Effect of guineagrass and Thapra stylo silages on dry matter intake and milk production

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ABSTRACT: The effect of guineagrass and Thapra stylo silages on dry matter intake and milk production were determined in 6 Holstein Friesian x Red Shindi crossbred cows using a 3 x 3 Latin square design. Experimental period were 28 days period and consisted of 21 days of feed intake. Cows were assigned at random to receive concentrate with 16% CP of 2% BW and *ad libitum* one of three diets with different silages: 1) guineagrass silage, 2) Thapra stylo silages or 3) guineagrass+Thapra stylo silages (50:50 as fresh basis). All silages showed the high pH (4.5) but low of NH_3-N content. The result found that total DM intake (kg/day) and DM intake ($BW^{0.75}$) was not significantly different among diets. Milk production was not significantly (P>0.05) among treatments. Milk protein was higher in cow fed with Thapra stylo silages compared with the guineagrass silage. In conclusion, mixed silages were not significantly improving dry matter intake and milk production of dairy cows.
Keywords: guineagrass, thapha stylo, silage, lactic acid bacteria

Introduction

Ensiling is well-known method to preserve the moist crops by controlling anaerobic fermentation (Yahaya et al., 2004). The success of the ensiling can be achieved when the number of Lactic acid bacteria (LAB) dominates and activity of clostridia restricts during the fermentation (Bureenok et al., 2005). The tropical silages are poorly fermentation due to the high content of fiber fraction and low amount of water soluble carbohydrates (WSC), leading to increase buffering capacity of silages. Moreover, the low quality of tropical silages is often caused by the low nutritive value of the herbage ensiled. In the tropical countries, the grass silage has low quality of CP content (at approximately 3-5%), while the legume silage has high CP content (10-15%). The one way for higher quality grass silage in tropical areas is ensiled with legumes (Tjandraatmadja et al., 1994). The combinations between grasses and legumes have been reported to improve feed intake and nutrient digestion (McDonald, 1991). There is limited research of feeding cows with grass-legume mixed silages. This study was aimed to study the effect of Purple guinea grass *(Panicum maximum TD 58)* and Thapra stylo (*Stylosanthes guianensis* CIAT184) silages on voluntary feed intake and nutrient digestibly in dairy cows.

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Materials and Methods

Silage preparation

Silage was prepared from purple guineagrass (*Panicum maximum* TD58) and Thapra stylo (*Stylosanthes guianensis* CIAT184). Guineagrass and Thapra stylo were harvested at 45 d and 60 d after planting, respectively. All silages were prepared with 1% FJLB made from the silage material. Silage materials were chopped into 2- to 3-cm lengths and mixed with the silage additives. These mixtures were then packed tightly in 100-kg plastic drums and stored at room temperature (27–30°C) until start feeding trial.

Animals, Feeding

Six Holstein Friesian crossbred cows (mean body weight, 498.33 kg) were individually housed in cages. The cows were randomly assigned to receive *libitum* concentrate with 16%CP of 2%BW and *ad libitum* three diets with different silages: 1) guineagrass silage (Gu), 2) Thapra stylo silages (Sty) or 3) guineagrass+Thapra stylo silages (Gu+Sty). The 28-d experimental period consisted of a 21 d of feed intake and 7 d of sampling. Feed was offered twice daily at 08:00 and 15:00 h, and the refused portions were weighed daily before the morning feeding. BW was measured before the morning feeding at the beginning and end of each experimental period. The daily dry matter (DM) intake per unit of metabolic BW was calculated with the mean value of initial BW and final BW of each period. The cows were milked twice a day at 6:00 and 16:00 hours. Milk yields were recorded daily throughout the experiment; milk composition was sampled in the end of each experimental period. During the 7 d sampling, all feces were collected in the morning before feeding.

Chemical Analyses

Chemical composition

The DM content of the silages and feces were determined by oven drying at 70°C for 48 h. The dried sample was milled to pass through a 1.0 mm sieve. The nitrogen was determined by the Kjeldahl procedure (AOAC, 1995). The NDF and ADF concentrations were determined by methods described by Van Soest et al. (1991).

Silage

Silage samples from the center of each plastic drum in each treatment were collected. Subsamples (50 g) were macerated with 150 ml of distilled water and stored in a refrigerator at 4°C for 12 h. The extract was filtered using No.5 filter paper (Whatman, England). The pH of silage was determined with a pH meter (Lab 860, Schott). Lactic acid and volatile fatty acid was determined by HPLC (Aminex® HPX-87H, 300 mm x 7.8 mm i.d; column temperature, 40°C; flow rate, 0.60ml/min, Shimzu Co., Ltd., Kyoto, Japan). The NH_3-N content was determined using a steam distillation technique (Japan Grassland Farming Forage Seed Association, 1994).

Statistical analyses

Statistical analyses were performed using the general linear models (GLM) procedure of SAS (SAS Institute Inc., Cary, NC). All data were analyzed using the procedures of SAS for a 3×3 Latin square design.

Results and Discussion

The chemical composition of guinea grass and Thapra stylo silage materials, their silages quality is shown in **Table 1** and **2**, respectively. All silages were well preserved and of moderate fermentation quality. The silage in this experimental have 4.48-4.62 pH which higher than the normally, usually pH might around 3.8 – 4.2 (McDonald et al., 1991). But the ammonia nitrogen was quite low (**Table 2**). The chemical analysis of silage confirms that the value of legumes as a source of home-grown protein, with higher than in the grass silages. Voluntary feed intake and milk production are presented in **Table 3** and **4** The result found that total DM intake (kg/day) and DM intake ($BW^{0.75}$) were lower in cow fed with the legume silages but was not significantly different among diets ($P > 0.05$). Milk production was the higher in cow fed guinea grass silage than the other diets but was not significantly different among diets. However, milk protein was higher in cow fed with Thapra stylo silages. This study was not agree with Dewhurst et al. (2003) who found that the voluntary intake and milk yield of legume silages were higher than cow fed with grass silages. This may cause by the low of CP on Thapra Stylo legume silage in this study.

Table 1 Chemical composition of the grass and legume before ensiling.

	DM	Ash	EE	CP	NDF	ADF
	(%)	(g/kg DM)				
Guinea grass	41.86	84.47	14.78	85.89	677.59	360.51
Thapra stylo	35.23	79.45	16.8	104.3	517.59	439.9

Table 2 Silage quality and chemical composition of silage

	Gu	Sty	Gu+Sty	SEM
pH	4.53	4.57	4.58	0.03
LA (g/kg DM)	38.21 ^{a}	19.53 ^{ab}	15.32 ^{b}	3.39
AA (g/kg DM)	24.24 ^{b}	63.84 ^{a}	52.10 ^{a}	2.82
NH_3-N	2.32 ^{a}	2.06 ^{b}	2.17 ^{ab}	0.03
DM (%)	36.72 ^{a}	34.43 ^{b}	35.25 ^{ab}	0.33
CP (%DM)	5.15 ^{c}	8.42 ^{a}	6.24 ^{b}	0.05
NDF (%DM)	73.99 ^{a}	69.49 ^{b}	74.77 ^{a}	0.29
ADF (%DM)	47.12 ^{c}	57.72 ^{a}	52.36 ^{b}	0.36

Values in the same row followed by different letters are significantly different ($P < 0.05$).
SEM = standard error of the mean.

Table 3 Feed intakes in cows fed with different silage- based diet.

	Gu	Sty	Gu+Sty	SEM
Concentrate intake, kg/DM/d	10.50	9.85	9.44	0.34
Concentrate intake, %BW	2.03	1.91	1.86	0.07
Roughage intake, kg/DM/d	4.05	3.66	4.28	0.14
Roughage intake, %BW	0.80	0.73	0.83	0.03
Roughage intake,g/kgBW$^{0.75}$	38.05	34.55	39.44	1.27
Total intake, %BW	2.84	2.64	2.69	0.07
Total intake,g/kgBW$^{0.75}$	134.95	125.37	127.71	3.01

Table 4 Milk production and chemical composition of milk in cows fed with different silage- based diet.

	Gu	Sty	Gu+Sty	SEM
Milk production, kg/d	10.27	8.85	9.81	0.29
Milk production, 4%fat kg/d	11.40	9.74	11.44	0.38
Milk fat, %	4.62 ^{a}	3.94 ^{ab}	3.54 ^{ab}	0.14
Milk protein, %	2.84 ^{b}	3.25 ^{a}	3.00 ^{a}	0.06
Total Solids, %	13.66 ^{a}	12.78 ^{b}	12.43 ^{b}	0.15
Solids not fat, %	9.04	8.84	8.89	0.04
MUN (mg%)	15.33	16.50	16.17	0.61

Values in the same row followed by different letters are significantly different ($P < 0.05$).

SEM = standard error of the mean.

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