Asian Australas. J. Biosci. Biotechnol. 2016, 1 (1), 73-77

Asian-Australasian Journal of Bioscience and Biotechnology
ISSN 2414-1283 (Print) 2414-6293 (Online)
www.ebupress.com/journal/aajbb

Article

Feeding effect of concentrate supplementation on growth and reproductive performance of growing lamb

Md. Zillur Rahman[1], Md. Yousuf Ali*[1], M.O. Goni [1], M. Ershaduzzaman[1] and Most. Sumona Akter[2]

[1]Bangladesh Livestock Research Institute, Savar, Dhaka-1341, Bangladesh
[2]Central Cattle Breeding and Dairy Farm, Savar, Dhaka-1341, Bangladesh

*Corresponding author: Md. Yousuf Ali, Bangladesh Livestock Research Institute, Regional Station, Shahjadpur, Sirajgonj, Bangladesh. E-mail: 113yousuf.bau@gmail.com, myousuf@blri.gov.bd

Received: 14 March 2016/Accepted: 11 April 2016/ Published: 30 April 2016

Abstract: A research work was undertaken to evaluate the feeding effect of concentrate supplementation on growth and reproductive performance of growing lamb upto first lambing. The trial was conducted at Char-elahi union, Chompanygonj, Noakhali. Thirty female sheep of about average 11.3 (±2.3) kg live weight and about 6-8 months of age were used and randomly allocated into three experimental diets, T0 (grazing), T1 (grazing + 1% concentrate supplement of live weight) and T2 (grazing + 2% concentrate supplement of live weight). The study revealed that the average daily DM intake was 261.00, 405.35 and 405.35g for diets T0, T1 and T2, respectively which was significantly (P≤0.01) different. DM intake when expressed as metabolic body weight also showed significant (P≤0.01) differences.DM intake as per cent of live weight were 1.96, 2.81 and 3.69 for diets T0, T1 and T2, respectively, which differ significantly (P≤0.05) among the treatment group. Daily grass DM intake was 261.00, 260.49 and 260.38g for diets T0, T1 and T2, respectively and this difference was not significant (P≥0.01) among the treatment group. Daily average live weight gain was 20.00, 35.50 and 44.00g for diets T0, T1 and T2, respectively. Live weight gain on diet T2 was significantly (P≤0.01) higher than that of diet T1 and T0. The results suggested that concentrate supplementation had higher growth response possibly due to better nutrient contents and their utilization. There were no significant (P≥0.01) effect on reproductive performances of service per conception, gestation length (d) and litter size (no.) of three dietary treatments. The Percentage of born alive T2 (100%) and T1 (90%) were higher in supplemented group compared to non supplemented T0 (70%) group. Birth weight of lambs of T2 (male-1.41kg, female, 1.06 kg) and T1 (male-1.21 kg, female-0.90 kg) group were significantly (P≤0.05) higher compared to that on only grazing group T0 (male-0.72 kg, female-0.56kg). The concentrate supplementation (2%) may be suggested for optimizing growth and reproductive performance of female sheep under grazing condition in coastal area.

Keywords: growing lamb; concentrate; growth and reproductive performance

1. Introduction

In many tropical countries, productivity of sheep is very poor and has been related to the limitations of disease, nutrition, genotype and management practices. Most of the farmers in Bangladesh rear sheep with tethering as well as traditional system of grazing without any supplementation. This system of production causes reduced growth and poor reproductive performance. If scavenging type of rearing can be supplemented with minimum level of concentrate as an additional source of dietary energy then the level of production can be increased at minimum cost. Hossain *et al.* (2003) reported that supplementation of higher level of concentrate may be suggested for optimizing growth and reproductive performance of female sheep under grazing condition. Sultana (2010) stated that supplementation of concentrate @ 1.5% of body weight/day/lamb under semi intensive management system were beneficial in terms of increased weight gain. Limited works have been done for overall improvement sheep. Therefore, present investigation was aimed at predicting the effect of graded

level of concentrate supplementation on feed intake, growth and reproductive performance of growing lamb in the field condition of coastal area.

2. Materials and Methods

2.1. Site of the experiment

The trial was conducted at Char-elahi union, Chompanygonj, Noakhali during the period from Nov. 15, 2010 to May 15, 2011. This region has a subtropical humid climate with an average annual average temperature ranges from a maximum of 34.3 °C to a minimum of 14.4 °C; its annual rainfall is 3302 mm. (http://en. wikipedia.org/wiki/Noakhali).

2.2. Animals grouping and housing

Thirty female lamb of average 11.3 (±2.3) kg live weight and about 6-8 months of age were selected and randomly allocated into three experimental groups, T0 (grazing), T1 (grazing + 1% concentrate supplenment of LW) and T2 (grazing + 2% concentrate supplement of LW). The animals were ear tagged and allowed for 10 days to adapt to the experimental conditions prior to onset of the study. Faeces of each sheep was examined initially for checking internal parasitic infestation and all animals were dewormed with Helmex anthelmentic drugs immediately before starting of the trial. Following adaptation, sheep were housed in individual pens in an animal house (Figure 1) subjected to adequate natural ventilation and sunlight. The animals were allowed to graze (Figure 2) for 8 hours daily during day while at night they were individually penned.

Figure1. Sheep house.

Figure 2. Sheep grazing in coastal area.

2.3. Feeding of animals

Animals were grazed from 08.00 a.m to 16.00 in the Char areas. In case of supplement group's (T1 and T2) animals were fed concentrate mixture (wheat bran, soyabean meal, khasari bran, maize crushed, DCP, salt) which contain 18% CP and 10.31MJ ME/kg DM. The supplemental diets were fed daily at night when the animals were kept in the house. The increment of supplemental feed was based on live weight gain. Concentrate refusals were collected every morning and weighted. Free access of clean drinking water was carefully ensured for all animals. Mixed grasses were collected from different places where sheep grazed and then mixed.

2.4. Measurements and procedure

2.4.1. Grazing intake

Dry matter intake of grasses was estimated by animal weight gain method. Animals were weighed individually before access to the grazing area. The animals were allowed to graze and weighed at 2 hour interval from 08.00 to 16.00 hours. Average weight of each animal was recorded. The difference between two weights before and after grazing was considered as the amount of grasses consumed by individual animal of each group.

2.4.2. Live weight changes

Animals were weighed initially and then at 7 days interval. This process was continued before conception of the animals. Immediately after parturition, weight of individual lamb was recorded. The animals were weighed at 07.30 hour prior to grazing.

2.4.3. Reproductive performance

Date of service, gestation period, litter size, sex, birth weight of lamb were also recorded after parturition.

2.4.4. Chemical analysis of samples

The samples were subjected to chemical analysis 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.

2.4.5. 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 mixed grass

The chemical composition of mixed grasses at monthly interval has been shown in Table 1.The non-significant variation of the chemical composition of green grasses at different months. Tareque (1987) observed that, dry matter content of grasses tends to decline during dry season. The chemical composition (g/100g DM) of concentrate mixture was DM (90.71), OM (90.20), CP (18.0), ADF (14.21) and Ash (9.8).

3.2. Feed intake and growth performance of sheep

Supplementation of concentrate having as an additional source of dietary energy exerted multiple effects on total dry matter intake and growth potentials of sheep raised under grazing condition (Table 2). It was observed that, concentrate supplementation did not show any significant ($P \geq 0.05$) difference on green grass dry matter intake (261.00, 260.49 and 260.38 g/d, of T0, T1 and T2, respectively). Average total dry matter intake in sheep was 261.00, 405.35 and 569.20 g/d for T0, T1 and T2 diets, respectively. Dry matter intake expressed as per cent live weight of T0 was 1.96 kg/d and significantly ($P \leq 0.05$) lower than T1 (2.81 kg/d) and T2 (3.69 kg/d). In char areas, sheep received only 1.96% DM of LW from grazing land and this minimum level could not maintain the requirements for productive and reproductive purposes. Daily average dry matter intake expressed as metabolic body size (g/ kgw $^{0.75}$/d) were 38.36, 63.12 and 75.21 which was significantly ($P \leq 0.01$) differences among the treatment groups of T0, T1 and T2. Kabir (2000) observed dry matter intake in sheep to be 31.8 g/ kgw $^{0.75}$/d for grazing group and 78.2 g/ kgw $^{0.75}$/d for 2% concentrate supplemented group. Average daily live weight gain in sheep was highest (44.00 g/d) received 2% concentrate supplemented group followed by 1% concentrate supplemented group (35.50 g/d) and than only grazing group (20.00 g/d).

3.3. Reproductive performance of sheep

The reproductive traits of female sheep raised under three feeding regimes have been shown in Table 3. Service per conception were T0 (1.52), T1 (1.44) and T2 (1.48) which was not significantly ($P \geq 0.05$) differences among the groups. These results are not similar to the findings of Pereira *et a*l. (1980), who observed that the number of service per conception was 1.03 and 1.14 for White and Black Santa Ines ewes, respectively. Khan (1989) observed that the number of services per conception was 1.29 in Ramboullet ewes which was also lower than the present study. There are no significant ($P \geq 0.05$) differences on gestation length among the treatment group. It is well documented that the litter size improves with advance in age through increased ovulation rate, uterine capacity and maternal traits affecting reproductive efficiency of ewes. Birth weight of lambs was higher on T2 diet (male1.41, female 1.06 kg) and T1 diet (male 1.2, female 0.90 kg) compared with that, on T0 diet (male 0.72, female 0.56 kg). It is speculated that, concentrate mixture might increased the availability and proper balance of nutrients to the host animal. This in turn resulted in higher supply of nutrients to the fetus and reflected higher birth weight. However, size, weight and health status of ewe may be another important factor which may affect birth weight of lambs. Doney *et al*. (1982) observed that, provision of proper nutrition before mating is associated with complex interrelation between body weight gain and body condition of lambs. In contrast, Kochapakdee *et al.* (1994) reported that, better supplementary feeding did not always play potential role in attainment of birth weight or post weaning rate of gain of lambs. The Percentage of born alive of supplemented group T2 (100%) and T1 (90%) were higher compared to non supplemented T_0 (70%) group.

Table 1. Chemical composition of mixed grasses (g/100g DM).

Parameters	Collection time								Level of significance
	November	December	January	February	March	Aprl	May	SED	
DM	21.3	21.2	20.6	20.4	20.5	20.4	22.42	0.98	NS
OM	85.83	85.21	86.30	86.10	85.9	85.7	85.9	0.91	NS
CP	9.38	8.90	9.00	9.10	9.23	9.10	9.30	0.69	NS
ADF	34.24	33.12	34.16	33.54	34.23	35.00	34.86	0.39	NS
Ash	14.17	14.79	13.70	13.90	14.10	14.30	14.10	0.23	NS

Table 2. Effect of concentrate supplementation on live weight gain and dry matter intake on growing female lamb.

Parameters	Dietary treatment			SED	Level of significance
	T0	T1	T2		
Total DMI (g/d)	261 [c]	405.35 [b]	569.2 [a]	12.23	**
Con. DM intake (g/d)	-	144.86 [b]	308.82 [a]	3.63	**
Grass DM intake(g/d)	261	260.49	260.38	3.89	NS
DM intake (g/kgw $^{0.75}$/d)	38.36 [c]	63.12 [b]	75.21 [a]	2.33	**
DM intake (%LW)	1.96 [c]	2.81 [b]	3.69 [a]	0.36	*
Initial wt. (kg)	11.30	11.24	11.41	0.67	NS
Final wt. (kg)	15.00 [c]	17.63 [b]	19.41 [a]	1.03	*
Live wt. gain (g/d)	20.00 [c]	35.50 [b]	44.00 [a]	3.12	**

[abc] Mean values with different superscripts differ significantly, NS= Not significant, *P≤0.05; **P≤0.01

Table 3. Effect of concentrate supplementation on reproductive performance of growing lamb.

Parametrs	T0	T1	T2	SED	Level of significance
Service per conception (No.)	1.52	1.44	1.48	0.15	NS
Gestation length (d)	151	150	150	1.28	NS
Litter size (No.)	1.41	1.56	1.69	0.29	NS
Birth wt. (kg):					
Male	0.72 [b]	1.21 [a]	1.41 [a]	0.05	*
Female	0.56 [b]	0.90 [a]	1.06 [a]	0.07	*
Percentage born alive	70	90	100	-	-

[ab] Mean values with different superscripts differ significantly, NS= Not significant, *P≤0.05

4. Conclusions

In grazing condition sheep received low or minimum amount of DM (1.96% DM of live weight) which was far below for productive and reproductive purposes. It may be concluded that the supplementation of concentrate (2% of LW) was beneficial in terms of increased weight gain, birth weight and born alive of lamb in coastal area.

Acknowledgements

The principal author, Md. Zillur Rahman along with others is thankful to the Department of Goat and Sheep, Bangladesh Livestock Research Institute, Savar, Dhaka for their technical assistance.

Conflict of interest

None to declare.

References

AOAC. 1995. Official Methods of Analysis. (16th edition), Association of Official Analytical Chemist. Washington D.C.

Devendra C and M Burns, 1983. Goat Production in the Tropics. Commonwealth Agricultural Bureaux, Farnham House, Farnham Royal, U. K.

Doney JM, RG Gunn and F Horak, 1982.Reproduction. In Sheep and Goat Production. 1. E. Coop (Edn.), Elsevier Scientific Publishing Company, 495-510.

Duncan, DB. 1955. Multiple Range and Multiple F-tests. Biometrics, 11: 1-42.

Goering, HG and PJ Van Soest, 1970. Forage fiber analysis. ARD. USDA. Washington, DC. Agriculture Handbook, no. 379, 20 pp.

Hossain ME, M Shahjalal, MJ Khan and AA Bhuiyan, 2003. Effect of Dietary Energy Supplementation on Feed Intake, Growth and Reproductive Performance of Sheep under Grazing Condition. Pakistan Journal of Nutrition, 2 :148-152.

http://en.wikipedia.org/wiki/Noakhali_District

Kabir F, 2000. Effect of supplementary feeding to grazing on growth and reproductive performance in female goats and sheep. M. S. Thesis. Department of Animal Nutrition, Bangladesh Agricultural University, Mymensingh.

Kochapakdee SW, S Pralomkarn, A Saithanoo, Lawpetchara and BW Norton. 1994. Grazing management studies with thai goats. Productivity of female goats grazing newly established pasture with varying levels of supplementary feeding. Asian-Australasian J. Ani. Sci.,7: 289-293.

Steel RGD and JH Torrie, 1980. Principles and Procedures of Statistics: A Biometric Approach, 2nd edition.mcGraw-Hill kapagakusha Ltd., Tokyo, Japan.

Sultana 2010. Stated that supplementation of concentrate @ 1.5% of body weight/day/lamb under semiintensive management system were beneficial in terms of increased weight gain.

Tareque, AMM, 1987. Progress Report of the Research Scheme of the Project "Nutritional Evaluation of Ruminant Feedstuffs is Bangladesh and Formation of Balanced Ration". Bangladesh Agricultural University, Mymensingh.