G.J.A.S.R

Global Journal of Animal Scientific Research

Journal homepage: www.gjasr.com

Print ISSN: 2345-4377 *Online ISSN: 2345-4385*

Original Article

Growth Performance and Carcass Characteristics of Horro Rams under Different Management Practices at Ambo University, Ethiopia

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ARTICLE INFO

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How to cite this article:
Merera C., U. Galmessa, T. Ayele and L. Fita. 2014. Growth Performance and Carcass Characteristics of Horro Rams under Different Management Practices at Ambo University, Ethiopia. *Global Journal of Animal Scientific Research. 2*(2): 184-189.

Article History:
Received: 23 April 2014
Accepted: 19 May 2014

ABSTRACT

This study was conducted to evaluate growth performance, carcass and non carcass characteristics of Horro Rams under different management practices at Ambo University. A total of 24 Horro rams were randomly assigned to the following three treatments: T1= Day 1 rest before slaughter (Animals slaughtered after transportation to experimental site), T2= Rhodes hay *ad libitum* and T3= Rhodes hay *ad libitum* + 400 g concentrate head/day. The initial, fortnight and slaughter live body weight were taken at the initial, fortnightly and at the end of the feeding trial. Average daily gain (ADG) was calculated as change in live body weight over total duration of fattening period. All the carcass and non carcass components were taken and recorded. Data were analyzed using the General linear model procedures of Statistical Analysis System Software 9.2. ADG of concentrate supplemented Horro rams (117.36 g) was greater ($P < 0.001$) than animals fed Rhodes hay *ad libitum (*11.11 g). Average hot carcass weight of supplemented animals (13.5 kg) was heavier ($P < 0.001$) than animals fed on Rhodes hay *ad libitum* and slaughtered after day one rest of transportation (8.4 and 8.93 kg, respectively). Concentrate supplementation had significant and positive influence on ADG, carcass and non carcass components of Horro rams. Therefore, management practices like optimum feeding would improve the growth performance, carcass and non carcass characteristics of Horro sheep.

Keywords: ADG, carcass, concentrate and Horro rams

INTRODUCTION

In Ethiopia, sheep population is ~25.5 million **(**CSA, 2013) and mainly kept for meat production (Ewnetu *et al*.. 2006). The annual mutton production of the country is estimated at 78 thousand metric tons and the annual average off-take rate for sheep is estimated to be about 35 % with an average carcass weight of about 10kg, which is the second lowest amongst sub -Saharan Africa countries (FAO, 2001). Despite the fact that huge genetic

diversity does exist in Ethiopia, profitability from sheep farming is limited by low performance in terms of market weight, reproductive efficiency and meat yield. Over all there is low off-take rate and very low meat yield, which is aggravated by poor feeding and management problems (Mukasa and Lahlou, 1995). Majority of the animals depend upon natural pasture besides crop residues to meet nutritional requirements, it has been observed that the quality and quantity of the pasture fluctuates seasonally thereby affecting the growth, carcass quality and quantity of the animals. Supplementation is very vital to improve the growth performance and mutton yield of local breeds.

Ethiopia has been exporting meat, live animals and skin to Middle East countries. There is a high demand of meat and live animals for domestic and export markets. It is an urgent need to improve the productivity of animals to meet high demand for livestock products. There is also a great need to meet the export standard of carcass and high demand of meat. Thus, the objective of this study was to evaluate growth performance, carcass and non carcass characteristics of Horro Rams under different management practices at Ambo University, Ethiopia.

MATERIAL AND METHODS

Location and facilities of experiment site

The study was conducted at Ambo University farm, which is approximately 115 km west of Addis Ababa, Ethiopia. Slaughter and associated measurements were performed at facilities of Animal Sciences Laboratory of the Ambo University. Rest and feeding of animals took place at a sheep feedlot facility (4 pens of 4 × 3.5 m) of the University.

Experimental Animals and treatments

Horro sheep are the long fat tailed highland sheep mainly found in Horro Guduru zone of western Ethiopia. Based on dentition, all animals were approximately 1 year of age and similar in average initial body weight (21.31 ± 2.16 kg) and conformation. Horro rams were purchased from ‘Gabaa Sanbataa’ market found in Horro district of the Horro Guduru zone, approximately 190 km from Ambo University. Animals were transported as procedures for procurement, transportation, and handling were the ones used by abattoirs in Ethiopia. A total of 24 Horro rams were randomly assigned to the following three treatments with 8 replicates:

T1= Day 1 rest before slaughter (Animals slaughtered after transportation to experiment site)
T2= Rhodes hay *ad libitum* or control group
T3= Rhodes hay *ad libitum* + 400 g concentrate per day/ head of animal

Those animals randomly assigned for 90 days fattening treatments were drenched with albendazole and sprayed with diazinon. There was no health problem encountered during the experiment period. The concentrate composition is 49.5% noug cake (Gizotia abyssinica), 49.5 % ground maize grain and 1% salt. Water and moderate quality grass hay were provided *ad libitum* for all treatments until slaughter until approximately 12:00 h the day preceding slaughter.

Measurements

The initial, fortnight and slaughter live body weight were taken at the initial, fortnightly and at the end of the feeding trial. Average daily gain (ADG) was calculated as change in live body weight over total duration of fattening period. The experimental animals were slaughtered after one day rest of arrival at experimental site and at the end of 3 months

fattening period. All the carcass and non carcass components were taken and recorded during the slaughtering time. Empty body weight was estimated as the sum of the carcass and non-carcass components with digests excluded.

Statistical Analysis

Data were analyzed using the General linear model procedures of Statistical Analysis System Software 9.2 (SAS, 2008). During analysis, treatment was considered as independent variable whereas average daily weight gain, carcass and non carcass components considered as dependent variables. Initial body weight (BW) was used as a covariate for ADG. Means were separated by least significant difference.

RESULTS AND DISCUSSION

Growth Performance of Horro rams

Concentrate supplementation had significant effect on average daily weight gain (ADG) and as expected, the ADG was greater ($P < 0.001$) for concentrate supplemented Horro rams compared to animals fed Rhodes hay *ad libitum* (Table 1).

Table 1: Least square means of live body weights and average daily gain (ADG) of Horro rams under different management practices

TRT	Initial Body weight (kg)	Final Body weight (kg)	ADG (g/day)
1	21.63	-	-
2	21.64	22.64[b]	11.11[b]
3	21.45	32.00[a]	117.36[a]
SE	2.16	2.49	24.21
CV	-	9.03	15.72
R^2	-	80.12	84.69
P- value	-	0.0001	0.0001

T1: Animals slaughtered after day 1 rest of transportation; T2: Rhodes hay *ad libitum* and T3: Rhodes hay *ad libitum + 200g noug cake + 200g ground maize grain per day/head of animal.*
[ab] Means within rows without common superscript differ significantly at $P < 0.001$.

The change in live body weight/growth curve was substantially increased up to 30 days fattening duration and then after increased slightly which could be explained as compensatory growth in the first days of fattening periods (Figure 1).

The ADG of concentrate supplemented Horro rams obtained in this experiment (117.36 g/day) was similar to the earlier report of ADG by Galal *et al.*. (1981), who reported 118 g/day for 12 months Horro sheep supplemented on 400 g concentrate/head/day after daytime grazing at Bako Agricultural Research Center but greater than the ADG reported by Ewnetu *et al.*. (2006) and Kassahun (2000), who reported 47.3 and 70.9 g/day per animal for Horro male lambs, respectively. In line with these results, Chala *et al.* (2013) reported that daily live weight gains were greater ($P < 0.05$) for Horro ewe lambs supplemented with Leucaena pallida and concentrate compared with the un-supplemented control treatment. Santos-Silva *et al.*. (2004) also reported that hay fed lambs showed lower intake, average daily weight gain and slaughter weights than those fed pellets.

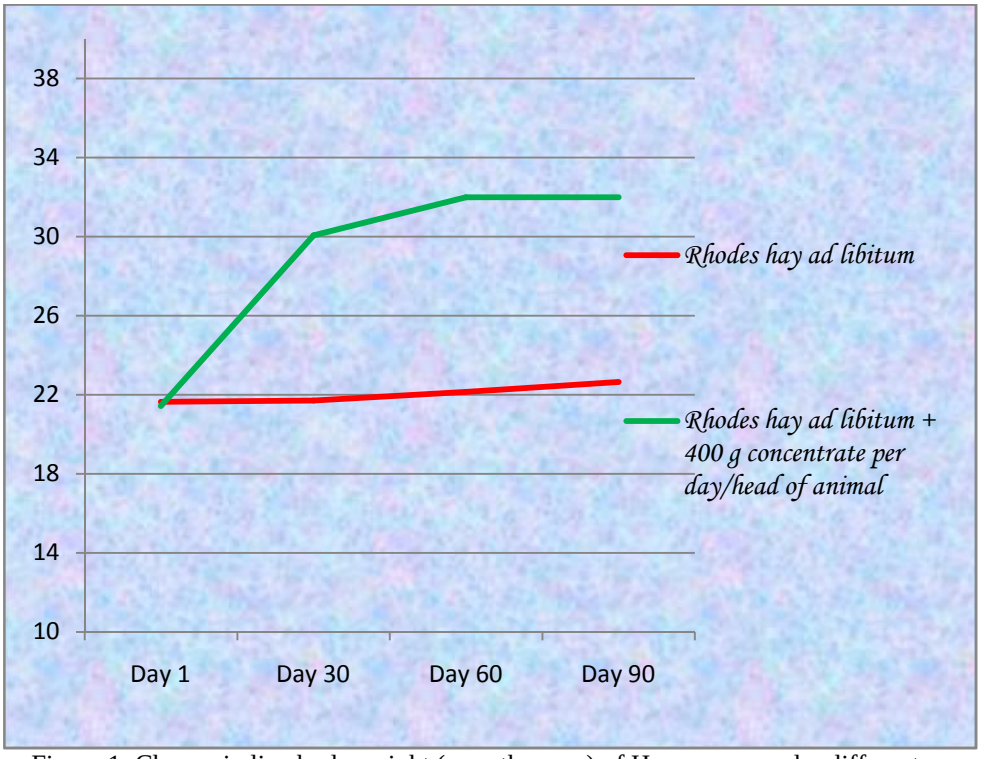

Figure 1: Change in live body weight (growth curve) of Horro rams under different management practices during fattening period

Carcass and non carcass components

Concentrate supplementation had significant positive influence on carcass weight, dressing percentage, tail fat weight and kidney with fat of Horro rams (Table 2; Picture 1). Hot carcass weight was heavier ($P < 0.001$) for supplemented animals compared to animals fed on Rhodes hay *ad libitum* and slaughtered immediately after day 1 rest of arrival/transportation to experiment site. Dressing percentages on slaughter and empty body weight basis, tail fat weight and kidney with fat of supplemented Horro rams were greater ($P < 0.05$) than other treatment animals.

Table 2: Least square mean values of carcass components of Horro Rams under different management practices at Ambo University

Carcass components	Treatments			Overall mean	SE	CV	R^2	P-value
	1	2	3					
Hot carcass weight (kg)	8.40 [b]	8.93 [b]	13.50 [a]	10.34	1.15	11.11	63.58	0.0001
Dressing % on Slaughter body weight basis	38.88 [b]	39.28 [b]	42.24 [a]	40.17	2.51	6.25	29.70	0.0295
Dressing % on empty body weight basis	45.54 [b]	46.19 [b]	48.39 [a]	49.89	3.29	7.04	14.09	0.0219
Kidney with fat (g)	81.63 [b]	104.29 [b]	173.25 [a]	120.39	18.40	15.29	84.24	0.0001
Heart (g)	105.5	104.72	287.38	168.52	219.99	13.49	15.19	0.1924
Liver (g)	331.38	371.86	422.00	375.22	111.49	29.72	11.71	0.2897
Tail weight	312.5 [b]	347.29 [b]	1063.3 [a]	584.22	331.48	56.74	56.29	0.0003

T1: Animals slaughtered after day 1 rest of transportation; T2: Rhodes hay *ad libitum* and T3: Rhodes hay *ad libitum + 200g noug cake + 200g ground maize grain per day/head of animal.*

[ab] Means within rows without common superscript differ significantly at $P < 0.001$.

In agreement to these results, Chala *et al.* (2013) reported that Horro rams supplemented with 400g concentrate and cyndon dactyl hay ad libitum had greater carcass weight (11.6 kg) and dressing percentage (45.2%). Ulfina *et al.* (2004) also reported that there was improvement in carcass weight and dressing percentage with increased level of concentrate supplementation. Merera *et al.* (2009) concluded that 2 weeks feeding period could be employed with highland sheep to markedly increase carcass weight. Similarly, earlier report

by Galal *et al.* (1981) on the same sheep breed showed significant differences between realimented and continuously fed lambs in carcass weight and dressing percentage and fat deposition measurements. In accordance with the above results, Priolo *et al*. (2002) also revealed that carcasses from stall-fed lambs were heavier than those from grass-fed lambs and carcasses from stall lambs had better muscular conformation score (P <0.05) and were fattier than those from grass-fed animals.

Supplementation had also improved the mass weight of skin, omental fat, spleen, head and the visceral full (P < 0.01; Table 3). The greater yield of skin is practically useful for leather industry or export market. Likewise, higher mass of non-carcass tissues available for market has important for domestic consumption and export. Similar mass weights of non carcass components were reported by different researchers (Chala *et al..*, 2013; Ulfina *et al..*, 2004 and Galal *et al..*, 1981).

Table 3: Least square mean values of non carcass components of Horro Rams under different management practices

Non Carcass components	Treatments			Overall mean	SE	R^2	CV	P-value
	1	2	3					
Skin (kg)	1.99 [b]	2.87 [a]	3.06 [a]	2.59	0.50	55.5	19.3	0.0003
Visceral full (kg)	3.11 [b]	3.35 [b]	4.00 [a]	3.49	0.48	41.8	13.8	0.0004
Head (g)	1325.0 [b]	1225.7 [b]	1504.8 [a]	1357.3	169.9	34.4	12.5	0.0147
Legs (g)	448.9 [a]	515.9 [b]	628.4 [c]	531.7	60.3	64.4	11.3	0.0001
Lung and track (g)	261.8 [a]	330.7 [b]	430.3 [c]	341.4	49.4	70.2	14.5	0.0001
Omental fat (g)	33.5 [b]	53.5 [b]	129.0 [a]	79.9	37.9	59.6	17.5	0.0018
Spleen (g)	39.8 [a]	36.9 [a]	57.0 [b]	44.9	10.5	45.6	23.3	0.0023
Blood (g)	1136.3	966.4	1100.4	1072.1	293.1	6.5	27.3	0.5162
Testicles (g)	268.3	261.4	951.8	503.9	875.9	13.8	13.8	0.2261

T1: Animals slaughtered after day 1 rest of transportation; T2: Rhodes hay *ad libitum* and T3: Rhodes hay *ad libitum + 200g noug cake + 200g ground maize grain per day/head of animal.*
[abc] Means within rows without common superscript differ significantly at P < 0.001.

Picture 1: Hot carcass weight, conformation and composition of Horro rams fed up on Rhodes hay *ad libitum* (left side) and 400 g concentrate head/day +Rhodes hay *ad libitum (right side) at Ambo University*

CONCLUSION AND RECOMMENDATION

The study was conducted to evaluate growth performance, carcass and non carcass characteristics of Horro Rams under different management practices at Ambo University. ADG of concentrate supplemented Horro rams (117.36 g) was greater ($P < 0.001$) than animals fed Rhodes hay *adli bitum (*11.11 g). Average hot carcass weight of supplemented animals (13.5 kg) was heavier ($P < 0.001$) than animals fed on Rhodes hay *ad libitum* and slaughtered after day one rest of transportation (8.4 and 8.93 kg, respectively). Concentrate supplementation had significant and positive influence on ADG, carcass and non carcass components of Horro rams. Therefore, management practices like optimum feeding would improve the ADG and yield of mutton.

ACKNOWLEDGEMENT

The authors would like to express thanks to Ambo University for financial and logistic support

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