2.4	46.1	6.2	0.57	0.27
Sorghum silage	29.4	8.7	60.1	33.4	2.6	51.0	4.2	0.47	0.17
Concentrate	91.2	23.5	77.2	5.5	11.6	54.7	4.7	0.57	0.36

Table 3. Feed intake and efficiency and milk yield for the different treatments

Variables	A	B	C
Feed DM Intake (kg/d)			
Roughage	4.95b	6.22a	4.50b
Concentrate	5.40	5.40	5.40
Total	10.35b	11.63a	9.90b
DMI Per 100 kg BW	2.1	2.4	2.0
Milk Yield (kg/d)	7.01c	7.54ab	7.93a
Feed Efficiency (kg total DMI/kg milk)	2.16b	2.65b	1.37a

The values within rows with different letters are significantly different ($P<0.05$)

References

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