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Effect of Concentrate Supplementation on the Performance and Carcass Characteristics of Natural Grazing Sudanese Desert Lambs

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Abstract

This research was carried out to detect the effect of concentrate supplementation on the performance and carcass characteristics of natural grazing Sudanese desert lambs. Twenty one (one year old) male lambs were used for 56 days. These Lambs were divided into three homogenous groups. The three lamb groups grazed on natural pasture for about 8 hours daily. After grazing period the first group (C1) received zero concentrate, the second group (C2) received 200 g/head/day concentrate and the third group (C3) received 400 g/ head/day concentrate. At the end of the feeding trials, the animals were slaughtered for carcass analysis. Final live weights did not differ significantly between treatment groups although lambs fed concentrate level 200g and 400g were heavier than the group that not supplemented concentrate. The daily weight gain was increased with increasing concentrate level. Empty body weight was differed in lambs fed on different levels. Dressing percentage of lambs fed 200g and 400g concentrate were similar and higher than in lambs fed on pasture alone. Weights of the head, blood, feet, lungs, heart, liver, spleen, rumen, gut, mesenteric fat and testicles did not differ, however, weights of skin, tail and kidney differed significantly. The results showed that concentrate supplementation is necessary to improve growth performance.

Keywords

Concentrate Supplementation, Sudanese Desert Lambs, Carcass Characteristics

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1. Introduction

Sheep production contributes substantially to the agricultural economy of Sudan. Natural range and pastures cover 90.3 million hectares. Livestock numbers are estimated at 103.3 heads with 48.91 million heads of sheep (Ministry of animal resources, 2005).

The sheep profitability is depend on the performance of the sheep. The consumption of low quality feed and pasture during summer reduce animal performance in Sudan. The nutritive value of pasture and range land in Sudan is greatly affected by seasonal changes. Most of livestock in Sudan are kept under extensive management system and are fed exclusively on range land grasses. The nutritive value of pasture and range land in Sudan is greatly affected by seasonal fluctuation of rainfall, therefore grazing alone may not be sufficient for optimizing live weight gain. Supplementation is a feeding system strategy for solving this problem.

The objective of this study is to evaluate the effect of concentrate supplementation on the performance and carcass characteristics of Sudan desert lambs grazing on natural pasture in Sudan.

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2. Materials and Methods

Twenty one (one year old) Sudan desert lambs were selected at random and used in the study. The average initial body weight (BW) was 26.93 kg ± 1.92. Animals were treated against external and internal parasites on the beginning of the experiment and ear tagged.

Lambs were adapted for tow weeks to the experimental diets and pens. The animals were kept in individual pens with access to clean water. They were weighed once a week in the morning before watering and feeding.

2.1. Feeding

Animals were divided into three groups each of seven lambs and fed natural pasture for eight hours daily. The first group (C1) was offered zero concentrate , the second group (C2) was offered 200 g/animal/day concentrate and the third group (C3) was offered 400 g/animal /day concentrate in individual troughs at 4 pm after return from grazing. The experiment lasted for eight weeks. The composition of the concentrate was presented in table (1).

Table 1. The composition of the concentrates offered to Sudan desert lamb fed natural pasture in the Gadarif state, Sudan.

Ingredients (As fed):	%
Sorghum grain	54.0
Wheat bran	30.0
Groundnut cake	15.0
Limestone	0.5
Common salt	0.5
CP (%)	18.6
ME (MJ/kg DM)	11.74

2.2. Carcass Evaluation

Animals tended for slaughter were fasted for 16 hours, weighed and slaughtered following Islamic rituals by serving the jugular vein, trachea and the esophagus. The hot carcass weight (HCW) was recorded after removing the skin, head, fore and hind feet, viscera and fat depots. Internal organs were also removed. The kidneys and renal fat were left in the carcass. The weights of blood, internal organs, testicles, fat depots and full and empty gastrointestinal tracts were recorded. The empty body weight (EBW) was obtained by excluding the gastrointestinal tract contents. The weight of each body component was expressed as a percentage of (EBW). The dressing percentage for each group was calculated on LBW and on EBW.

2.3. Wholesale Cuts

The hot carcass of each animal was split into left and right sides along the vertebral column using a saw. The left side was subdivided into five wholesale cuts according to M.L.C (1976) including the neck, single short forequarter, best end of neck and breast, loin and Leg and chump. The weight of each wholesale cut was recorded.

2.4. Statistical Analysis

Data was analyzed by ANOVA for completely Randomized design using the general linear model procedure (SAS, 1997). Mean comparison was carried out by the least significant difference test with an alpha level of 0.05.

3. Results and Discussion

3.1. Effect of Concentrate Supplementation on Feedlot of Sudanese Desert Lambs Under Grazing Condition

Table (2) displays the performance of male Sudan desert lamb fed different levels of concentrates under grazing condition. Final weight was increased with increasing concentrate level of supplementation. The higher level of concentrate supplemented group had the highest final body weight but the difference was not significant (P> 0.05). Concentrate supplementation increased the daily weight gain. Group C2 was highest in average daily weight gain compared to group C1 but not significantly (P> 0.05). Group supplemented with 400g/day concentrate was significantly (P < 0.01) higher in average daily weight gain than the other two groups.

Table 2. The performance of male Sudan desert lamb fed different levels of concentrates under grazing condition.

Parameters/Treatments	C1	C2	C3	S.E	Level of significance
Initial weight(kg)	27.00	27.21	26.50	0.41	NS
Final weight(kg)	33.76	36.91	38.62	0.89	NS
Average daily weight gain(g)	120.7 a	148.21 a	216.33 b	8.91	**
Total weight gain(kg)	6.76±3.75	9.7±1.71	12.12±2.10		

C1: group fed zero concentrate; C2: group fed 200g/animal/day concentrate; C3: group fed 400g/animal/day concentrate
Means in the same row with different superscripts are significantly ($p < 0.05$) different. NS= not significant; **P < 0.01;S.E: Standard error of the mean

The increase in daily weight gain with concentrate supplementation found in this study was similar to the findings of Salim *et al*. (2002) in female sheep and goats. It was also confirmed the results of Elhag and Mukhtar (1978) who stated that feeding concentrates increased daily gain in Sudan desert rams compared to ration consisting of roughage only. Kochapakdee *et al*. (1994) have showed the importance of concentrate supplementation on growth and productivity

of goats and sheep and also stated that grazing alone may not be sufficient for optimizing live weight gain and wool production. In addition, Hagos and Melaku (2009) stated that, supplementation with 150, 250 and 350 g DM per head increased daily body weight gain and carcass parameters compared to non supplemented group in Afar rams.

3.2. Effect of Concentrate Supplementation on Carcass Weight and Dressing Percentage of Sudanese Desert Lambs Under Grazing Condition

Slaughter weight (Kg) and carcass characteristics of Sudan desert lamb fed different levels of concentrate under grazing condition are shown in table (3).

Table 3. Slaughter weight (Kg) and carcass characteristics of Sudan desert lamb fed different levels of concentrate under grazing condition.

Parameters/Treatments	C1 n = 3	C2 n = 3	C3 n=3	S.E
Slaughter weight (Kg)	37.00	37.63	41.33	0.94
Empty body weight (Kg)	31.97a	32.95ab	35.93b	0.78
Hot carcass weight (Kg)	15.45a	17.20b	17.90b	0.44
Dressing (%):				
On LBW basis	41.82	45.73	43.32	0.75
On EBW basis	48.38	52.22	49.80	0.73

S.E: Standard error of the mean . Means in the same row with different superscripts are significantly ($p < 0.05$) different.

The empty body weight increased with increasing concentrate level and it was significantly ($p<0.05$) higher in C3 compared to C1. Hot carcass weight was significantly least in group C1 compared to other two groups and there was no significant difference between group C2 and group C3.

Table 4. Weights of body components of Sudan desert lamb fed different levels of concentrates under grazing condition.

Parameters	C1	C2	C3	S.E	Level of significance
Blood	1.42	1.37	1.53	0.17	NS
Head	2.60	2.55	2.83	0.98	NS
Skin	3.15a	3.10a	4.10b	0.17	*
Legs	0.92	1.00	1.00	1.88	NS
Lungs	0.97	0.85	0.93	0.54	NS
Heart	0.17	0.18	0.17	0.23	NS
Liver	0.77	0.82	0.73	0.24	NS
Spleen	0.19	0.16	0.22	0.14	NS
Kidneys	0.19a	0.21ab	0.27b	1.70	*
Rumen	4.43	5.07	5.20	0.32	NS
Intestine	3.47	2.63	3.40	0.22	NS
Mesenteric fat	0.07	0.10	0.17	2.16	NS
Testicles	0.41	0.50	0.48	4.28	NS
Tail	0.32a	0.55b	0.50b	4.04	*

Means in the same row with different superscripts are significantly ($p < 0.05$) different. NS= not significant; *$P < 0.05$; S.E: Standard error of the mean

Slaughter weight was the result of live weight, many researchers state the fact that increase in plane of nutrition will increase the live weight in all animals, hence the empty body weight. Results obtained here agreed with those of El-Khidir *et al* (1989) and Shahjelal *et al* (1992) who studied effect of energy level on kids.

Dressing (%) as calculated on LBW basis or on EBW was increased with concentrate supplementation but not significantly. It was higher in C2 than other groups.

Dressing percentage is affected by many factors including breed, nutrition and age Carles, 1983; Gaili *et al.,* 1972, Ali, 2003). The dressing percentages in this study was comparable to the 43.35% for Ashger and 45.66% in Wattish (Abdul Elkarim and Owen, 1987). Also Babiker and Mohammed (1990) and Mansour et al (1993) reported comparable figures for dressing percentages.

3.3. Effect of Concentrate Supplementation on Body Component of Sudanese Desert Lambs Under Grazing Condition

As seen in Table (4) body components including legs, kidneys, rumen, mesenteric fat, testicle and tail were increased with increasing supplementation levels. The skin was significantly ($P < 0.05$) higher in group C3 compared to other two groups and there was no significant difference ($P> 0.05$) between group C1 and C2.The Kidney was significantly higher in group C3 compared to C1.Tail was significantly($P < 0.05$) lower in group C1 than the other two groups. Also here an increase in live body weight, slaughter weight will explain these results.

Table 5. Percentages of body components on empty body weight of Sudanese desert lambs under grazing condition.

Parameters	C1	C_2	C_3	Significant level
Blood	2.90	3.66	3.71	NS
Head	7.02	6.77	6.86	NS
Skin	8.22	8.24	9.92	NS
Legs	2.47	2.66	2.42	NS
Lungs	2.62	2.25	2.26	NS
Heart	0.46	0.47	0.41	NS
Liver	2.06	2.17	1.78	NS
Spleen	0.51	0.42	0.52	NS
Kidneys	0.50	0.55	0.66	NS
Rumen	11.85	13.48	12.56	NS
Intestine	9.48	6.96	8.22	NS
Mesenteric fat	0.20	0.27	0.40	NS
Testicles	1.12	1.33	1.18	NS
Tail	0.86	1.46	1.21	NS

Table (5) Shows the percentages of body components on empty body weight basis of Sudan Desert lambs under grazing condition. The percentage of body components including blood ,skin ,Rumen, mesenteric fat, testicle and tail were increased with concentrate but the difference was not significant($P> 0.05$). These results were in line with those stated by Gaili (1977) who indicated that body components when expressed as percentage of empty body weight, the treatment effects almost disappeared.

3.4. Effect of Concentrate Supplementation on Yield of Wholesale Cuts of Sudanese Desert Lambs Under Grazing Condition

Table (6) presents the weights of wholesale cuts of male Sudan desert lamb fed different levels of concentrates under grazing condition. The leg and chump and single short forequarter were higher in groups supplemented with concentrates compared to un supplemented group. These findings could be explained by the effect of nutrition on growth and development of various body parts and tissues (Pomeroy, 1952). The results obtained here agreed with those of Beshir (1996).

Table 6. The weights (Means ± SD) of wholesale cuts of male Sudan desert lamb fed different levels of concentrates under grazing condition.

Parameters/Treatments	C1	C2	C3
Leg and chump	2.43±0.15	2.92±0.23	2.85±0.05
Single short fore quarter	2.70±0.30	2.87±0.21	2.97±0.06
Loin	0.78±0.16	0.75±0.05	0.97±0.12
Best end of neck and breast	1.03±0.15	1.13±0.15	1.03±0.15
Neck	0.80±0.1	0.95±0.3	0.70±0.17

4. Conclusion

The results showed that concentrate supplementation improved growth rate of Sudanese desert lambs under grazing condition ,however animals without supplementation under the same feeding regime did not lose weight. Therefore, feeding of grazing lambs with concentrate supplementation may be suggested to optimize growth performance.

It can be concluded that concentrate supplementation to the natural grazing Sudanese desert lambs produced the best feedlot results in performance and carcass characteristics.

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