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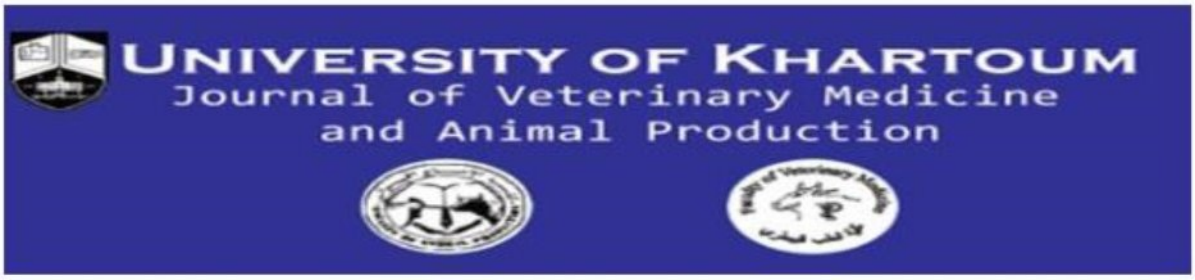

Effect of Compensatory Growth on Feedlot Performance of Sudanese Desert Lambs

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Abstract

The study conducted to detect the effect of compensatory growth on feedlot performance of the Sudanese desert lambs. Twelve lambs (Hamri ecotype) of the same initial weight (23±0.16 kg) were used in this experiment. The animals were randomly divided into two groups: the first group (A) was ad libitum offered a high energy diet (10. 50 MJ/Kg DM) for 8 weeks. While the second group (B) was given a low energy diet (8.03 MJ/Kg DM) throughout the same period. Lambs of the second group were found just to maintain their weight. After that period the lambs from the second group were offered the high energy diet (10. 50 MJ/Kg DM) until they reached the final weight obtained by the first group . It spent 6 weeks to reach that weight. Data were collected daily and weekly for feed consumption and weekly for weight gain. The results showed significant difference in daily live weight gain ($P \leq 0.001$) which was greater for group (B). No significant differences were detected in final live weight and total live weight gain between the two groups. Total dry matter intake was significantly ($P \leq 0.001$) higher in group(A) compared with group (B). Feed conversion efficiency was significantly ($P \leq 0.05$) superior in group (B) than group (A).

Key words: Compensatory Growth, Feedlot Performance, Lambs

المستخلص

اجريت هذه الدراسة لمعرفة تأثير النموالتعويضي على التسمين لحملان الصحراء السودانية. استخدم اثنا عشر حمل من النوع الحمري ومن نفس الوزن الأبتدائى.قسمت الحيوانات عشوائيا الي مجموعتين الاولى (أ) وعرضت لنظام غذائي عالي الطاقة (10.50MJ/Kg) لمدة M? يوم. بينما غرضت المجموعة الثانية (ب) لنظام غذائي منخفض الطاقة (8.03Kg DM MJ). الحملان الموجودة في المجموعة الثانية موجودة فقط

للمحافظة على الوزن وانفقت ?? يوما للوصول الى هذا الوزن . جمعت البيانات يوميا لمعرفة العلف المستهلك واسبوعيا لمعرفة زيادة الوزن. واظهرت النتائج اختلاف كبير (P<0.001) في زيادة الوزن الحي اليومي الذي كان اكبر في المجموعة (ب). كما انه لم يوجد اختلافات كبيرة في الوزن الحي النهائي ومجموع الزيادة في الوزن الحي بين المجموعتين.) كان مجموع سعرات المادة الجافة اعلى معنويا (P<0.001) في المجموعة (أ) مقارنة مع المجموعة (ب) وكانت كفاءة التحويل اعلى معنويا (P<0.05) في المجموعة (ب) من المجموعة (أ).

Introduction

Livestock production system in most part of the world particularly in the developing countries, depend on the natural vegetation of the range and farm land. Periods of drought are interspersed with periods of rainfall, making forage availability and quality very unpredictable. Seasonal variations in feed quantity and quality cause periods of live weight loss and gain in grazing animals. The productivity of the animals is low compared to performance of the same species in more favorable environments, but their ability to survive in bad periods is remarkable. Sudan is a country regularly subjected to wide seasonal variation in both pasture quantity and quality.

This may cause poor growth of young sheep, increased mortality and a delayed first mating of females. These effects can be reduced by supplementation but it is a costly procedure. Knowledge of the effects of feed restriction on growth rate and efficiency of feed utilization is important because the producer needs to manage his animals at the lowest possible cost. Normally after a time of feed restriction, restricted animals exhibit a growth rate higher than the growth rate of their Unrestricted contemporaries. This effect has been termed compensatory growth (Bohman, 1955). The effect of compensatory growth in animals has been reviewed by Wilson and Osbourn (1960) and Allden (1970). According to Thomson *et al.* (1982), compensatory growth can be explained in terms of a reduction of maintenance requirements, a decrease in the energy value of the body mass gain and an increased efficiency of feed utilization. Furthermore, increased appetite and its associated gut fill effects are also important contributory factors to higher feed intake after a period of feed restriction. However, compensatory growth strategy could be of special importance and a suitable way to increase the efficiency of the available feed. With the implementation of such strategy less high quality feed is needed to supplement the low- quality feed and part of the year animals can be taken off from the ranges. The delay in growth during the dry period is compensated during the following raining season. The objectives of this study are to investigate the effect of compensatory growth on feedlot performance of desert lambs of the Sudan.

Materials and Methods

Experimental animals

Twelve of the desert lambs (Hamri ecotype) were used. They were brought from Almowelih Omdurman local market and transported via a car to the Department of meat production pens, Faculty of Animal Production, University of Khartoum at Shambat. Then they were rested, ear tagged and kept for a pre-experimented period of three weeks. During this period animals were fed on groundnut hulls (34.6%), sorghum grains (22%), wheat bran (10%), groundnut cake (8%), urea (1.31%), common salt (1 %), and limestone (1%). The animals were given antibiotic and Albendazole as prophylactic treatment. At the end of the adaptation period animals were weighed following an overnight fast except for water and divided into two groups of equal average live weight (23±0.16 Kg). Each group was further sub-divided into three groups of two lambs each.

Experimental procedure

Immediately after the adaptation period , the two animal groups (group A and B), were randomly assigned to the feed management, which were adlibitum feeding . Group (A) was adlibitumly fed on a high energy diet containing 10.50 MJ/Kg

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ME and 14.67% CP (table 1). The feeding continued for 8 weeks and the lambs attained a final weight of 36.6 kg. Feeding in group (B) was offered into two interchangeable periods. In the first period low energy diet containing 8.03 MJ/Kg ME and14.70% CP was offered adlibitum for a period of 8 weeks. In the second period the lambs were also adlibitum offered the high energy diet until they attained the final weight of group (A). They took 6 weeks to reach that final weight.

Data collection

Performance data, which included feed intake, live weight gain, and feed conversion efficiency were calculated.

Table (1): Ingredient proportions of experimental diet

Ingredient proportions (%)	High energy diet	Low energy diet
Sorghum grain	40	4
Wheat bran	15	5
Groundnut cake	11	6
Molasses	14	30
Groundnut hull	17.8	51.4
Urea	0.2	2.4
Limestone	1	1
Common salt	1	1
Total		
ME(MJ/Kg)	10.50	8.03
CP (%)	14.67	14.70

Statistical procedure

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

Results

Feedlot performance

Feedlot performance data of the experimental groups are shown in Table (3). There were no significant differences between restricted and unrestricted lamb groups in final live weight and total live weight gain. However daily live weight gain was significantly ($p<0.001$) greater for restricted than in unrestricted group. Total live weight gain was not significantly different between the two groups but was greater in restricted lamb group than in unrestricted group.

Feed intake and feed conversion efficiency

According to Table (3) daily feed intake was greater but not significantly different in restricted lamb group than for unrestricted one and, total feed intake was significantly ($p<0.001$) greater for unrestricted fed lamb group than for restricted group. Feed conversion efficiency was significantly ($p<0.05$) superior for rehabilitated lamb group.

Table (2): Chemical composition of the experimental diets

Item	High energy diet	Low energy diet
Moisture (%)	60.32	44.07
Ash (%)	2.28	8.17
Crude protein (%)	21.49	21.49
Crude fiber (%)	15.31	25.17
Ether extract (%)	2.04	1.36
Nitrogen free extract (%)	61.10	43.02
Calculated metabolizable Energy (MJ/ Kg /DM)*	10.50	8.03

*ME (MJ/Kg DM) concentration was calculated according to MAFF (1975)

Table (3): Performance of ad libitum fed and feed rehabilitated in Sudan desert lambs

Item	Unrestricted group (A)	Restricted group (B)	Level of significance
No of animals	6	6	
Feeding period (day)	60	45	
Initial live weight (kg)	23.71± 9.43	24.60 ± 3.20	NS
Final live weight (Kg)	36.64±7.36	36.70±3.80	NS
Total live Weight gain (kg)	12.93±25.21	12.10±26.70	NS
Daily live weight gain (g)	215.50±437.26	268.89±166.8	***
Daily feed intake (Kg/head) (as fed)	2.16±0.08	2.38±0.27	NS
Total feed intake (Kg/head) (as fed)	129.68±75.99	107.66±83.06	**
Daily dry matter intake (Kg/head)	1.30±0.03	1.44±0.10	NS
Total dry matter intake (Kg/head)	77.8±8.99	64.67±6.29	***
Feed conversion efficiency (Kg Dm/kg live weight gain)	6.09±4.44	5.04±0.67	*

NS = not significant. ***=** $p < 0.05$**.** **=P <01, ***= $p < 0.001$.

Discussion

Live weight gain

Performance data of unrestricted group and restricted fed lamb groups presented in Table (3) indicated that no significant differences in final live weight and total live weight gain, but daily live weight gain was significantly higher in compensating lamb group. This could be

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explained by the increase in daily feed intake on both as fed and dry matter basis.

Compensating animals following feed restriction are known to grow at a faster rate compared with unrestricted fed animals (Wilson and Osbourn 1960). Several studies had shown that the increase in the rate of growth during compensation was a result of increased rate of protein accretion and a decreased rate of fat deposition (Dashtizadeh *et al.,* 2008 and Al-sebood, 2009). Daily live weight gain of empty body was significantly ($P \leq 0.05$) greater in lambs exposed to feed restriction and then free fed than in lambs fed ad libitum and this was accompanied by significant increase in the weight of liver, intestines and fat (Sami *et al.,* 2013). Turgeon et al., (2013) found that lambs restrict fed to slow their growth rate and then free fed gained more than lambs that were rapidly growing without feed restriction.

Feed intake

Daily feed intake on both as fed and dry matter basis was greater for compensating than for control lamb groups, however total feed intake was significantly ($P \leq 0.01$) greater for the control group as these animals spent a longer feeding period than the compensating lamb group . Gonzaga Neto *et al.* (2011) found that during the re- alimentation phase of feed restricted cattle they consumed more dry matter per empty body weight than cattle group ad libitum fed. Also Yagoub and Babiker (2009) found that feed restricted goats when free fed consumed more feed than unrestricted control group. In the study of the last authors feed intake was calculated throughout the restriction and rehabilitation periods in which feeding extended for 175 days compared with free fed goat groups in which the feeding period extended for 105 days only.

Feed conversion efficiency

Compensated lambs had significantly ($P<0.05$) higher feed conversion efficiency than continuously fed lambs Table (3). Improved feed conversion efficiency during the re elimination period of feed restricted lambs as these lambs grew at a higher rate and ate less dry matter intake than control lambs. The finding in this study agreed with the results of Gonzage Neto *et al.* (2011) that feed conversion efficiency improved during the re elimination period. Shadnoush *et al.* (2011) observed that restricted feeding followed by re-feeding of lambs caused more efficiency of performance which was associated with lower maintenance requirements. Turgeon et *al.* (2012) also indicated greater improvement in feed conversion efficiency which was accompanied by increased rate of gain in compensating lambs.

Conclusion

It could be concluded that compensatory growth positively affect the daily weight gain and feed conversion efficiency in Sudanese desert lambs, so we can save some money if we use this pattern of feeding in finishing lambs.

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