PJN
ISSN 1680-5194

PAKISTAN JOURNAL OF NUTRITION

ANSInet
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Pakistan Journal of Nutrition 8 (11): 1802-1805, 2009
ISSN 1680-5194

1. Effect of Compensatory Growth on Performance of Sudanese Female Goats

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Abstract: Tow groups of female goats less than one year in age, Nubian ecotype (15 goat/group) and of the same initial weight (16.5 kg/kid) were subjected to tow dietary levels of energy for 105 days, the first group was offered the highest energy diet (11.5 MjME/kcl) while the second group was given the lowest dietary energy diet (8.5 MjME/kcl). Through this term of the experiment (105 days) goats of the second group were found just to maintain their weight. Then seven goats from the second group was offered the highest energy diet (11.5 MjM E/kg) to reach the final weight obtained by the first group, it spent 175 days to reach that weight. These goats which were raised on the lowest dietary energy level (8.5 MjME/kg) were used to study the effect of compensatory growth on the performance of Sudanese female goats. Weekly, daily rate of gains and total dry matter intake were significantly ($p< 0.001$) lower in the compensating female goats than the first group. It could be concluded that compensatory growth significantly ($p<0.01$) affected daily and weekly rate of gain and total dry matter intake which were lower in the compensating goats than the normally growing goats.

Key words: Sudanese female goats, Compensatory growth, feed conversion efficiency

INTRODUCTION

In tropical regions growth rates of animals maintained under extensive grazing systems fluctuate because of seasonal patterns of forage growth. During the dry season both quality and quantity of forages available to livestock declines and this is accompanied by a decrease or even loss of live weight, however animals are able to grow rapidly and recover body weights by having higher than normal rates of gain when given liberal amounts of feed, after periods of restriction has been eliminated. This phenomenon is termed compensatory growth (Wilson and Obsourn, 1960).

Compensatory growth is a controversial subject; the reported observations vary from one study to another. Conflicting conclusions undoubtedly have resulted from differences in: (a) the species of the animals studied and their physiological peculiarities; (b) the degree of maturity of the animal at the time deprivation and rehabilitation were imposed; (c) the nature and severity of under nutrition and the duration of the period of under nutrition; (d) the physiological requirements of the various tissue groups during the time under nutrition and refeeding were imposed and (e) the breed or sex of animals.

This study was undertaken to examine the effect of the compensatory growth on the performance of Sudanese female goats.

MATERIALS AND METHODS

Experimental animals: Thirty female Nubian goats were used in this experiment. Animals were selected according to their age (9-12 month) and weight which was approximately 16.5 Kg. Goats were ear-tagged and given an adaptation period of four weeks. During this period goats were fed groundnut haulm and a mixture containing equal percentages of assigned experimental rations *ad libitum*. Spraying with an acaricide solution against ectoparasites and deworming with thiobenzol as a drench solution was performed, the thiobenzol treatment was repeated after 15 days. Immediately after the adaptation period the animals were individually weighed and then randomly divided into tow groups (A and B) of similar number and weight and each group was separately penned.

Feeds and feeding: Tow iso-nitrogenous diets, contains tow levels of dietary energy (11.5 and 8.5 Mj/KgDM) were used. The ingredient proportions and calculated chemical analysis of experimental diets are given in Table 1. During the feeding period animals were fed the assigned diets *ad libitum*.

Conduct of the experiment: The experiment was divided into two terms, first term which was lasted in 105 days, and second term in which seven goats from the second group (B) were refed with the highest dietary energy diet (11.5 Mj/KgDM).These goats were kept until they reach the final weight obtained by the first group (A), they spent 175 days to reach that weight.

Data collection: Performance data which include, feed intake, live weight gain and feed conversion efficiency was calculated.

Table 1: Ingredients proportion and chemical composition of Experimental diets

Item %		A	B
Physical Composition (As fed)	Sorghum grain	40	0
	Wheat bran	15	4
	Groundnut cake	15	4
	Groundnut hulls	17.8	54.8
	Urea	0.2	3.2
	Molasses	10	32
	Lime stone	1	1
	Common salt	1	1
Percentage Chemical composition (DM)	Moisture	6.2	5.08
	Crude protein	17.48	17.89
	Crude fibre	16.5	22.3
	Ether extract	2.43	1.68
	Ash	14.3	16.65
	Calculated metabolizable Energy (Mj/Kg DM)*	11.55	8.50

*Calculated according to Ministry of Agriculture, Fisheries and Food, London, U.K. (1975).

Statistical analysis: The data was analyzed by student t-test according to (Snedecor and Cochran, 1980).

RESULTS

Performance data: As shown in Table 2, there was no significant difference in initial weight and final live weight which was the determined the target weight. Total live weight was slightly lower in the compensated group, while the weekly rate of gain and daily weight gain were significantly ($p<0.001$) decreased in the compensated group than in the first group. Fig. 1 and 2 clearly show live weight growth and daily gain of the first and the compensated goat groups. Total dry matter intake and daily feed intakes were significantly ($p<0.001$) lower in the compensated group than in the first group. In fact the compensated group consumed 50% lower dry matter than the first group. When the dry matter intake was plotted in a graph Fig. 3, the compensated group in the first term of the experiment consumed more dry matter than the first group, subsequently their dry matter intake dropped to about 50% of the first group. Feed conversion ratio was significantly ($p<0.001$) superior in the compensated group compared with the first group. In fact the compensated group was 172% superior in feed conversion efficiency than the normally growing group.

DISCUSSION

Feedlot performance: compensated female goats had lower weekly and daily rate of weight gain than the normally growing ones. These could be due to the reduced feed intake of the compensated group. These results disagreed with those of Toukourou and Peters (1999) who studied the impact of feed restriction on the growth performance of goat kids and found no difference in body weight gain among the restricted and control goat groups. Also Ehoche *et al.* (1992) worked with zebu bulls and found that during first and mid period of restriction, restricted bulls had lower weight gain than

Table 2: Effect of compensatory growth on feedlot performance

Item	Basal group (A)	Compensating group (B)	P
Number of animals per lot	15	7	-
Period to attain target weight (days)	105	175	-
Initial weight (Kg)	16.55±0.43	16.76±1.6	N.S.
Finial weight (Kg)	25.67±1.01	25.32±1.11	N.S.
Total live weight gain (Kg/head)	9.12±0.41	8.44±0.92	N.S.
Weekly rate of gain (Kg/head)	0.61±0.003	0.34±0.037	0.001
Daily rate of gain (g/head)	87.14±1.87	48.57±0.166	0.001
Total dry matter intake (K/head)	121.86±0.30	65.39±0.175	0.001
Feed intake (Kg/head/day)	1.161±0.043	0.374±0.025	0.001
Feed on version ratio (Kg DMI/Kg gain)	13.36±0.67	7.75±1.10	0.001

p = probability, N.S = Not significant.

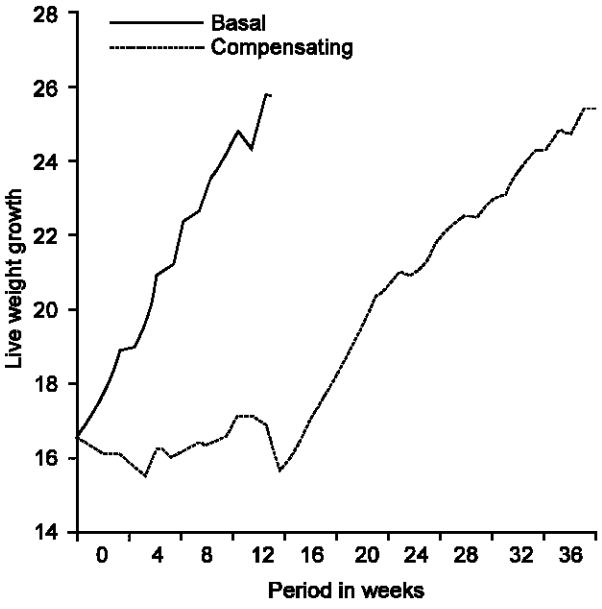

Fig. 1: Effect of compensatory growth on live weight growth

the control ones. But during the final period of their experiment live weight was significantly ($p<0.05$) higher in restricted bulls than in the control ones. Thornton *et al.* (1979) studied compensatory growth in sheep and found rapid gains during compensatory growth which were associated with an increased feed intake.

This discrepancy might be related to type of animals, length of recovery period, severity and duration of restriction period and type of realimination diet.

Feed intake: compensated female goats had significantly ($p<0.01$) lower feed intake than the basal group. In fact the compensated kids ate 50% lower than the normally fed kids. This result was in line with those of Drew and Reid (1975) who found that there was no increase in daily feed intake after refeeding immature lambs. The results obtained in this study also agreed with those of Coleman and Evans (1986) who worked on

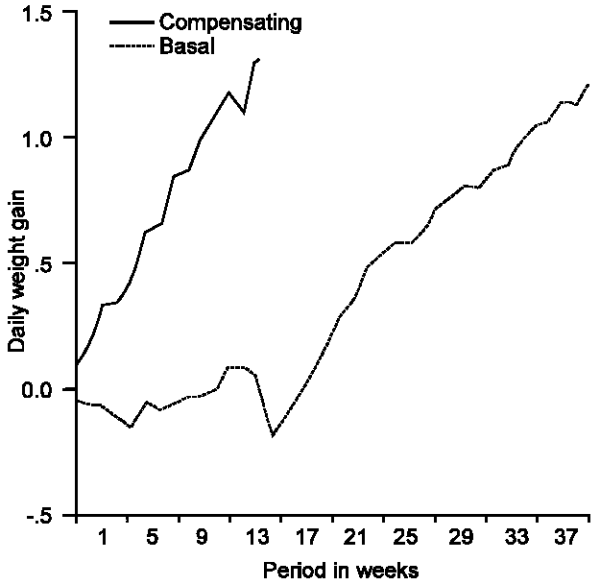

Fig. 2: Effect of compensatory growth on daily weight gain

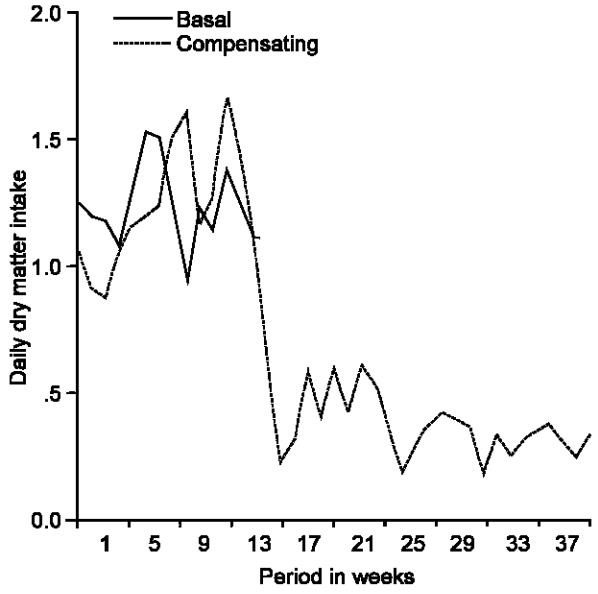

Fig. 3: Effect of compensatory growth on daily dry matter intake

the effect of nutrition, age and size on compensatory growth in steers. They found that feed intake was reduced in restricted group than in the controls. Kabbali *et al.* (1992) also found that daily consumption was not higher in reefed lambs than in the controls. However, Owen *et al.* (1971) studied the effect of food restriction on subsequent voluntary feed intake of pigs and found that feed intake was increased in restricted group than in the control group. On the other hand Ehoche *et al.* (1992) studied the growth performance and carcass characteristics following feed restriction and realimination in zebu bulls and found that daily dry matter intake was higher in restricted bulls than in normally grown ones. Also Rayan *et al.* (1993a) found that during realimination, steers that were previously restricted had greater feed intake than non restricted control animals. These results were at variance with the present result. Type of animals, diet composition, severity and duration of restriction might be the reasons.

Feed conversion efficiency: compensated female goats had highly superior feed conversion efficiency than continuously fed kids. The improved feed conversion efficiency in this study might be due to the reduced feed intake. The findings in this study agreed with the results of Ehoche *et al.* (1992) who studied the growth performance and carcass characteristic following feed restriction and realimination in zebu bulls and found that efficiency of feed utilization was significantly greater in restricted bulls than in continuously fed bulls. Enhanced growth efficiency during compensatory growth has been reported in several studies as Turgeon *et al.* (1986) who worked in lambs and Abdalla *et al.* (1988) who worked in calves.

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