ENSILAGE FOR LOW RESOURCES FARMERS 2. POULTRY LITTER AS CHEAP ADDITIVE

F.H.K. Asiedu [1], C.A. Alexander [1] and G. Proverbs [2]

[1] Caribbean Agricultural Research and Development Institute, University Campus, P. O. Box 113, Mona, Kingston 7, Jamaica

[2] Caribbean Agricultural Research and Development Institute, Cave Hill Campus, P. O. Box 164, St. Michael, Barbados

ABSTRACT

The effect of poultry litter (15% wet basis) additive on the quality of king grass (*Pennisetum purpureum* x *P. americanum*) silage was studied in a randomized block design experiment (8 replications). Compared with grass silage (G), grass + poultry litter (G+P) caused significant (P<0.05) reduction in moisture (G, 716 v G+P, 670 g/kgDM), pH (5.41 v 4.72) and butyric acid (9.6 v 5.5 g/kgDM). Crude protein (CP, Nx6.25, g/kgDM), *in vitro* digestibility (IVOMD, g/kgDM) and metabolizable energy (ME, MJ/kgDM) increased from (G)104, 536 and 8.00 to (G+P) 127, 613 and 9.19. In a feeding trial using St. Elizabeth x Barbados Blackbelly lambs G+P gave significantly (P<0.05) higher daily gain (182 v 149 for G). This was related to significantly (P<0.05) higher intake of CP and ME from G+P (71.9 v 55.1 g/d and 5.20 v 4.24 MJ/d).

KEYWORDS

King grass, silage, poultry litter, additive, silage quality, lambs, weight gain

INTRODUCTION

King grass (*Pennisetum purpureum x P. americanum*) is preferred to elephant grass (*P. purpureum* Schum.) as fodder crop because of its superior nutritive value (Burton and Powell, 1968). The quality of king grass silage, in comparison with other *Pennisetums* and other fodder crops, has been established (Woodard et al., 1991; Thompson, 1992). Panditharatne et al. (1986) have shown that cassava tuber meal and coconut oil meal as additives improved further the quality of king grass silage. However, there is a dearth of information on the effect of poultry litter additive on the ensiling qualities of king grass.

The objective of this study was to evaluate the effect of poultry litter as cheap additive on the quality of king grass silage in furtherance of the goal of developing cheap ensiling process for Jamaican low resources farmers.

METHODS

Seven weeks regrowth of king grass was ensiled without (G) or with 15% (wet basis) poultry litter (G+P) in pit silos in a randomized block design with eight replications. The details of the ensiling process and the duration of ensilage are as described elsewhere (Asiedu et al., 1997). Additionally, IVOMD was determined and ME calculated.

Subsequently, the silages were fed *ad libitum* to two groups of ten St. Elizabeth x Barbados Blackbelly ram lambs (av body weight 15.3 kg) over two experimental periods in a cross-over design. Each period lasted 42 days and was preceded by 14 days for conditioning. The lambs also received, at 2% of the body weight (fresh basis) a supplement diet comprising poultry litter, wheat middlings, leucaena leaf meal and molasses (350, 300, 250 and 100 g/kgDM respectively; CP 176 g/kgDM, ME 9.78 MJ/kgDM). Live weight was recorded individually and feed intake recorded per group at seven days intervals following the conditioning period.

Statistical analysis followed the same procedure as described by Asiedu et al. (1997).

RESULTS AND DISCUSSION

The results of the effect of poultry litter as an additive on the chemical composition and the nutritive value of king grass silage are presented in Tables 1 and 2. Sensory evaluation also revealed that both silages had the characteristic yellowish-green colour and sweet aromatic smell associated with properly preserved silage.

The inclusion of poultry litter had significant (P<0.05) effect on all the chemical constituents except the contents of ammonia nitrogen, lactic acid and acetic acid (Table 1). Poultry litter reduced moisture content by 6.4%, pH by 12.8% and butyric acid content by 42.7%. Conversely, the inclusion of poultry litter increased total nitrogen, IVOMD and ME by 21.6, 14.4 and 14 9% respectively. The juxtaposition of these results and those of Veiga and Campos (1975) and Chaudhry et al. (1993) suggests that poultry litter has similar positive effect on king grass silage as it does on elephant grass and corn. This positive effect may be explained by the moisture absorbing capacity, as well as the additional fermentable nitrogen provided by the poultry litter.

The dry-matter intake by lambs was similar for the two silages which, on average, accounted for about 60% of the total dry-matter intake (Table 2). The intake of CP and ME from the silages was, however, significantly (P<0.05) higher for the G+P. This was due to the higher contents of these nutrients in G+P (see Table 1). The higher CP and ME intake was ultimately reflected in 22.1% higher daily gain of lambs fed the G+P silage (Table 2).

It is concluded that poultry litter included at a level of 15% (wet basis) to king grass silage provides a cheap source of additive to improve the characteristics and nutritive value of the silage, as well as the performance of animals fed such silage.

REFERENCES

Asiedu, F.H.K., C.A. Alexander and G. Proverbs. 1997. Ensilage for low resources farmers. 1. Drum, wirebasket and pit as silos. Proc. 18th. Int. Grass. Cong.,Winnipeg, Canada (in press).

Burton, G.W. and J.B. Powell. 1968. Pear millet breeding and cytogenetics. Adv. Agron. **20:** 49-89.

Chaudhry, S.M., Z. Naseer and D.M. Chaudhry. 1993. Fermentation characteristics and nutritive value of broiler litter ensiled with corn forage. Food Chem. **48:** 51-55.

Panditharatne, S., V.G. Allen, J.P. Fontenot and M.C.N.

Jayasuriya. 1986. Ensiling characteristics of tropical grasses as influenced by stage of growth, additives and chopping length. J. Anim. Sci. **63:** 197-207.

Thompson, K.E. 1992. Agronomic and silage characteristics of King grass and two *Pennisetum* hybrids (*P. glacum* L. R.Br. x *P. purpureum* Schum.). M.Sc thesis. Univ. Florida, Gainsville, USA.

Veiga, J.B. and J. Campos. 1975. The use of molasses, sodium metabisulphite, urea and poultry litter in the making of silage from elephant grass (*Pennisetum purpureum*). Experientiae (Brazil) **19:** 1-19.

Woodard, K.R., G.M. Prine, D.B. Bates and D.P. Chynoweth. 1991. Preserving elephant grass and energycane biomass as silage for energy. Bioresource Tech. **36:** 253-259.

Table 1
Chemical composition of king grass silage

	Grass	Grass + Poultry litter	SED [c]
Moisture, g/kgDM	716 [a]	670 [b]	10.7
pH	5.41 [a]	4.72 [b]	0.157
Total N, g/kgDM	16.7 [b]	20.3 [a]	0.71
NH_3-N in total N, g/kgDM	145 [a]	129 [a]	10.0
Lactic acid, g/kgDM	26.9 [a]	29.6 [a]	1.60
Acetic acid, g/kgDM	12.4 [a]	10.9 [a]	0.94
Butyric acid, g/kgDM	9.6 [a]	5.5 [b]	0.96
IVOMD [d], g/kgDM	536 [b]	613 [a]	8.1
Metabolizable energy, MJ/kgDM	8.00 [b]	9.19 [a]	0.126

[c] Standard error of a difference between two means (error degrees of freedom = 7).
[d] *In vitro* organic matter digestibility.
[a.b] Values on the same line with different superscripts are different, P<0.05.

Table 2
Intake of DM, CP and ME, and average daily gain of lambs.

	Grass	Grass + Poultry litter	SED [c]
Dry-matter intake			
Silage, kg/d	0.53 [a]	0.57 [a]	0.061
Total, kg/d	0.88 [a]	0.94 [a]	0.108
Crude protein intake			
Silage, g/d	55.1 [b]	71.9 [a]	6.47
Total, g/d	116.8 [b]	137.6 [a]	7.11
Metabolizable energy intake			
Silage, MJ/d	4.24 [b]	5.20 [a]	0.455
Total, MJ/d	7.66 [a]	8.85 [a]	0.956
Average daily gain, g	149 [b]	182 [a]	13.2

[c] Standard error of a difference between two means (error degrees of freedom = 22, except Average daily gain which is = 38).
[a.b] Values on the same line with different superscripts are different, P<0.05.