

## Effect of Levels of Concentrate Supplement on Live Weight Gain and Carcass Characteristics in Sheep on Restricted Grazing

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**ABSTRACT** : Sixteen local sheep (8 male + 8 female) of about six months old with average live weight 10.78 ( $\pm 1.11$ ) kg were allocated into four treatments. The treatments (T) are : T<sub>0</sub> = Restricted grazing without concentrate; T<sub>1</sub>, T<sub>2</sub> and T<sub>3</sub> = Grazing + 100, 200 and 300 g concentrate per sheep daily. Live weight of grazing (7.30 hrs daily) sheep was recorded in each week. The uncastrated male sheep were slaughtered for carcass and non-carcass parameters. Statistically significant ( $p < 0.05$ ) differences were observed in live weight gain (g/day) among the treatments (T<sub>0</sub> = 15.71; T<sub>1</sub> = 22.66; T<sub>2</sub> =

32.66 and T<sub>3</sub> = 40.47). The dressing % were: (T<sub>0</sub> = 32.75, T<sub>1</sub> = 38.50, T<sub>2</sub> = 36.90 and T<sub>3</sub> = 37.75). The warm carcass weight represented 37.21% of live weight.

Significant ( $p < 0.01$ ) correlation were observed for live weight with carcass weight ( $r = 0.99$ ) and dressing % ( $r = 0.88$ ). Concentrate supplement increase live weight gain in sheep on grazing. Live weight is a good indicator to assess carcass characteristics.

**(Key Words** : Concentrate, Live Weight, Carcass, Grazing, Sheep)

### INTRODUCTION

The livestock population in Bangladesh is estimated at about 24, 0.87, 1.07 and 28 million for cattle, buffalo, sheep and goats, respectively (FAO, 1995). Sheep in Bangladesh are indigenous type, small in size with live weight ranges from 10-20 kg per sheep. Sheep are sparsely distributed all over the country with the exception of high density in the district of greater Rajshahi, Tangail and in the delta region of Noakhali (Rahman, 1989). Sheep are raised primarily for meat production. The forages available for the grazing of sheep are in the harvested and fellow land, road sides, crop field ridges and canal sides. Farmers in the rural area usually do not provide any concentrate feed for their grazing sheep. Mahajan et al. (1976) found that grazing alone is insufficient for satisfactory live weight gain.

There is a dearth of information for local sheep of Bangladesh on live weight gain and carcass and non-carcass characteristics through relationships between live weight and carcass and non-carcass parameters reported by Al-Saigh et al. (1988). Therefore, the present experi-

ment was carried to provide growth performance, carcass and non-carcass characteristics of sheep with different level of concentrate supplementation on naturally grazing sheep.

### MATERIALS AND METHODS

#### Design and treatment

Sixteen local sheep (8 uncastrated male + 8 female) of about six months old with average live weight 10.78 kg ( $\pm 1.11$ ) were allocated into four treatments in a Completely Randomized Design (CRD). The experimental layout and treatments are presented in table 1.

#### Management and feeding

The selected lambs were identified with an ear tag and were adjusted for management and feeding for 3 weeks before the trial started. Throughout the experimental period identical housing, health care and sanitary measures were provided to all the sheep.

The drug (Estazol, Albendazole, 10 mg/kg weight) was administered to the sheep as routine anthelmintic. Experimental sheep were allowed for natural grazing in an around the Sheep and Goat farm premises for a period of 07:30 hrs daily (08:00 a.m. to 1:00 p.m. and 3:00 p.m. to 05:30 p.m.). Concentrate mixture was offered daily at 07:30 a.m. prior to taking the sheep for grazing.

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**Table 1.** Experimental layout, concentrate offered and live weight performance of sheep

Parameter	Treatment (T)			
	Grazing without concentrate (T <sub>0</sub> )	Grazing + concentrate (g/sheep/day)		
		100 (T <sub>1</sub> )	200 (T <sub>2</sub> )	300 (T <sub>3</sub> )
Number of sheep/treatment	4	4	4	4
Initial live weight (kg)	10.03 ± 0.17	10.35 ± 2.52	10.30 ± 1.52	10.78 ± 1.11
Final live weight (kg)	11.68 ± 0.74	12.73 ± 2.73	13.73 ± 2.81	15.03 ± 1.86
Duration of the trial (days)	105	105	105	105
Live weight gain (g/day)	15.71 <sup>c</sup>	22.66 <sup>bc</sup>	32.66 <sup>ab</sup>	40.47 <sup>a</sup>
* Extra return from meat for added concentrate (Tk. /d)	—	0.24	0.84	1.18
Grazing of sheep (hrs/day)	7.30	7.30	7.30	7.30
Concentrate mixture:				
Wheat bran (g/d)	—	50	100	150
Sesame oil cake (g/d)	—	50	100	150
Common salt (g/d)	—	5	5	5

Common letters in the superscript indicates that means do not differ significantly.

\* Concentrate @ Tk. 6.00 per kg; Meat sold @ Tk. 120.00 per kg. 1 US \$ = TK. 42.00.

### Measurement of live weight

Live weight of the sheep was recorded each week, by spring balance, at 07:30 a.m. prior to concentrate feed supply.

### Measurement of carcass characteristics

After measuring live weight, length, height and heart girth the eight male sheep were slaughtered by Halal (Islamic law) method, eviscerated immediately after flaying. The head was removed and the fore legs and hind legs were trimmed off at the carpal and tarsal joint. The gut (full stomach, small intestine and large intestine) was

weighed and then internal contents were emptied and the weight of the empty gut recorded. Other postslaughter parameters recorded were: weight of the drained blood, skin, heart, liver, lung, kidney etc.

### Statistical analysis

Analysis of variance was performed to determine the significance of treatments according to the method of Steele and Torrie (1960). For the comparison of means Duncan's New Multiple Range correlation was used.

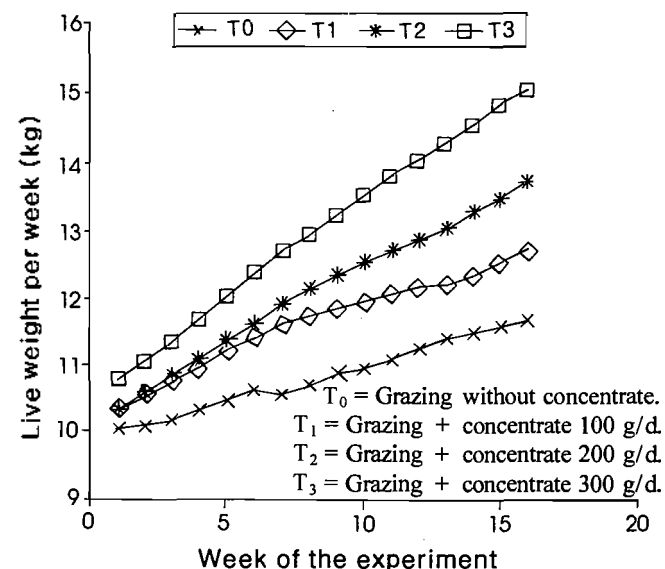
## RESULTS AND DISCUSSION

### Live weight gain

The effect of levels of concentrate supplementation on the live weight gain of sheep are shown in table 1. Statistically significance ( $p < 0.05$ ) differences were observed in average live weight gain (g/day) among the treatments. Increased daily live weight gain with concentrate supplementation on grazing is supported by the findings of Bhatia et al. (1981) with Indian sheep and Hossain (1990) with local sheep of Bangladesh.

Figure 1 illustrates the live weight change of sheep during different weeks of the experiment. Gradual increase in live weight was observed more in treatments (T<sub>1</sub>, T<sub>2</sub> and T<sub>3</sub>) with concentrate supplement compare to sheep on grazing only (T<sub>0</sub>).

This could be due to shortage of protein feed available in the grazing field. Mahajan et al. (1976) stated



**Figure 1.** Effect of concentrate intake on average live weight (kg) of sheep during the trial.

that grazing alone is insufficient for appropriate live weight gain and supplementation of green oat or concentrate mixture showed better growth performance to grazing sheep.

### Carcass characteristics

The effect of level of concentrate supplement on warm carcass weight and dressing % are shown in table 2.

The dressing % of sheep were almost similar in the treatments ( $T_1 = 38.50$ ,  $T_2 = 36.90$  and  $T_3 = 37.75$ ) of grazing + concentrate compared to grazing only ( $T_0 = 32.75$ ). The dressing % (33-39%) in this study was less compared to the results reported by Rahman (1989). This difference could be due to level of nutrition in the grazing field.

**Table 2.** Effect of levels of concentrate supplementation on warm carcass weight and dressing % of male sheep

Parameter	Treatment (T)			
	Grazing without concentrate ( $T_0$ )	Grazing + concentrate (g/sheep/day)		
		100 ( $T_1$ )	200 ( $T_2$ )	300 ( $T_3$ )
Number of carcass	2	2	2	2
Pre-slaughter live weight (kg)	12.10 ± 0.28	15.05 ± 0.78	13.75 ± 1.77	15.30 ± 0.15
Warm carcass weight (kg)	4.05 ± 0.21	5.90 ± 0.28	5.20 ± 0.99	5.90 ± 0.71
Dressing percentage (%)	32.75	38.50	36.90	37.75

The prediction of carcass weight (Y) from live weight (X) of male sheep through regression equation ( $Y = 0.56X - 2.64$ ) are presented in table 3. Negligible variation (0.03 to 3.18% only) was observed between predicted and actual carcass weight (kg). A similar regression equation ( $Y = 0.52X - 2.66$ ) was reported by Patanayak and Mohan (1974) in Indian cross-bred lambs.

The percent (%) of different carcass and non-carcass parameters in relation to live weight are given in table 4. The warm carcass weight represents 37.21% of live weight. The skin weight represents 10.27% of live weight.

The percentage of different organ in relation to live weight in this study was found to be similar to that observed by Al-Saigh et al. (1988).

Regression and correlation of carcass and non-carcass parameters (Y) on live weight (X) is presented in table 5. Statistically significant ( $p < 0.01$ ) correlation were observed for live weight and the weight of warm carcass ( $r = 0.99$ ), dressing % ( $r = 0.88$ ), drained blood ( $r = 0.84$ ), head ( $r = 0.90$ ), lung ( $r = 0.89$ ) and liver ( $r = 0.91$ ). The other parameters were found non-significant ( $p > 0.05$ ).

**Table 3.** Prediction of carcass weight (Y) from live weight (X) of male sheep through regression equation ( $Y = 0.56X - 2.64$ )

Treatment (T)	Live weight of sheep/treatment (kg)	Carcass weight (kg)		Variance	%
		Predicted	Actual		
Grazing without Concentrate	12.3	4.248	4.2	0.048	1.14
	11.9	4.024	3.9	0.124	3.18
Grazing + Concentrate (100/d)	15.6	6.096	6.1	-0.004	0.06
	14.5	5.480	5.9	-0.220	3.11
Grazing + Concentrate (200/d)	15.0	5.760	5.7	-0.140	2.37
	12.5	4.360	4.5	-0.140	0.03
Grazing + Concentrate (300/d)	16.4	6.544	6.4	0.144	2.23
	14.2	5.312	5.4	-0.088	1.63
Overall mean	14.05	5.23	5.26	-0.30	0.57

**Table 4.** Carcass and non-carcass parameters of male sheep as percent (%) of live weight (n = 8)

Parameter	Mean weight of parameters (kg or g) $\pm$ SD	Percent (%) of live weight	Range of weight (kg or g)
Live weight (kg)	14.05 $\pm$ 2.03	—	11.9 – 16.4
Warm carcass weight (kg)	5.26 $\pm$ 0.33	37.21	3.9 – 6.4
Head (kg)	0.95 $\pm$ 0.06	6.90	0.85 – 1.20
Liver (kg)	0.28 $\pm$ 0.16	1.88	0.23 – 0.35
Lung (kg)	0.15 $\pm$ 0.07	1.06	0.11 – 0.17
Skin (kg)	1.44 $\pm$ 1.83	10.27	1.15 – 1.80
Feet (kg)	0.40 $\pm$ 0.02	2.85	0.33 – 0.45
Gut (kg)	0.57 $\pm$ 11.56	3.99	0.50 – 0.60
Heart (g)	58.75 $\pm$ 2.27	0.42	50.0 – 70.0
Spleen (g)	38.13 $\pm$ 4.62	0.27	20.0 – 50.0
Kidney (g)	46.25 $\pm$ 1.83	0.33	40.0 – 50.0
Caul fat (g)	78.75 $\pm$ 19.13	0.56	30.0 – 180.0
Renal fat (g)	41.25 $\pm$ 3.50	0.29	30.0 – 60.0

**Table 5.** Regression of carcass and non-carcass parameters (Y) on live weight (X) of male sheep (n = 8)

Dependent variable (Y)	a	b	r
Warm carcass weight (kg)	-2.64	0.56	0.99**
Dressing percentage (%)	17.62	1.32	0.88**
Drained blood weight (g)	28.71	32.56	0.84**
Head weight (kg)	0.03	0.07	0.90**
Lung weight (kg)	-14.58	11.62	0.89**
Liver weight (g)	-83.66	25.71	0.91**
Feet weight (kg)	0.25	0.01	0.38 <sup>NS</sup>
Heart weight (g)	38.56	1.44	0.37 <sup>NS</sup>
Kidney weight (g)	24.60	1.54	0.49 <sup>NS</sup>
Spleen weight (g)	-20.78	4.19	0.83 <sup>NS</sup>
Gut content (kg)	1.11	0.74	0.56 <sup>NS</sup>
Skin length (cm)	42.52	1.99	0.58 <sup>NS</sup>
Skin width (cm)	34.49	0.66	0.49 <sup>NS</sup>
Gut weight (kg)	0.37	0.014	0.70*
Skin area (sq. cm)	1,194.16	134.74	0.77*

NS = Non-significant ( $p > 0.05$ ).

\* = Significant ( $p < 0.05$ ).

\*\* = Significant ( $p < 0.01$ ).

### IMPLICATIONS

The local sheep grazing on natural grass only can grow average 15.7 g/day and on grazing + 300 g concentrate per day can grow 40.5 g/day. Live weight increases with increasing level concentrate supplement in grazing sheep. For better growth performance of sheep on grazing the farmers in rural areas should be encouraged to use concentrate and/or other supplement. In this study the

parameters for economic analysis were not considered, however, the added return from extra meat produced (table 1) for concentrate supplements shows higher amount of income. From this study more details economic study is suggested.

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