

Effect of Concentrate Supplementation to Grazing on Growth and Reproductive Performance in Female Goats and Sheep

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Abstract: Supplemental effect of concentrate was studied on growth and reproductive performance in female goats and sheep under grazing condition. Six females each of goats and sheep aged about ten months and weighing on average, 12.6 and 11.7 kg respectively was used. The supplied concentrate supplement contained wheat bran, rice polish and soybean meal (50:40:10, 350 g/d). Animals of each species were blocked according to live weight and the blocked groups were assigned at random to two feeding regimes (with or without concentrate supplementation) in a 2×2 factorial experiment. Significantly higher ($P < 0.01$) dry matter intake was observed in supplemented group than those of control group (grazing without concentrate) irrespective of animal species. Between sheep and goats significant ($P < 0.05$ to $P < 0.01$) difference was observed in DM intake and live weight gain. Kids birth weight was higher (0.71 vs. 0.55 kg) and gestation length was lower (142 vs. 145 d) in goats given the concentrate supplement than those of control goats. These results suggested that the effect of supplementing concentrate diet be benefited for the growth and reproductive performance of goats and sheep under grazing condition.

Key words: Goat, sheep, concentrate, supplement, grazing, reproduction, birth weight, gestation length

Introduction

Among domestic animals, goats and sheep play a significant role in the subsistence economy of Bangladesh. According to BBS (1998) small, marginal and landless farmers (55%) followed by medium (34%) and large farmers (11%) rear goats. Goat meat is one of the most commonly eaten red meat and highly acceptable to people of all castes and religion. In Bangladesh goats are generally reared as scavengers and organized stall-feeding is practically nil (Huq, 1990). But during adverse climatic condition goats are housed providing stall-feeding with tree leaves, natural grasses and kitchen wastes (Husain, 1993). In Bangladesh, goat production in the villages by traditional husbandry system is often characterized by poor growth, high mortality and low reproductive rates. In village environments, the productivity of goat may be increased by controlling diseases through vaccination and anthelmintic drug (Lambourne, 1985) and improving nutrition by either concentrate feeding (Paravvan and Ovalo, 1985) or provision of additional forage (Muri and Jordao, 1991). Some previous studies (Kochapakdee et al., 1994a) have reflected the importance of concentrate supplementation on growth and productivity of goats and sheep. These authors also reported that grazing alone might not be sufficient for optimizing live weight gain and wool production. If scavenging type of rearing can be supplemented with minimum amount of concentrate then the level of production may be increased at minimum cost.

Materials and Methods

The experiment was conducted at Bangladesh Agricultural University Animal Nutrition Field Laboratory, Mymensingh from April, 1999 to September, 2000.

Pasture establishment and management: An area of 0.12 ha was surrounded by fancy materials and this was developed to use as a grazing land. Pasture was established before the onset of the experiment for raising goats and sheep during day. Legumes such as mitali (*Phaseolus mungo*) seeds @ 46 kg/ha were sown in the grazing field. Intercultural operations like irrigation, removal of undesirable plant and weeds had been accomplished and made the land ready for goats and sheep to graze during day.

Animals diets and experimental design: Six females each of goats and sheep aged about 10 months and weighing on average 12.6 and 11.7 kg respectively were used. The animals were ear tagged and then allowed 7 days to adapt to the experimental conditions

prior to the commencement of the study. Following adaptation, goats and sheep were housed in individual pen in an animal house subjected to natural ventilation and sunlight. Animals of each species were blocked according to live weight and the blocked groups were assigned at random to two feeding regimes (with or without concentrate supplementation) in a 2×2 factorial experiment. The animals in control group were allowed to graze in a newly established grazing land for a specific period of 6.00 hours daily. In addition to above grazing the animals in supplemented group received a concentrate mixture (350g/d) consisting of wheat bran, rice polish and soyabean meal. The supplemental diet contained an estimated ME concentration of 10.8 MJ and 159g crude protein (CP) per kg dry matter (DM). The concentrate mixture was fed daily at night, when animals were kept in individual pen. The increment of supplemental diet was made based on live weight gain and feed consumption. At all times, fresh drinking water was supplied to the animals.

Measurements and procedures: Dry matter (DM) intake by goats and sheep raised under grazing condition during day were estimated by animal weight gain method. In addition to grazing, the supplemented groups (goats and sheep) were allowed to feed a measured amount of concentrate diet, when they were housed in individual pen at night. In every morning left over feeds were collected before the animals were allowed to graze and then weighed to determine the daily feed intake of supplemented group. Goats and sheep were weighed initially and then 7 day intervals throughout the experimental period and finally average weight of individual animal was calculated in every 28-day interval. After completion the experimental period the average weight gain of individual animal was also recorded. The oestrus symptoms of female goats were identified by visual observation and animals in oestrus were mated by Black Bengal buck (24-36 hours later from the beginning of oestrus). As it is difficult to detect heat in sheep, a ram was always kept along with the ewes to allow them for natural service. Special attention was given to pregnant animals and gestation gain was recorded. Age at puberty, date of service, gestation period, litter size, sex, birth weight of kids, lambs and dam weights were also recorded immediately after parturition.

Statistical analysis: Data related to growth performance and dry matter intake were analyzed using "MSTAT-C" statistical program to compute analysis of variance (ANOVA) for a 2×2 factorial experiment. In the ANOVA, the treatment sum of square was

partitioned into three components each with one degree of freedom.

Results and Discussion

Concentrate supplementation on live weight gain and dry matter intake of goats and sheep: The mean values for live weight gain and dry matter intake of goats and sheep between 1 and 20 weeks of the experiment were recorded (Table 1). It is evident that in all growth intervals, DM intakes were significantly ($P < 0.01$) higher in supplemented group than those of control group irrespective of animal species. The results showed that DM intakes were significantly ($P < 0.05$) higher in sheep than those in goats during the period between 57-84 days (376 vs. 318 g/d) and 113-140 days (387 vs. 347 g/d) of the experiment. Similar values were recorded for DM intakes between sheep and goats for the other growth intervals. Hutson *et al.* (1988) reported that, with low quality forage, intake was lower and digestibility of potentially digestible DM was higher in goats compared with sheep. They also observed that feed intake in both species was increased when increased amount of supplemental protein was fed. The average daily live weight gains recorded in the supplemented group were significantly ($P < 0.05$ to $P < 0.01$) higher during the periods from 29-56 days (35.1 vs. 23.2 g/d), 57-84 days (33.9 vs. 23.8 g/d), 85-112 days (32.1 vs. 20.2 g/d) and 113-140 days (26.8 vs. 19.1 g/d) than those observed in control group. In contrast, during the periods from 29-56 days and 57-84 days of the trial, goats gained significantly ($P < 0.05$ to $P < 0.01$) higher live weight (32.7 vs. 25.6 g/d and 33.3 vs. 24.4 g/d respectively) than those of sheep

irrespective of feeding regime. These results suggest that the effect of supplementing concentrate on live weight gain was higher in goats than sheep. Mahjan *et al.* (1976) in an experiment in India reported that grazing alone is not sufficient for better live weight gain and supplementation of green oat or concentrate mixture showed better performance of grazing sheep.

Reproductive performance: Average gestation length recorded in this study was 143.5 days for goats. In another study with Black Bengal goats, Husain (1993) reported a gestation length of 144.93 ± 0.29 days, which is similar to the present findings. Data for gestation length of sheep was not available, because it was difficult to detect estrus symptoms. Average birth weight of kids (0.71 vs. 0.55 kg) was higher in supplemented group than those of control group and sheep produced kids of higher birth weight (0.75 vs. 0.63 kg) than goats (Table 2). A marked difference was observed in kids of control and supplemented group. It is difficult to explain whether the effect was only due to concentrate supplementation. The size and weight of the dam may be other important factors in this regard. Kochapakdee *et al.* (1994b) reported that supplementary feeding did not significantly effect either kids birth weight or weight gain in the first 6 weeks after birth. However, response to pre-mating nutrition in sheep is complicated by the interrelationship between level of nutrition, body weight and body condition (Doney *et al.*, 1982). Due to lack of adequate information, it is difficult to draw a precise conclusion on the effect of concentrate supplementation on reproductive traits.

Table 1: Effect of concentrate supplementation on live weight gain and dry matter intake in goats and sheep

Parameters	Goats		Sheep		SEM	Significance of contrast		
	Control group	Supplemented group	Control group	Supplemented group		S	C	SC
Live weight gain (g/d)								
0- 28d	25.00	33.33	23.81	27.38	3.35	NS	NS	NS
29- 56d	26.19	39.29	20.24	30.95	1.85	**	**	NS
57- 84d	27.38	39.29	20.24	28.57	3.38	*	*	NS
85- 112d	21.43	34.52	19.05	29.76	2.28	NS	**	NS
113- 140d	20.24	26.19	17.86	27.38	2.56	NS	*	NS
Dry matter intake (g/d)								
0- 28d	183.60	488.50	218.10	515.60	13.50	NS	**	NS
29- 56d	183.00	499.60	218.40	540.90	17.12	NS	**	NS
57- 84d	182.00	453.60	216.40	536.00	18.20	*	**	NS
85- 112d	186.20	508.70	220.60	553.10	17.38	NS	**	NS
113- 140	186.60	506.90	220.30	552.80	17.09	*	**	NS

S = Main effect between goats and sheep, C = Main effect between control and supplemented group, SC = Interaction between main effect, NS = Non significant, * = $P < 0.05$, ** = $P < 0.01$

Table 2: Effect of concentrate supplementation on reproductive parameters in goats and sheep

Parameters	Goats		Sheep	
	Control group	Supplemented group	Control group	Supplemented group
No. of does and ewes per treatment	3	3	3	3
No. of pregnant animals	1	2	1	1
Gestation length (days)	145	142	-	-
Litter size	1	3	-	2
No. of kids/lambs died during birth	-	-	-	1
Percentage born alive	100	100	-	50
Birth weight of kids (kg)	0.55	0.71	-	0.75
Sex of kids	Female	All female	-	All male

#Data presented here were not statistically analyzed.

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