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Study on the Effect of Feeding Different Levels of Energy in Compound Pellet on Performance of Growing Black Bengal Goat

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Abstract: *Three different complete compound pellets containing different levels of energy, viz. SE (standard energy, ME content 10.28MJ/kg DM as per NRC, 1981), LE (low energy, ME content 9.25MJ/kg DM) 10% less ME and HE (high energy, ME content 11.30MJ/kg DM) 10% high ME than SE respectively, were prepared and fed to three groups of growing Black Bengal goats for evaluating feeding value. Completely randomized design was followed in the experiment. The effect of different levels of energy containing pellet on performance of goat was varied. Both dietary group SE and HE showed higher ($p<0.01$) weight gain, total CPI, total MEI, and better ($p<0.05$) FCR and PCR than dietary group LE and only dietary group HE showed higher ($p<0.05$) total DMI, MEI 100kg^{-1} LW d^{-1} and MEI kg^{-1}W$^{0.75}$ d^{-1} than LE and DMI kg^{-1}W$^{0.75}$ d^{-1} than SE and LE. Higher ($p<0.01$) digestibility of DM, OM, ADF, NDF and ($p<0.05$) CP and CF was observed in SE and HE and digestibility of NFE in HE was higher ($p<0.01$) than SE and LE. On the other hand, higher ($p<0.05$) digestibility of EE was observed in SE and LE. Digestible crude protein, TDN and D value were higher ($p<0.01$) in SE and HE. Digestible EE was highest ($p<0.01$) in LE and lowest in HE but digestible NFE was highest ($p<0.01$) in HE and lowest in LE. Higher ($p<0.01$) nitrogen intake and ($p>0.05$) nitrogen retention was observed in SE and HE. Meat yield, selling price of meat, and total price was highest in HE and both SE and HE showed higher ($p<0.01$) value of the parameters than LE. Total rearing cost was highest ($p<0.01$) in HE and lowest in LE. Higher ($p<0.05$) net profit was obtained from SE and HE than LE. There was a positive correlation between increase of energy in dietary pellet and performance. It can be concluded that high energy containing pellet may be used for commercial Black Bengal goat production in stall feeding.*

Key words: *Goat, Performance, Digestibility, Nitrogen balance, Economic Assessment*

I. Introduction

Goats, which are raised on natural browsing, cannot fulfill their nutrient requirement for growth and productivity. Energy intake is the major limiting factor for growth of small ruminant under tropical region. Pen feeding of goats may achieve faster growth rates allow for finishing at specific target weights (Lupton *et al.*, 2008) but feedlot goats have shown only a marginal response in growth rate. Seasonal variations play a potential role in the nutrient composition of common grasses. Production and composition of grasses is affected by season (Rahman *et al.*, 1991). Grasses in dry season contain higher dry matter per cent than those grown in rainy season (Tareque, 1987). According to statistics (FAO, 2002) world goat population represents 94% that of sheep, yet their meat accounts to 49% of mutton and lamb. This low productivity may be due to the fact that 96% of the world goats are in the developing countries where goat improvement programs are scarce. It is important to focus on net return as the ultimate goal. Maximization of production is not guaranteeing maximizing of net return. The reason is that the law of diminishing returns governs much of animal production, especially feeding and the relationship to production. Goats can play a vital role to meet up the demand of protein for human consumption through establishing commercial goat farm and improving traditional system of feeding by using economic balance diet. Energy requirement for optimum growth of goat in diet through roughage and concentrate should be supplied in balanced form. Grinding and pelleting of roughage and concentrate is a suitable form of well nutrient balanced diet. Grinding and pelleting of low quality roughages and other agro-industrial by-products help in increasing the palatability of the feed (Sharma and Singhal, 1986). Grinding reduces refusal and wastage of more unpalatable portion of roughages (Reddy, 1988). To popularize goat farming in Bangladesh it is necessary to find out the alternative feeding approach to rear goat in full confinement. Feeding system based on compound pellet feed is one of the promising methods for establishment of goat industry. The complete feeding system not only ensures better utilization of nutrients from agricultural crop residues but also supplies balanced nutrients, controls the ratio of roughage to concentrate, provides uniform feed, increases bulk density; reduce feed wastages and is easy to handle and transportation. The present experiment was designed to investigate the effect of different level of energy in complete compound pellet diet on production performance of Black Bengal goat in stall feeding system.

II. Materials and Methods

2.1 Processing of Feed Ingredients and Preparation of Compound Pellet: Napier grass (*Pennisetum purpureum*), cultivated in fodder field of Animal Nutrition Department of Bangladesh Agricultural University, was selected as basal feed for Black Bengal goats and was cut at the age of 60 days, chopped, dried and ground by electric grinder using 1mm diameter sieve. Wheat bran, rice polish, mustard oil cake, soybean meal, maize, wheat, molasses, dicalcium phosphate and common salt were purchased from local market. Proper attention was given during purchase to avoid dust, fungus and any other extraneous materials. The sample of grass and other ingredients were analyzed for proximate components before using for pellet preparation. Three types of compound pellet, viz. pellet SE (standard energy) containing 10.28 MJME/kg DM of feed as per NRC (1981) treated as control, pellet LE (low energy) containing 10% less energy (9.25MJME/kg DM) and pellet HE (high energy) containing 10% high energy (11.30MJME/kg DM) than pellet SE, respectively were prepared for the goats belonging to three groups with the ground grass and concentrate feed ingredients at roughage: concentrate ratio of 60 : 40 (Table 2.1), and properly stored for feeding the experimental goats.

2.2 Selection and Housing of Goat: Fifteen castrated male Black Bengal goats of about six months of age and average body weight 10.51 to 10.72 kg were collected from local farm. The goats were randomly divided into three equal groups, tagged for identification and housed in a well ventilated shed and allowed two weeks to adapt with the housing conditions and experimental diets. The goats were vaccinated against Peste des petits ruminants (PPR) after allowing seven days of quarantined. The goats were treated with an anthelmintics to control gastrointestinal parasites. The goats were reared for 100 days with identical management and thereafter they were slaughtered to know the dressing percentage.

2.3 Feeding the goats: Fifty percent of the allocated (@ 3% of body weight) compound pellet for a day was supplied to the respective group at every 8:00 am and the animals were allowed for grazing from 9:30 am to 11:30 am. After grazing goats were confined in pen. The rest portion of compound pellet was supplied to the goats at 4:00 pm. Grazing length was shortened and feed allocation increased gradually. After seven days, grazing was fully stopped and feed was supplied @ 5kg DM/100kgLW. In the whole experimental period all goats were kept in a paddock for exercise at 6:30 am and returned them to their pen at 8:00 am. One half of (@ 5kg/100kgLW) compound pellets were given to the respective group of goats at every 8:00 am. Another portion of compound pellets were supplied to the goats of each group everyday at 4:00 pm. Every morning before supply of feed, left over of all groups, if any, were collected from feeder, weighed and daily feed intake was calculated . Fresh drinking water was supplied to the goats for 24 hours.

2.4 Body weight measurement: The initial live weight of each goat was taken at the beginning of the experiment for three consecutive days before offering feed at morning and the mean weight of individual goat was recorded as initial weight. Thereafter, goats were weighed individually at 6:30 am prior morning feeding in every 7 days interval throughout the experimental period. Final live weight of each goat was also taken for three consecutive days at the end of the experiment. Body weight gain was calculated from the data.

2.5 Metabolic trial: On 84^{th} days of experiment goats were placed in metabolic crate and allowed 7 days for adaptation and 10 days for collection of feces and urine. Daily feed intake, feces voided and urine were recorded. Samples of feed, faeces and leftover were dried, ground to pass through 1 mm sieve for analysis of proximate principles. Urine was collected in a bucket containing 6 N H_2SO_4 solutions to protect N loss and a portion of 10% urine and faeces was preserved at 4°C for the determination of total nitrogen.

2.6 Slaughtering and carcass weight of the goat: To know the carcass yield goats were weighed after overnight fasted and slaughtered according to Halal method on last day of experiment. The dressing percentage was calculated as the carcass weight divided by the slaughter weight then multiplied by 100 (Devendra, 1988).

2.7 Proximate analysis: The samples of feed, left over and feces were analyzed for nutrient content following the methods of AOAC (2012). Nutritional analyses were done for dry matter (DM), crude protein (CP), crude fibre (CF), ether extract (EE), total ash (TA) and nitrogen free extract (NFE). Digestible crude protein (DCP) was calculated according to the methods of McDonald *et al*. (1988). Acid detergent fibre (ADF) and neutral detergent fibre (NDF) content of samples were determined by Fibertec™ system (VELP Scientifica, EU) following the procedure of Van Soest (1991). Energy value of whole diet was estimated from digestible organic matter (DOM) as ME (MJ/kg DM) = 0.16 × D value (MAFF, 1984). D value or the concentration of digestible organic matter in dry matter (DOMD) of the diets was calculated as gm of digested OM in each kg DM of diet multiplied by 1000.

Table 2.1 Ingredients (%) and Proximate composition (% DM basis) of Different Experimental Diets

Composition of different experimental diets			
Ingredients	**Dietary groups**		
	SE	**LE**	**HE**
Napier grass (dry)	60.0	60.0	60.0
Wheat bran	7.0	2.0	0.5
Rice polish	9.0	24.5	0.5
Mustard oilcake	7.0	5.0	1.0
Soybean meal	5.0	7.0	9.0
Maize	8.0	0.5	15.0
Wheat	3.0	0.5	13.0
Molasses	1.0	0.5	1.0
Proximate composition of experimental diets			
Crude Protein (CP)	14.00	14.00	14.00
Ether Extract (EE)	3.35	3.92	2.07
Crude Fibre (CF)	20.91	24.75	18.75
Total ash	9.71	13.47	10.04
Nitrogen Free Extract (NFE)	51.59	43.89	54.85
MEMJ/kg DM (calculated)	10.28	9.25	11.30

Dicalcium phosphate (DCP) and common salt was added @ 1% of concentrate. SE = standard energy (containing 10.28 MJME/kg DM as per NRC, 1981), LE = low energy (containing 10% less energy than SE), HE = high energy (containing 10% high energy than SE), MJME = Mega Jules Metabolizable Energy, DM = Dry matter.

2.7 Statistical analysis of the data: Data were analyzed by complete randomized design using the GLM procedure of SAS version 9.1 (SAS Institute Inc., Cary, N.C.) to determine the effect of different compound pellet feed containing different level of energy on growth performance of Black Bengal goat.

III. Results

3.1 Growth performance: The average initial live weight of goat belonging to the three dietary groups SE, LE and HE was between 10.51 and 10.72kg and the difference among the treatment groups was not significant ($p>0.05$). After completion of experiment, final average weight (kg) of three groups ranged from 14.70 to 17.81kg where goats of SE and HE showed statistically similar weight ($p>0.05$) and significantly higher ($p<0.01$) than LE. Live weight gain (kg) of goats in SE and HE by 100 days and per day was also statistically similar and significantly higher ($p< 0.01$) than LE (Table 3.1 and Fig. 3.1). Goats of HE intake highest amount of total dry matter (51.65kg) and lowest dry matter intake (44.36kg) was observed in LE. The difference of DM intake between HE and LE was significant ($p< 0.05$) (Table 3.1, Fig. 3.2). Daily DMI 100kg-^{1} LW was highest ($p>0.05$) in HE and lowest in LE but higher ($p< 0.05$) daily DMI g kg^{-1} metabolic body size was observed in HE than other two groups.

As is shown in Table 3.1, total crude protein intake 7.38 kg by goats of HE was statistically similar to SE (7.02kg) and higher ($p< 0.01$) than LE (6.19kg). The difference of daily CPI kg 100kg-^{1} LW and g kg^{-1} metabolic body size among the groups was statistically insignificant. Total ME (MJ) intake by the goats of HE (486.81) and SE (435.14) was statistically similar and higher ($p< 0.01$) than LE. Daily ME intake 100kg-^{1} live weight and kg^{-1} metabolic body size was higher ($p< 0.05$) in HE than LE (Table 3.1) but SE showed statistically similar value to LE and HE. Feed conversion ratio (FCR) of SE (7.15) and HE (7.28) was statistically similar and higher ($p< 0.05$) than LE (12.36). Goats fed low energy pellet (LE) showed significantly ($p< 0.05$) lower performance in protein conversion to live weight gain (1.50) than SE (1.03) and HE (1.04).

Table 3.1 Growth Performance of Black Bengal Goats Fed Different Levels of Energy Containing Compound Pellet Diets

Parameter	Dietary groups			LS
	SE	LE	HE	
Performance of kids				
Initial live weight (kg)	10.51±0.295	10.58±0.319	10.72±0.409	NS
Final live weight (kg)	17.30^{a}±0.515	14.70^{b}±0.750	17.81^{a}±3.57	**
Live weight gain, LWG (kg100d-^{1})	6.79^{a}±0.245	4.12^{b}±.668	7.09^{a}±0.309	**
LWG (g d^{-1})	67.90^{a}±2.453	41.24^{b}±6.686	70.98^{a}±3.091	**
DM intake				
Total dry matter intake, DMI (kg100d-^{1})	48.61^{ab}±1.834	44.36^{b}±1.664	51.65^{a}±1.288	*
DMI (kg100kg-^{1} LW d^{-1})	3.54±0.205	3.52±0.104	3.63±0.110	NS
DMI (g kg^{-1}W$^{.75}$d^{-1})	111.95^{b}±6.514	111.51^{b}±3.317	114.80^{a}±3.498	*
CP intake				
Total crude protein intake, CPI (kg100d-^{1})	7.02^{a}±.264	6.19^{b}±0.232	7.38^{a}±0.184	**
CPI (kg d^{-1}100kg-^{1} LW)	0.50±0.015	0.49±0.028	0.51±0.015	NS
CP I (g kg^{-1}W$^{.75}$d^{-1})	16.10±0.479	15.64±0.910	16.40±0.499	NS
ME intake				
ME(MJ kg^{-1} DM)	8.94^{a}±0.288	7.35^{b}±0.412	9.43^{a}±0.197	**
Total ME intake (MJ) (100d^{-1})	435.14^{a}±23.59	328.07^{b}±27.87	486.81^{a}±12.69	**
MEI (MJd^{-1}100kg^{-1}LW)	31.60^{ab}±1.690	26.28^{b}±.904	34.31^{a}±1.729	*
MEI (MJ kg^{-1}W$^{.75}$d^{-1})	0.99^{ab}±0.053	0.83^{b}±.091	1.08^{a}±.0.05	*
Nutrient efficiency for gain				
Feed conversion ratio, FCR (DMI/WG)	7.15^{b}±0.663	12.36^{a}±2.633	7.28^{b}±0.391	*
Protein conversion ratio, PCR(CPI/WG)	1.03^{b}±0.009	1.50^{a}±0.368	1.04^{b}±0.055	*

SE = standard energy as per NRC (1981), LE = low energy (10% lower than NRC standard), HE = high energy (10% more than NRC standard), NS= Insignificant, ** *$p<0.01$*, * *$p<0.05$*, $^{a, b, ab}$ mean values having different superscripts in a row differ significantly. LS= Level of significance

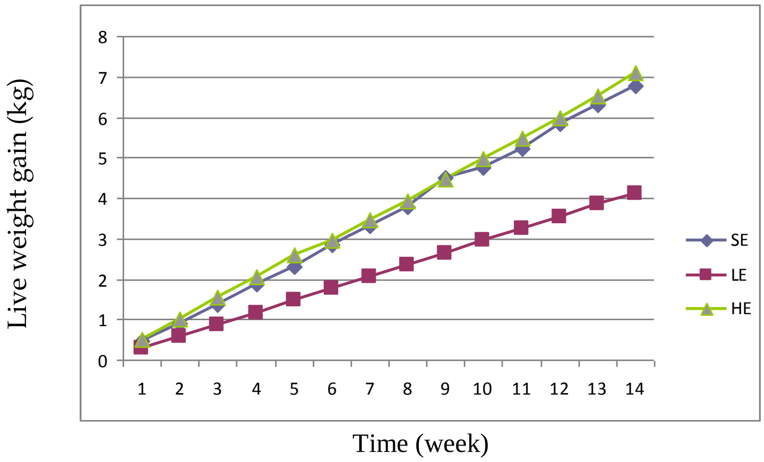

Figure 3.1 Cumulative live weight gain (kg), SE= standard energy, LE= low energy, HE= high energy

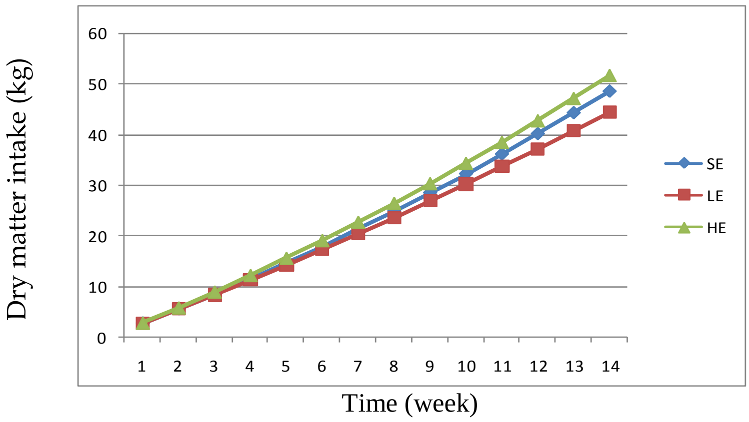

Figure 3.2 Cumulative DM intakes from pellet (kg), SE = standard energy, LE = low energy, HE = high energy

3.2 Apparent digestible coefficient: Goats of HE showed highest digestible coefficient of DM, OM, CP and CF and lowest values were observed in LE. The values in SE were statistically similar to the values of HE. Both SE and HE showed higher (*$p<0.01$*) digestibility of DM & OM and higher (*$p<0.05$*) digestibility of CP and CF than LE (Table 3.2). Digestibility of ether extract in LE (65.15) was similar to SE and significantly higher (*$p<0.05$*) than HE (55.98) but nitrogen free extract was significantly higher (*$p<0.01$*) in HE (68.48) than SE (60.61) and LE (54.24). Digestibility of acid detergent fibre and neutral detergent fibre in SE and HE were statistically similar and significantly different *($p<0.01$)* from LE.

Table 3.2 Apparent Digestibility of Nutrients, Nutritive Value and Nitrogen Balance of Different Complete Pellet Diets Containing Varying Levels of Energy

Parameter	Dietary groups			LS
	SE	LE	HE	
Digestibility (%)				
Dry matter (DM)	$58.74^{a}\pm2.159$	$49.73^{b}\pm3.199$	$63.41^{a}\pm1.458$	**
Organic matte (OM)	$61.92^{a}\pm1.991$	$53.15^{b}\pm2.981$	$65.52^{a}\pm1.374$	**
Crude Protein (CP)	$66.76^{a}\pm1.739$	$58.08^{b}\pm2.668$	$65.99^{a}\pm1.355$	*
Crude Fibre (CF)	$57.54^{a}\pm2.221$	$50.04^{b}\pm3.180$	$60.71^{a}\pm1.566$	*
Ether Extract (EE)	$64.28^{a}\pm1.870$	$65.15^{a}\pm2.266$	$55.98^{b}\pm1.753$	*
Nitrogen Free Extract (NFE)	$60.61^{b}\pm2.061$	$54.24^{b}\pm2.912$	$68.48^{a}\pm1.255$	**
Acid Detergent Fibre (ADF)	$61.76^{a}\pm2.001$	$50.00^{b}\pm3.181$	$61.01^{a}\pm1.553$	**
Neutral Detergent Fibre (NDF)	$61.37^{a}\pm2.022$	$50.61^{b}\pm3.143$	$62.09^{a}\pm1.510$	**
Nutritive value				
Crude Protein (CP)	$9.64^{a}\pm0.251$	$8.11^{b}\pm0.372$	$9.43^{a}\pm0.193$	**
Crude Fibre (CF)	12.03 ± 0.464	12.38 ± 0.787	11.38 ± 0.293	NS
Ether Extract (EE)	$2.15^{b}\pm0.062$	$2.55^{a}\pm0.088$	$1.15^{c}\pm0.036$	**
Nitrogen Free Extract (NFE)	$31.27^{b}\pm1.063$	$23.80^{c}\pm1.278$	$37.56^{a}\pm0.688$	**
TDN	$57.79^{a}\pm1.920$	$50.05^{b}\pm2.638$	$60.98^{a}\pm1.257$	**
D value	$55.90^{a}\pm1.798$	$45.99^{b}\pm2.580$	$58.94^{a}\pm1.236$	**
Nitrogen balance				
Nitrogen intake(g d^{-1})	$13.28^{a}\pm0.304$	$11.63^{b}\pm0.326$	$14.92^{a}\pm0.440$	**
Nitrogen outgo in feces (g d^{-1})	4.42 ± 0.320	4.68 ± 0.222	5.07 ± 0.270	NS
Nitrogen outgo in urine (g d^{-1})	4.50 ± 0.716	3.33 ± 0.470	$4.10\pm.918$	NS
Nitrogen retained(g d^{-1})	4.34 ± 0.708	3.61 ± 0.369	5.74 ± 1.010	NS

SE= standard energy as per NRC (1981), LE= low energy (10% lower than NRC standard), HE= high energy (10% more than NRC standard), NS= Insignificant ** *$p<0.01$*, * *$p<0.05$*, ^{a,b} mean values having different superscripts in a row differ significantly, LS= Level of significance

3.3 Nutritive value: As is shown in Table 3.2, percent of digestible crude protein was significantly higher (*$p<0.01$*) in SE (9.64) and HE (9.43) than LE (8.11) but insignificantly different digestible crude fibre value was observed among the treatment groups. Percent of digestible ether extract was dissimilar among the groups where LE showed highest value (2.55) and HE showed lowest value (1.15). The difference was significant (*$p< 0.01$*) among the treatment groups. On the other hand, percent of digestible nitrogen free extract (NFE) was highest *($p<0.01$)* in HE (37.56) and lowest in LE (23.80). Goats of HE showed similar TDN and D value with SE and significantly higher (*$p<0.01$*) than LE.

3.4 Nitrogen balance: The nitrogen intake (g d^{-1}) was highest by goats of HE (14.92) but statistically similar to SE (13.28) and both groups showed higher value (*$p<0.01$*) than LE (11.63) (Table 3.2). Nitrogen outgo (g d^{-1}) in feces was highest *($p>0.05$)* in HE (5.07) and lowest in SE (4.42). On the other hand, nitrogen outgo in urine was highest *($p>0.05$)* in SE (4.50) and lowest in LE (3.33). Though highest amount of nitrogen (g d^{-1}) retention was observed in HE (5.74) and lowest amount in LE (3.61) but the difference among the groups was not significant.

3.5 Economic assessment: Goats of HE showed highest weight gain (7.09kg) and lowest value (4.12kg) was found in LE but both HE and SE group showed higher (*$p<0.01$*) value than LE (Table 3.3). Dressing percentage was insignificantly higher in HE (51.84) and SE (51.28) than in LE (50.37). Meat yield, price of meat and total price of goats in HE was similar to SE and higher (*$p<0.01$*) than LE. Feed cost and total rearing cost of three dietary groups were absolutely different. The costs were highest in HE followed by SE and lastly in LE. The difference of the costs among the groups was significant (*$p< 0.01$*). Cost for kg^{-1} weight gain and kg^{-1}meat yield was highest in LE followed by HE and lowest in SE but the difference was not significant among the groups.

Net profit (Tk.) was highest in SE (977.68) but statistically similar with HE (872.05) and significantly higher ($p<0.05$) than LE (546.66).

Table 3.3 Economics of Different Levels of Energy Containing Compound Pellet Diets Fed to Black Bengal Goats

Attribute	Dietary groups			LS
	SE	**LE**	**HE**	
Carcass traits				
Weight gain(kg)	6.79^{a}±0.245		7.09^{a}±0.309	**
Dressing %	51.28±0.539	50.37±0.460	51.84±1.052	NS
Meat yield(kg)	3.48^{a}±0.153	2.08^{b}±0.350	3.67^{a}±0.161	**
Economics of feeding				
Price of meat (@Tk.430/kg)	1499.06^{a}±65.82	897.89^{b}±150.545	1582.19^{a}±69.27	**
Price of skin, head, GI tract	300	300	300	-
Total return	1799.06^{a}±65.82	1197.89^{b}±150.54	1882.19^{a}±69.27	**
Price of feed (Tk/kg)	11.23	8.83	13.58	-
Feed cost (Tk.)	596.38^{b}±22.564	426.22^{c}±15.930	785.14^{a}±19.707	**
Labour cost (Tk.)	200	200	200	-
Other cost (Tk.)	28	25	29	-
Total rearing cost (Tk.)	824.38^{b}±22.564	651.22^{c}±15.930	1014.14^{a}±19.70	**
Cost /kg LW gain (Tk.)	121.13±1.351	183.09±41.096	143.46±7.171	NS
Cost /kg meat yield (Tk.)	236.34±4.624	366.00±85.966	276.72±13.685	NS
Net profit (Tk./animal)	977.68^{a}±44.458	546.66^{b}±138.635	872.05^{a}±76.343	*

SE= standard energy as per NRC (1981), LE= low energy (10% lower than NRC standard), HE= high energy (10% more than NRC standard). NS= Insignificant, ** $p<0.01$, * $p<0.05$, $^{a, b, c}$ mean values having different superscripts in a row differ significantly, LS= Level of significance

IV. Discussion

Addition of energy in pellet diet increased the palatability and enhanced digestibility of nutrients like protein by rumen microbes and ultimately increased live weight in animal. The average growth rate of goats of HE, SE and LE fed 11.30 MJME/kg DM, 10.28 MJME/kg DM and 9.25 MJME/kg DM containing pellet diet were 70.98g d^{-1}, 67.90 g d^{-1} and 41.24g d^{-1} respectively. Lu *et al*. (1987) recommended 11.30 MJME/kg DM for the growth of 125gd^{-1} and 10.28 MJME/kg DM for 75g d^{-1} for different breeds of goats. However, Lu and Potchoiba (1990) suggested the requirement 11.30 MJME/kg DM for the growth of 101g d^{-1} and 10.28 MJME/kg DM for 61g d^{-1} body weight gain for Alpine and Nubian goats. Similar trend of growth was attained by the goats of the present study. The variation of weight gain from the recommendation of NRC (1981) and Lu *et al*. (1987) of the present study might be due to breed variation, size and environmental condition. In addition, it implies that there is a positive effect of energy on weight gain. The present finding also agreed with the findings of Lu and Potchoiba, 1990; Hossain *et al*. (2003). Researchers (Yagoub and Babiker, 2008; Shahjalal *et al*. 1992 and Ibrahim *et al*., 1998) observed that as the level of the dietary energy decreased final live weight of animal decreased linearly. Johnson and McGowan (1998) and Sen *et al*. (2004) reported that higher energy feeds have positive effects on growth rate and extent of fattening in goats. Total DMI and daily DMI per 100 kg LW and per kg metabolic body size of goats was increased from low energy dietary group to high energy dietary group. Higher weight gain and simultaneously total higher body weight of high energy containing groups might be the cause of higher DMI. Addition of energy in pellet enhances palatability which may also the partial result of increased DMI in high energy groups. Significantly higher CP and ME intake in high energy groups than low energy group was the result of significantly higher DMI in high energy groups. Better FCR and PCR were observed in high energy group than low energy group. Lower weight gain in low energy group might be the cause of lower FCR and PCR which was might be the result of lower utilization of feed nutrients. Similar results were observed by Huston (1980) and Calhoun *et al*. (1988) in Angora goats and Ash and Norton (1984) in Australian Cashmere goats. Campbell (1988) reported that increasing energy intake results in a linear increase in growth rate and gain; feed efficiency in growing lamb. Feed conversion efficiency deteriorated with the decrease of the dietary energy (Yagoub and Babiker, 2008; Lu and Potchoiba, 1990 and Hossain *et al*., 2003). Digestibility of DM, OM, CP, CF, NFE, ADF and NDF was increased with the increase of energy in diet but digestibility of EE was decreased. In this study readily available higher amount of energy in high energy containing pellet was favour for the microbes to enhance the digestibility of nutrients. Similar finding was observed by Prakash *et al*. (2006). They reported that digestibility of NFE increased ($p< 0.05$) in Barbari kids with the increase of energy level. It was obvious from the obtained results that digestibility of nutrients was significantly increased with lambs fed on high energy diet, while the low energy diet was decreased [14] and Hossain *et al*. (2003). Dayal *et al*., 1995; Karim *et al*., 2001and Prakash *et al*. (2006) reported that level of energy did not influence on digestibility of DM, OM, NDF and ADF. As percentage of NFE and digestibility of both CP and NFE was lower in low energy dietary group than high energy groups so nutritive value of CP and

NFE was lower in LE group than other two groups. Highest digestible EE in LE group indicated that maximum amount of dietary EE was utilized by rumen microbes to fulfill the energy requirement of their body and lowest value of EE in HE group remarked that easily digestible energy was available to fulfill the requirement. Higher digestibility of CP and available carbohydrate resulted higher both TDN and D value in high energy containing dietary group. Higher DM intake was the cause for significantly higher nitrogen intake by higher energy containing pellet group. Nitrogen excretion through feces and urine was insignificantly different among the groups. These values related with digestion and absorption of nitrogen. Retention of nitrogen was increased with the increase of energy in the diet. It indicated that availability of energy in diet helped rumen microbes to digest dietary nitrogen and hence absorption and retention in the body of host animal. Dressing percentage was increased in group fed higher energy containing diet. Similar result was reported by Yagoub and Babiker (2008). Dressing percentage was increased with increase of fatness and this is associated with feeding of high dietary energy [14]). It means that higher slaughter weight results higher dressing yield. Meat yield, price of meat and total price was significantly higher ($p< 0.01$) in high energy dietary group. It happened due to higher weight gain and dressing percentage in high energy group. Feed cost and total rearing cost was significantly higher ($p< 0.01$) in high energy group because price of per kg feed and total feed intake was higher in high energy group. Cost for per kg weight gain and meat yield was highest in LE group and lowest in SE group. Though feed cost was lowest in LE group but the high cost for weight gain and meat yield was occurred due to the lowest utilization of feed nutrients for weight gain. Weight gain was highest in HE group but high price of per kg feed and higher feed intake resulted higher cost for weight gain and meat yield than control group SE. Highest profit in group SE and significantly higher ($p<0.05$) profit in SE and HE was observed than in LE due to higher weight gain and dressing percentage of goats of SE and HE group than LE group.

V. Conclusion

Compound pellet feeding in confinement system ensured the estimation of actual nutrient intake by the goat. Intake of DM, CP and ME, weight gain of goat, digestibility of nutrients, nitrogen balance and dressing percentage of goat were increased with the feeding of increased energy containing compound pellet in stall feeding system. Total selling price was significantly increased from low energy dietary group to high energy dietary group and significantly higher profit was obtained in SE and HE. There was a positive correlation between increase of energy in diet and selling price of goat. Inclusion of Low priced energy containing feed ingredients in high energy compound pellet may be economical for commercial goat production in stall feeding system.

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