

Full Length Research Paper

Evaluation of different feeding options for yearling Arsi-Bale sheep rams to attain export market body weight

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ABSTRACT

The study was conducted at Adami Tulu Agricultural Research Center on twenty one yearling Arsi-Bale rams. They were assigned to three feeding treatments (T_1 = Grazing + 50% wheat bran + 50% Noug seed cake, T_2 = Grazing + 45% wheat bran + 20% maize grain + 35% Noug seed cake and T_3 = Grazing + 65% wheat bran + 35% cotton seed cake) with the aim of evaluating the three feeding options and come up with the economical one(s), which could enable the rams to attain export market weight. The rams were supplemented based on their individual body weight requirements (2.5% of their individual body weight) and kept on feeding for seventy five days. Final body weight, total weight gain and average daily weight gain of the rams were not significant among the treatments. Average daily weight gains of the rams over the feeding period were 113.3, 109.3 and 104.7 grams for those rams in T_1 , T_2 and T_3 , respectively. Partial budget analysis indicated that feeding option number two (T_2) is more economical as compared to T_1 and T_3 . However, fattener can use any of the feeding options depending on availability of the ingredients in their area.

Keywords: Arsi-Bale rams fattening, Sheep market weight, Different feeding options

INTRODUCTION

Ethiopia has above 30 million heads of sheep (CSA, 2017). Beside the large population, sheep production is very low. Carcass yield of local small ruminants remained at about 8 kg per head between the year 1999 and 2008 (Getahun, 2008), which was below the East African (11 kg) and the world (12 kg) average carcass yield during the same years.

The increase in demand of meat of ruminant animals from foreign countries particularly Arab countries has led to the import from Africa. Ethiopia has relative opportunities for live animals and meat export since it is geographically located at the entrance of Asian countries. Currently, the country has more than nine standard livestock slaughtering abattoirs. However, the earning from export of live animals and processed meat is very small as compared to the potential of the country.

Moreover, the red meat currently produced from livestock production in the country could not satisfy the high demand for animal protein (Shapiro *et al.*, 2015). The standard export market live weight demands for a yearling small ruminant is 25 – 30kg per head (Endashaw *et al.*, 2013). However, yearling live weight for our sheep is estimated at 16 to 18kg/head. Poor quality and quantity of feed are among the factors that limit their productivity (Hagos and Solomon, 2017). To improve this scenario various livestock research and development activities have been undertaken by different research institutions. Improving the growth performance of fattening animals is one of the most important traits to obtain the required export market weight gains. Different feed options play significant role to bring experimental animals to attain export market weight demand at different length of

fattening period. In addition to the effect of dietary feeds, various fixed effects have their own role on growth performance and carcass characteristics of experimental animals kept under a given environmental conditions (Abebe *et al.*, 2013).

A study by Endashaw *et al.*, (2013), indicated that yearling Afar goats are fed on different diets to meet the required export market body weight. Afar lambs reach 25kg for export market at about 70 days of feeding while Black Head Ogaden rams will take about 112 days (Getahun, 2014). Information on feeding rations that enables yearling Arsi-Bale rams to reach export market weight is scanty. Therefore, this study was designed to evaluate different feeding options and identify the most economical feeding option(s) for rams to attain the demanded export market body weight.

MATERIALS AND METHODS

Description Study site

The experiment was conducted in Adami Tulu Agricultural Research Center, which is located in mid rift valley, at 167km from Addis Ababa, at altitude of 1650m above sea level. The agro ecological zone of the area is semi-arid and sub humid with acacia woodland vegetation type. The mean annual rain fall is 760mm and mean minimum and maximum temperatures are 12.6 and 27^oc, respectively.

Experimental animals and dietary feeds

One year old Arsi-Bale rams was purchased from Bulbula and Batu markets. The purchased rams was treated for internal and external parasites. Each animal was assigned randomly to treatments. All experimental animals were individually fed with their corresponding rations for 14 days for adaption and 75 days for fattening period. The feeding treatments offered to the rams during the fattening period were: T₁ (Grazing + 50% wheat bran + 50% Noug seed cake + 1kg salt per 100kg mixed feeds), T₂ (Grazing + 45% what bran + 20% maize grain + 35% Noug seed cake + 1kg salt per 100kg mixed feeds) and T₃ (Grazing + 65% wheat bran + 35% Cotton seed cake + 1kg salt per 100kg mixed feeds).

Feeding of experimental animals

After 14 days of adaptation period, concentrated feeds were given to the animals at a rate of 2.5% of their body weights. The feed amounts given to the animals are adjusted in every two weeks over the feeding period. Each dietary treatment were offered twice daily (half in the morning and half in the afternoon after eight hours grazing) for the respective groups of animals. Feed

refusals from each treatment group were collected and weighed every day in the morning before the daily feed allowance was provided to the rams.

Growth performance measurements

$$ADW = \frac{FBW - IBW}{D}$$

$$TWG = FBW - IBW$$

Where: ADG = Average daily weight gain, TWG = Total weight gain, FBW= Final body weight, IBW = Initial body weight, D = Total fattening days

Economic return of rams fattening

The costs incurred in conducting the trial were recorded. Total variable costs such as animal purchase, transportation, feeds, labor and veterinary were included in partial budget analysis. At the end of the fattening period, the gross revenues were obtained from the prices of the rams as estimated by people who have enough knowledge regarding the prices of fattened animals. Fixed costs incurred for feeding the animals were not included in the cost benefit analysis.

Statistical analysis

Data on live weights and carcass parameters were analyzed using general linear model (GLM) of Statistical Analysis System (SAS ver. 8).

RESULT AND DISCUSSION

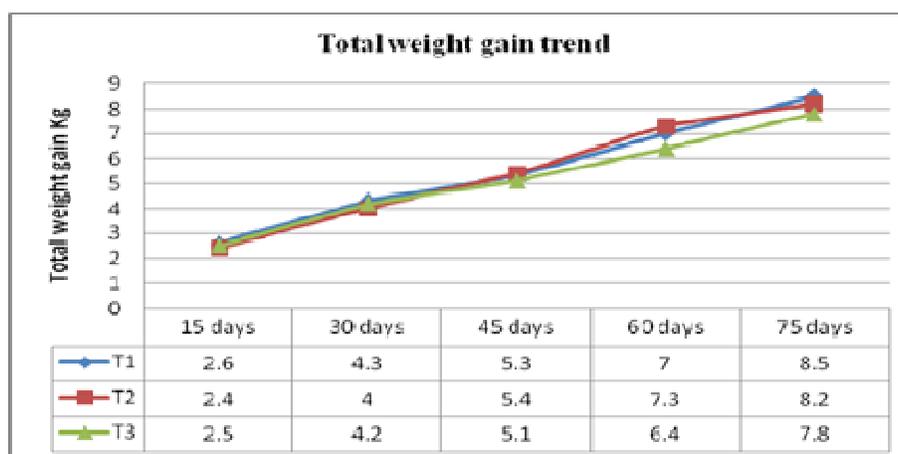
Growth performance of rams

Experimental rams were fed on different feed options to attain export market weight. The average initial weights were 16.85, 16.85 and 17kg for animals in T₁, T₂ and T₃, respectively. Final body weights, average daily weight gains and total weight gains of rams in 45 and 75 days are indicated in Table 1. No statistical differences were observed among the treatment groups in final weight gain, average daily weight gain and total weight gain during both 45 and 75 days. The yearling Arsi-Bale rams attained export market body weight (24.8 – 25.3kg) in the 75 days of fattening. A study conducted at Werer Agricultural Research Center indicated that yearling Afar rams that had initial body weight of 18.5kg and fed on different wheat bran and leucaena leaves mixture reached 30kg in 98 fattening days (Abebe *et al.*, 2013). The rams fed on T₁ (grazing + 49% wheat bran + 50%

Table 1. The growth performance of Arsi-Bale sheep rams at different feeding days

Fattening period	Weight	T ₁	T ₂	T ₃
First day	IBW (kg)	18.85	16.85	17.0
45 days	FBW (kg)	22.3±1.9	22.2±2	22.3±1.8
	TWG (kg)	5.4±1	5.4±1	5.3±1.7
	ADG (g)	120.6±28.3	119±29.6	117.5±40
75 days	FBW (kg)	25.3±1.5	25.1±1.2	24.8±1.1
	TWG (kg)	8.5±1.2	8.2±1.91	7.85±1.4
	ADG (g)	113.3±15.86	109.5±25.5	104.7±18.3

IBW: Initial body weight, FBW: Final body weight, ADG: Average body weight gain, TWG: Total weight gain, Treatments not significance at $P < 0.05$

**Figure 1.** Trend of total weight gain of yearling Arsi-Bale rams over the fattening period

Noug seed cake) had relatively higher weight gain than those fed on T₂ and T₃. This shows that the feed conversion efficiency of the animals in treatment one is higher than that of the rest. Total weight gain of animals fed with each feeding treatment was calculated at different fattening periods. The weight changes of yearling rams from average initial body weight of 17.5kg to final body weight after 75 days were 8.5, 8.2 and 7.85kg per treatment one, two and three, respectively.

The average daily weight gain of yearling Arsi-Bale rams was lower than that reported for Afar sheep (116.3, 120 and 116.1g/day) which were fed on three different levels of wheat bran and leucaena mixture for 98 days (Abebe *et al.*, 2013). Study conducted at Debrezeit Agricultural Research Center (Getahun, 2014) indicated that Black Head Ogaden rams which fed teff straw ad libitum and 450g concentrate per day registered lower average daily weight gain of 65.2g/day. Local sheep breed in Eastern Amhara which fed Teff straw + 110g wheat bran + 53g Noug seed cake + 389 pigeon pea for 90 days were attained 54.67 grams average body weight per day (Solomon *et al.*, 2016). Central-highland sheep rams which fed hay ad libitum + 90g wheat bran + 3g salt + 207g leucaena leucocephala Leaves had attained 86.67 grams of daily gain (Gebregiorgis *et al.*, 2017).

Rams reared in Raya–Alemata district which fed air dried Ziziphus leaf had gained lower (90.5g/day/head) average daily gain (Tesfaye *et al.*, 2015). The average daily weight gains of yearling Arsi-Bale rams in this study were relatively similar to the work reported by Tadesse *et al.*, (2014) for Arsi-Bale sheep (111.9g/day) fed on concentrate blocks in Southern Ethiopian.

Rams total weight gain trend

The trend of the total weight gain of experimental rams fed with different dietary rations for 75 days are illustrated in Figure 1. The total weight gain of experimental rams fed on the three dietary rations was gradually increased from initial fattening 15 days of fattening to end of fattening days. The figure 1 indicates that experimental rams have positive total weight gain trend. Rams fed on cotton seed cake attained lower total body weight gain compare to the treatment one and two.

Rams daily weight gain trend

The trend of daily weight gain of experimental rams fed

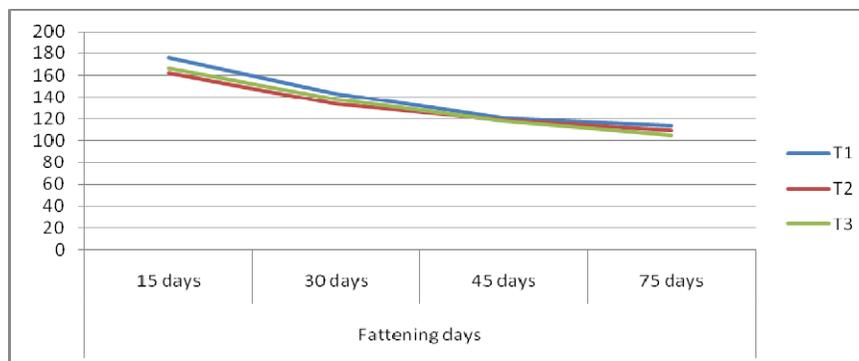


Figure 2. Rams average daily weight gain trend through the fattening period



Figure 3. live weight change of Arsi-Bale rams over feeding period

Table 2. Partial budget analysis of fattening Arsi-Bale rams on three dietary rations for 75 days

List of items	T1	T2	T3
Feeds costs per ram (ETB)	230	200	217
Purchasing price per ram (ETB)	900	900	900
labor cost per ram (ETB)	125	125	125
Vet cost per ram (ETB)	28.6	28.6	28.6
Total variable cost per ram (ETB)	1283.5	1253.5	1270.5
Total gross output per ram (ETB)	1650	1650	1650
Gross margin per ram (ETB)	366.5	396.5	379.5
Total gross margin(ETB)	2565.5	2775.5	2656.5

ETB=Ethiopia birr

with different dietary rations for 75 days are illustrated in Figure 2. Rams average daily weight gains were higher during the initial stage of the fattening period. These results may be associated to the animals' compensatory growth (Girma *et al.*, 2015). Later, these average daily weight gains showed decreasing trend, which is similar with Abebe *et al.*, (2013) who reported that animals' daily weight gains steadily decreased as their body weight progressively increased.

Live weight change of rams

Live weight change of yearling Arsi-Bale rams over feeding period is illustrate in Figure 3. The Arsi-Bale rams attained minimum export market body weight in the 75 days of fattening. Afar lambs reached the minimum live weight (25kg) in demand for export market at about 70 days of feeding while Black Head Ogaden rams took 112 days (Getahun, 2014). Yearling Arsi-Bale rams fed on

dietary one relatively have more weight gain than others group.

Economic return of sheep fattening

The partial budget analysis of yearling Arsi-Bale rams fattening is summarized in Table 2. However, the partial budget analysis indicated Arsi-Bale rams allocated to all treatments groups have positive gross margins; feeding T₁ diet incurred more variable costs than other treatments. Replacing part of wheat bran with maize grain looks more profitable than using only wheat bran as energy source (T₁ and T₃). This may be related to the price of maize grain which was lower than that of Noug seed cake and cotton seed cake. Therefore, fattener can choose treatment two to fetch for more profit. However, based on accessibility and availability of the feed ingredients, they can use any of the three treatments as well as there was no significant difference among the treatments.

CONCLUSION AND RECOMMENDATION

This study shows that yearling Arsi-Bale rams can attain export market body weight in 75 fattening days. This trial also show that no significance difference among treatments in final body weight, total weight gain and average daily weight gains in the 75 fattening days. This implies the provided dietary treatments have similar effect on body weight gain of the yearling Arsi-Bale rams to attain export market weight and have good growth performance. Finally, as the partial budget analysis indicates positive gross margins for all the three feeding options, it can be recommended that fatteners can use one of the three feeding options depending on the availability of and accessibility for the feeds.

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COMFLICT OF INTERESTS

Authors have declared that no competing interests exist.

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