Effect of haylage made of kume grass standinghay fermented with liquid palm sugar and local chicken manure on semen quality and scrotum circumference of male local goat[1]

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ABSTRACT : This experiment was conducted to study semen quality and scrotum circumference of male local goat fed kume grass standinghay fermented for 30 days using liquid palm sugar as carbohydrate source and local chicken manure as nitrogen source. Twenty male local goats of one year old with an average initial body weight of 10 ± 1.5 kg were employed in this experiment. Experimental design used in this experiment was the completely randomized design consisted of 5 treatments with 4 replicates. Those treatments were R_0 = kume grass standinghay, R_1 = R_0 fermented with 3 % liquid palm sugar, R_2 = R_0 fermented with 3 % liquid palm sugar and 15 % local chicken manure, R_3 = R_0 fermented with 3 % liquid palm sugar and 30 % local chicken manure, and R_4 = R_0 fermented with 3 % liquid palm sugar and 45 % local chicken manure. Percentage of both liquid palm sugar and local chicken manure was based on the weight of kume grass standinghay. The diets were offered eight to ten times daily. Variables measured were quality of semen namely pH, volume, and consistency of semen, spermatozoa concentration and motility, live spermatozoa, and scrotum circumference. Results indicated a significantly effect of treatments ($P<0.05$) on semen consistency, spermatozoa concentration, motility, viability, and scrotum circumference as well, meanwhile no significantly effect was observed on pH and semen volume. However, there was no significantly difference effect between R_3 (30 % local chicken manure in ration) and R_4 (45 % local chicken manure in ration) or in other word both treatments were relatively have the same effect.

Key words: haylage, kume grass, semen quality, scrotum circumference.

INTRODUCTION

The main feedstuff for ruminants, especially goat in Timor island, is kume grass (*Andropogon timorensis*). During 8 – 9 months of dry season, the grass are still growing but in condition called standinghay. This standinghay has low quality where its neutral detergent fiber (NDF) content is 88.89%, and 2.56% crude protein (Belli and Katipana, 2006), digestibility 39%, and high bulkiness about 6 litre/kg (Katipana *et al*., 2006). This leads the livestock unable to meet their nutrients requirement. In consequence, livestock loss their body weight, susceptible to diseases, and in turn many livestock are dead. In attempting to improve quality of the standinghay, a feed technology touch is needed (Katipana and Hartati, 2005).

One of feed technologies that can be practiced to improve standinghay quality is through anaerobic fermentation to be haylage (Mc Donald, 1981). Katipana and Manafe (2005) reported that anaerobic fermentation by utilizing liquid palm sugar as carbohydrate source, and chicken manure as nitrogen source, has improved quality of kume grass standinghay which in turn

increasing daily body weight gain of local goat from 22.50 g/h/d to 108 g/h/d. Unfortunately, there was no available information on reproductive aspects, especially semen quality and scrotum circumference. According to Ismaya (1993) and Wahid and Yunus (1994), there was a positively correlation between scrotum circumference and both quantity and quality of semen. Meanwhile, Amann (1981) reported a close-relationship between fertility and reproductive capacity on goat productivity. This can only be obtained if the feed consumed a high nutritive feed. Therefore, this research was carried out to study effect of offering haylage of kume grass standinghay fermented with

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liquid palm sugar and local chicken manure on scrotum circumference and semen quality of young male local goat.

MATERIALS AND METHODS

The experiment used twenty young male local goats of one year old with an average initial body weight of 10 ± 1.5 kg. Five treatments allotted were R_1 = kume grass standinghay as control, R_1 = R_0 + 3 % liquid palm sugar, R_2 = R_1 + 15 % local chicken manure, R_3 = R_1 + 30 % local chicken manure, and R_4 = R_1 + 45 % local chicken manure. Percentage of both liquid palm sugar and local chicken manure were based on the weight of kume grass standinghay. The experiment was carried out for two months. Procedure of making haylage is schematically presented on Scheme 1. Ration was fed 3 % of body weight of experimental goat and offered 8-10 times per day, and water was offered *ad libitum*. Nutritive value of each ration offered was analyzed in Almira Laboratory, Kupang, as presented in Table 1. Experimental animals were placed in individual pen.

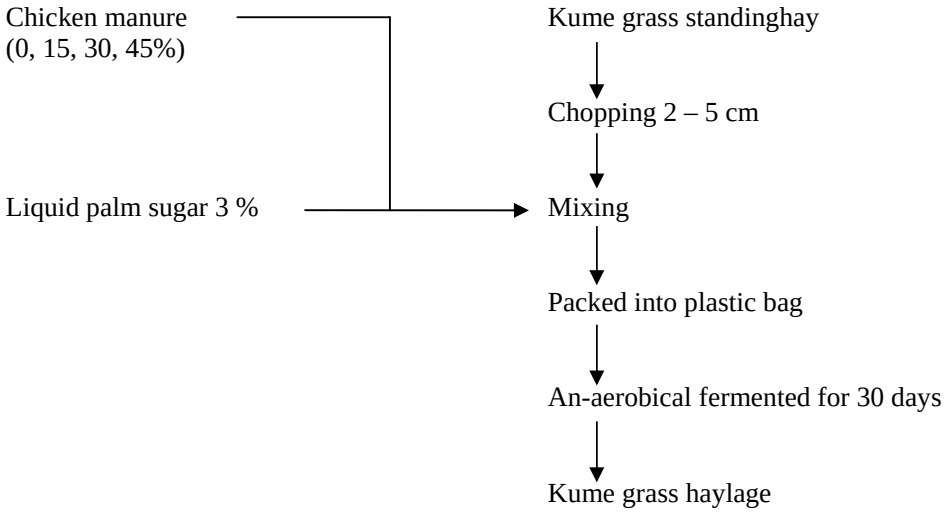

Figure 1. Procedure of making haylage from kume grass standinghay

Table 1. Nutritive value of standinghay and haylage made from standinghay fermented with liquid palm sugar and chicken manure

Nutrients	Kume grass standinghay (R_0)	Levels of chicken manure			
		0% (R_1)	15% (R_2)	30% (R_3)	45% (R_4)
Dry Matter, %	89.94	66.67	66.29	66.34	66.87
% Dry Matter :					
- Protein	2.56	5.18	7.72	9.75	10.86
- Fat	1.47	1.66	1.87	1.92	1.87
- Crude Fiber	38.75	34.47	32.22	28.43	27.97
- NFE	44.82	45.92	46.34	50.21	49.45
- Ca	0.38	0.64	0.84	1.22	1.29
- P	0.16	0.52	0.55	0.57	0.72
Energy, kcal/kg	4,041	4,060	4,038	4,155	4,186
Cell wall, % :					
- NDF	88.98	81.76	75.38	69.29	68.75
- ADF	66.16	62.12	5.55	55.85	54.77
- Cellulose	40.28	34.19	30.01	27.29	26.31
- Hemi-cellulose	22.82	19.64	16.83	13.64	13.98

Semen was collected once at the end of experiment by using artificial vagina, and was carried out in the morning. Semen evaluation consisted of volume, consistency, pH, motility, iability and concentration of spermatozoa. Vial tube of 10 ml scaled was used as collecting glass to measure semen volume, and digital pH meter was used to measure semen pH. Counting of spermatozoa motility only on the spermatozoa which very actively moved. Therefore, spermatozoa which moved slowly or less active were not counted. To measure the progressiveness movement of spermatozoa, one drop semen was put onto an object glass then covered with a cover glass before observed under microscope. Haemocytometer was used to count spermatozoa concentration. Viability measurement were on all life spermatozoa, either spermatozoa with an actively or slowly movement, from total spermatozoa found in haemocytometer. Measuring tape was used to measure scrotum circumference on the wider area.

Experimental design used was completely randomized design of five treatments with four replicates. Each replicate consisted of one local goat (kacang goat). Data collected was subjected to analysis of variance according to experimental design used, and Least Significant Difference (LSD) as further test for difference among treatments as described by Hanafiah (1991).

RESULTS AND DISCUSSION

Scrotum circumference and semen quality as the effect of offering standinghay and haylage of standinghay fermented with liquid palm sugar and some levels of local chicken manure is presented in Table 2. Data on Table 2 indicated that pH semen values was not significantly difference among treatments, i.e. 6.8 in average. As reported by Salisbury and van Demark (1961; 1985) that the normal pH value of semen was ranging from 6.5 to 8.0. Therefore, the average pH value of this research is in a normal pH range, due to buffer ability of semen to withstand pH changing which might be happened as the effect of metabolism activity of spermatozoa, to avoid it from dead.

Table 2. Semen quality and scrotum circle of young male local goat fed on kume standinghay and haylage of kume standinghay fermented with liquid palm sugar and some levels of local chicken manure

Parameters	Kume grass standinghay (R_0)	Levels of chicken manure				Statistical Test
		0% (R_1)	15% (R_2)	30% (R_3)	45% (R_4)	
Semen quality :						
pH	6.8	6.8	6.8	6.8	6.8	P>0.05
Volume, ml	0.85	1.25	1.35	1.35	1.40	P>0.05
Concistency	Milky	Creamy	Thick Creamy	Thick Creamy	Thick Creamy	
Concentration, x 10^8/ml	1.86[a]	3.15[b]	4.89[c]	6.92[d]	6.84[d]	P<0.05
Motility, %	69.74[a]	73.58[b]	75.97[c]	79.69[d]	79.63[d]	P<0.05
Viabilty, %	61.58[a]	65.66[b]	69.78[c]	73.56[d]	72.99[d]	P<0.05
Scrotum circumference, cm	12.75[a]	15.87[b]	18.77[c]	23.82[d]	23.76[d]	P<0.05

[a,b,c,d] Within a row, means without a common superscript different.

Semen volume was also not different among treatments but tended to increase, from 0.85 to 1.40 ml, with the increasing of local chicken manure level. Semen volume of goats ranging from 0.1 to 1.5 ml (Gall, 1981; Jainudeen and Hafez, 2000; Hafez, 2000), depended on age, season, just the first time or had already ejaculation for few times or not, scrotum circumference, and availability of nutrients from feed consumed (Gall, 1981; Banerjee, 1982; Parakassi, 1999). It was found that semen consistency seemingly change from milky to thick creamy in accordance to the increasing of chicken manure level, but there was no difference among R_2, R_3, and R_4 observed.

Spermatozoa motility was significantly (P<0.05) different from 69.74% to 79.69% as the increasing of chicken manure level, but there was no significantly difference between R_3 (30% chicken manure) and R_4 (45% chicken manure). According to Banerjee (1982), spermatozoa motility

depended on satisfactorily of energy. Due to the increasing of energy retention (Table 3) as the increasing of level of chicken manure in the ration, it is assumed that energy is satisfactory enough to increase spermatozoa motility. Viability of spermatozoa depends on the availability of energy, protein, and other nutrients. Because of increasing nutrients intake, energy and protein retention, the viability of spermatozoa were also increased. Data showed an increasing of scrotum circumference from 12.75 cm to 23.82 cm as the increasing of chicken manure level in ration, but R_3 (30% chicken manure) and R_4 (45% chicken manure) showed a relatively the same results. The increasing of scrotum circumference has a correlation with the increasing of body weight gain (Table 3). Due to body weight gain increased with the increasing of chicken manure level up to 30% in ration, scrotum circumference was also increased up to 30% level of chicken manure in ration, while scrotum circumference of R_3 (30% chicken manure) and R_4 (45% chicken manure) were relatively similar.

Table 3. Body weight gain, nutrients intake, energy and nitrogen retention of young male local goat fed on kume standinghay and haylage of kume standinghay fermented with liquid palm sugar and some levels of local chicken manure

Parameters	Kume grass standinghay (R_0)	Levels of chicken manure				Statistical Test
		0% (R_1)	15% (R_2)	30% (R_3)	45% (R_4)	
Body weight gain, g/h/d	22.50[a]	50.56[b]	73.93[c]	108.71[d]	107.92[d]	P<0.01
Dry matter intake, g/h/d	321.66[a]	356.26[b]	395.58[c]	479.83.92[d]	476.35[d]	P>0.05
Protein intake, g/h/d	8.25[a]	18.44[b]	30.56[c]	46.81[d]	51.75[d]	P>0.05
Energy intake, kcal/h/d	1299.83[a]	1446.42[b]	1597.34[c]	1993.70[d]	1994.00[d]	P<0.05
N-retention, g/h/d	2.13[a]	5.88[b]	8.44[c]	10.25[d]	10.19[d]	P<0.05
Energy retention, kcal /h/d	190.30[a]	244.19[b]	290.22[c]	378.93[d]	386.76[d]	P<0.05

[a,b,c,d] Within a row, means without a common superscript different.

CONCLUSION

Improving quality of kume grass standinghay through anaerob fermentation technology by utilizing liquid palm sugar as carbohydrate source, and 30% local chicken manure as nitrogen source, had increase semen consistency, spermatozoa motility, viability, spermatozoa concentration, and scrotum circumference, but did not affect pH and volume of semen.

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