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Article

Effect of urea molasses straw, urea treated straw and silage in the diets on growth performance of goats

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Abstract: The experiment was conducted with a view to investigate the effect of urea molasses straw (UMS), urea treated straw (UTS) and silage in the diets on growth performance of goats in Subornochar upazilas of Noakhali district. Total DM intake was significantly (P<0.05) higher in silage fed group than UMS and UTS group. ME (MJ/d) intake was higher (P<0.05) in UMS (6.68) and silage (6.78) group than UTS (3.48) group. The mean values of live weight gains (g/d) were 44.11, 43.88 and 50.89 for UMS, UTS and silage, respectively which varied significantly (P<0.05) among the groups. There were no significant variation among the dietary groups of animals in case of DM, CP, ADF and OM digestibility. There were significant (P<0.05) differences among the mean values of nitrogen retention (%) , the silage (34%) group of animals showed significantly higher values than those of UMS (30.32%) and UTS (29.10%) group. Diets with silage resulted was better weight gain and nitrogen balance compared to UMS and UTS. So, introduction of silage may be practiced in the existing feeding system for increase the productivity of goats.

Keywords: napier; feed intake; digestibility; N balance; weight gain

1. Introduction

Goats, the most popular small ruminant are found throughout the country and are considered a potential genetic resource for poverty alleviation. Its concentration is relatively higher in the North-western areas of Bangladesh and it belongs to the high gangas river floodplain agro-ecological zone. Black Bengal goats are reared under semi-intensive or extensive system by rural peoples. Landless and small farmers keep about 52.4% of the total goats and the medium and large farmers keep the rest 47.47% (BBS, 2001). Black Bengal goat constitute nearly 90% of the total goat population of the country and the remaining are Jamunapari and their crosses (Husain *et al.*,1998). In Bangladesh large number of studies on cattle and buffalo farming but very limited study on goat rearing system. A studied on profitability of goat production in some selected area of Bangladesh was done by Sayeed *et al.* (2004). The main constraint to livestock production in Bangladesh is scarcity and fluctuation of quality and quantity of year round animal feed supply. Therefore, this trial may be valuable for coastal farmers to select suitable feed technology to improve their goat production.

2. Materials and Methods

2.1. Time and place of trial

The trial was conducted at goat shed of Southern Agrotrade, Subarnachar, Noakhali. It was continued for a period of 90 days from July 20, 2011 to October 20, 2011.

2.2. Selection and grouping of animals

A total of 16 goats were used in this study. The animals were randomly distributed in four groups each having five animals. The groups were designated as A, B, C and D. The animal grouping was done in such a way that the mean live weight of all the groups was almost similar.

2.3. Formulation of diets

Four diets were prepared and considered as four dietary treatments (A, B, C and D) with roughage and concentrates. Group A- urea molasses straw (UMS), B- urea treated straw (UTS), C- silage and D- natural grasses (control). The concentrate part of the ration consisted of broken maize-30.0%,wheat bran-20.0%, kheshari bran-20.0%, soyabean meal-24.0%, fish meal-2.0%, DCP-2.0% salt-2.0% and vitamin-0.1%. The concentrate mixture contained of 16.5% CP and 10.2 MJ/kg DM of ME. Concentrate mixture was fed at 2% of the live weight. The rations were randomly supplied to different groups of animals.

2.4. Design of trial

The experiment was set following completely randomized design.

Treatment group	A	B	C	D
Animal species	Goat	Goat	Goat	Goat
No. of animal	4	4	4	4
Roughage supply	UMS	UTS	Silage	Grasses
Concentrate supply (% LW)	2%	2%	2%	2%

2.5. Preparation of UMS

The weighed amount of urea, molasses and straw were mixed at a ratio of 3:15:82. Straw was shredded to about 3-4 cm in a straw shredder. The urea and molasses were made solution with water and well mixed with straw (Figure1).

Figure 1. UMS preparation (left) and prepared UTS (right).

2.6. Preparation of UTS

Straw was shredded to about 3-4 cm in a straw shredder. The UTS was prepared by ensiling shredded straw with 5% urea for at least 10-15 days.

2.7. Preparation of silage

The Napier (*Pennisetum purpureum*) grasses were harvested manually. Then the grasses were chopped to 3 – 4 inch in length. About 2.5-3.0-ton fodder can be preserved in 100-cft soil pit. The pit was made in a well-drained and high place. The length was dependent on the amount of grasses. The silage was compact so that no water or air could enter inside the pit. All sides of the pit were covered by polythene.

2.8. Feeding UMS, UTS and silage

After preparation UMS was supplied to the animals. After preparation UTS was stored for 10 days than ready to fed animals. Silage was collected from silo pit in the morning for feeding the goat on the same day. Concentrate was supplied first followed by roughages with *adlibitum* access to fresh water.

2.9. Measurement of feed intake and sample collection

The roughage (UMS, UTS and silage) intake of each goat was determined by subtracting the amount of left over if any from the amount of feed given on the previous day. Refusal was collected every morning before feed

supply and weighed to determine daily feed intake. Representative feed samples of UMS, UTS, silage, grasses and concentrate mixture were collected and kept for chemical analysis.

2.10. Collection of faeces and urine

For metabolism trial, output of faeces and urine was recorded daily during the last 7 days of the feeding trial period of 90 days. The faeces was collected at every 8:00 am and after 24 hours, weighed and sub-sample was taken every day from an animal. Samples of faeces were put in plastic bags in the freezer (-20 °C). The urine sample was collected in a bucket containing 6N H_2SO_4 solution to maintain a pH of 4 or lower and taken 10% sub-sample to determine N.

2.11. Chemical analysis

The samples were subjected to chemical analysis for the determination of dry matter (DM), organic matter (OM) and crude protein (CP) following the methods of AOAC (1995). The acid detergent fibre (ADF) was determined according to Goering and Van Soest (1970). All the samples were analysed in duplicate and the mean values were recorded.

2.12. Statistical analysis

The statistical analysis was done using 'SPSS-11.5' statistical program to compute analysis of variance (ANOVA) in completely randomized design (Steel and Torrie, 1980). Differences among the treatment means were determined by Duncan′s Multiple range Test (DMRT) (Duncan, 1955).

3. Results and Discussion

3.1. Chemical composition of feedstuffs

The chemical composition of feeds used in the trial is given in Table 1. It can be seen from the table that the CP and ADF contents of Napier silage, UMS and UTS were 11.34 vs 46.88, 8.11 vs 47.42 and 7.41 vs 63.33%, respectively.

3.2. Feed intake and live weight changes

Feed intake and live weight changes of goat are shown in Table 2. Total DM intake was significantly ($P<0.05$) higher in silage fed group than UMS and UTS fed group. Concentrate DM intake was nearly similar among the group. These findings agreed by Chowdhury (2004). It indicated that silage containing diet increased total DM intake. Silage had a significant positive effect on feed dry matter intake of goats. The data on feed intake showed that goats consumed more dry matter when offered silages than UMS and UTS. ME (MJ/d) intake was higher ($P<0.05$) in UMS (6.68) and silage (6.78) group than UTS (3.48) group.

The mean values of live weight gains (g/d) were 44.11, 43.88 and 50.89 for UMS, UTS and silage, respectively which varied significantly ($P<0.05$) among the groups. The animals fed on silage showed significantly ($P<0.05$) higher live weight gain than the animals fed on UMS and UTS. However the animals on diets UMS and UTS showed no significant difference between the groups. The results suggest that ensiled forages had higher growth response due to better nutrient contents and their utilization.

Table 1. Chemical composition of feed stuffs.

Feed ingredients	%DM	% DM basis			
	fresh basis	OM	Ash	CP	ADF
Napier silage	17.65	88.77	11.23	11.43	46.88
UMS	66.34	87.79	12.21	8.11	47.42
UTS	47.91	86.74	13.26	7.41	63.33
Concentrate mixture	91.43	91.15	8.85	18.00	28.48

Table 2. Feed intake and live weight gain of growing goats fed different diets.

Parameter	Dietary treatments #			SED	Level of sig.
	A	B	C		
UMS DMI (g/d)	382.00	-	-	-	
UTS DMI (g/d)	-	385.00	-	-	
Silage DMI (g/d)	-	-	393.00	-	
Concentrate DM intake (g/d)	190.00 [a]	173.00 [b]	197.00 [a]	7.52	*
Total DM intake (g/d)	572.00 [a]	558.00 [a]	590.00 [b]	16.32	*
DM intake (g/kgw $^{0.75}$/d)	71.36 [a]	70.12 [a]	73.47 [b]	3.21	*
Estimated ME intake (MJ/d)	6.68 [a]	3.48 [b]	6.78 [a]	0.52	*
Initial live weight (kg)	12.53	11.97	12.62	1.47	NS
Final live weight (kg)	16.50 [ab]	15.92 [bc]	17.20 [c]	1.86	*
Live weight gain (g/d)	44.11 [a]	43.88 [a]	50.89 [b]	5.47	*

# A= UMS, B= UTS, C= Silage; [ab] Mean values in a row with different superscripts differ significantly, NS= Non significant, *P<0.05
DMI= Dry matter intake, MEI= Metabolizable energy intake, MJ= Mega Jule

Table 3. Nutrient utilization and N-balance in goat fed forage silage with concentrate.

Parameters	A	B	C	SED	Level of sig.
Digestibility (%)					
DM	70.00	70.00	73.00	3.11	NS
CP	58.00	57.00	59.00	4.12	NS
ADF	71.00	67.00	70.00	2.85	NS
OM	66.50	68.60	69.70	1.79	NS
N-retention (%)	30.32.0 [a]	29.10[a]	34.00 [b]	2.92	*

# A= UMS, B= UTS, C= Silage; [ab] Mean values in a row with different superscripts differ significantly, NS= Non significant, *P<0.05
DMI= Dry matter intake, MEI= Metabolizable energy intake, MJ= Mega jule

3.3. Nutrient utilization

The digestibility of different diets is shown in Table 3. Apparent digestibility values in the table (Table 3) showed that these were no significant variation among the dietary groups of animals in case of DM, CP, ADF and OM, although digestibility of silage group was slightly higher than those of other groups. The present trial indicated that used feeds did not significantly alter the digestibility of the whole diets supplied to the animals, although silage diet had slightly higher values for DM, CP, ADF and OM digestibilities. There was not always a correlation between intake and digestibility; highly digestible stuff may be poorly consumed and vice versa (Wilson, 1977).

There were significant (P<0.05) differences among the mean values in terms of nitrogen retention (%) data. There were significant differences among the mean values, the silage group of animals showed significantly higher values than those of UMS and UTS groups. The results of nitrogen balance study on the animals clearly showed that silage had significantly positive effect on the nitrogen retention in the body of the animals. These results indicated that the higher nitrogen content of silage contributed positively in the retention of nitrogen in the animal body. This has been reflected in the significantly higher growth rate of animals of silage groups than other groups as mentioned earlier.

4. Conclusions

Diets with silage resulted better weight gain and nitrogen balance of goats compared to urea molasses straw (UMS) and urea treated straw (UTS). So, silage may be practiced in the existing feeding system for high productivity of goats.

Conflict of interest

None to declare.

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