Introduction

Ethiopia has above 30 million heads of sheep [1]. However, sheep productivity is very low. The average carcass yield of local small ruminant was 8kg which was below the East African (11kg) and the world (12kg) average [2]. In Ethiopia, the current per capita consumption of meat is 13.9kg/year, being lower than the African and the world per capita averages, which are 27kg/year and 100kg/year, respectively [3].

In Ethiopia, livestock fattening practices by farmers mostly lay on the natural pasture [4]. Traditional fattening practices might not take in to account the nutrient requirement of animals, the level of feeding being either above or below the animal requirements. In such conditions, livestock production mainly depends on increase of animal numbers rather than productivity per animals. Production increment through increase of sheep numbers only may not meet the meat demand of growing population [5]. The productivity of animals could be increased through improving daily body weight gain of the animals.

Animal fattening is an opportunity for employment and is a means of income generation for the poor, especially the landless and widowed women [6]. Rams fattening is an efficient income-generating option for small-scale farmers

Abstract

Concentrate feed based yearling Arsi-Bale sheep fattening demonstration was conducted at Keta-Bareda and Wabe Gefersa kebeles of Dodola and Kofele districts, respectively. The objectives of the study were to demonstrate concentrate based rams fattening technology and to evaluate of its economic profitability at on-farm level. Two youth and one women research extension groups were formed purposely with collaboration of development agents. Seventy yearling Arsi-Bale rams were purchased from the surrounding markets and tagged with animal identification number. The experimental rams were then provided with anti-parasite treatments before commencing feeding. All rams were supplemented with a fattening ration of wheat straw +65% wheat bran +35% cotton seed cake for seventy five days. The body weight of rams was taken in fifteen days interval. Finally a mini field day was organized. The initial body weight of rams is 19.5±0.29kg. The final body weight, total weight gain and daily average weight gains of the rams were 27.4kg, 7.9kg and 100.33grams, respectively. Growth performances of sheep were not statically difference across the fattening location. The rams fed the dietary ration had attained export market weight. The farmers also appreciated the final body condition of the rams. After seventy five days, rams were then sold at farm gate with a gross margin of 309.09ETB/ram. Rams fattening technology make the youth and women profitable. Thus, rams fattening technology is need to scale up.
and is a source of family employment. Ethiopian female exhibited better skills in sheep husbandry compared to male household [7]. However, they are unable to realize substantial benefits due to their low level of business experience, access to technology and participation in local markets. Female are confronted by heavy domestic workload and subsequently face time constraints as well as limited access to resources such as land, credit and production inputs.

Currently, youth employment is also a pressing issue in Ethiopia where almost two-thirds of the population is younger than 25 years [8]. High level of youth unemployment creates critical socio-economic problems in a country. Rural youth have less access to agricultural land since it is occupied by their family. Hence, there is a need to demonstrate agricultural technologies that need less land and increase productivity as well as income.

However, sheep fattening is one of the options that rural youth and women confronted with the mentioned challenges can improve their incomes. As fattening technologies require less land and increase productivity as well as income, demonstration of such agricultural technologies is important. Studies also indicate that rams fattening is a relatively easy and profitable system of animals rearing to reduce poverty, unemployment and generate income for the rural people [9]. In line with this idea, growth performance evaluation experiments were done at Adami Tulu Agriculture Research Centre using different dietary rations on Arsi-Bale sheep rams in the process of developing sheep fattening technologies. Rams fed wheat bran and cotton seed cakes gained 104 grams daily weight gain [10]. Hence, this study was designed to demonstrate the concentrate based yearling rams fattening selected districts of West Arsi Zone.

Objective

- To demonstrate concentrate based sheep fattening technology to attain export market weight demand at on-farm level
- To evaluate financial profitability of concentrate based sheep fattening at on-farm level
- To increase youth and women income though sheep fattening at on-farm level conditions.

Materials and methods

Description of the area

The demonstration was conducted in Dodola and Kofele district of West Arsi Zone. Sheep fattening history, access to road and market and water availability were some of the criteria used during kebele selection. Accordingly, Keta-Bereda and Wabe Gefersa kebeles were purposively selected in collaboration with livestock experts from Dodola and Kofele districts, respectively. Keta-Bereda is located at 90 km and Wabe-Gefersa at 56 km East of Shashamane towards Bale-Robe town; Oromia regional state, Ethiopia.
development gents, livestock experts and other who participated on training and mini field day. A total of 20 male and 18 females involved directly in sheep fattening whereas a total of 86 individuals attended the mini on the mini field day.

Sheep house construction

Rams house was constructed from local wood (bamboo and eucalyptus). Its roof was covered by plastic material to protect the animals from sun and rainfall. Feeding troughs were constructed from eucalyptus wood. The troughs were set in the feeding house at 50cm above the ground and attached to the wall. The door of the house was made from iron sheet.

Animal purchase and feeding

A total of seventy yearling rams were purchased from the surrounding markets. The purchasing price of animal was determined by observation and negotiation with seller. Age of rams was determined by dentition techniques. The rams were then treated against internal and external parasites before commencement of the feeding. The animals were supplied with their daily dietary ration (3% of their body weight); half in the morning and the remaining half in the afternoon. The dietary ration was formulated from wheat bran and cotton seed cake. The total ration was grazing +65% wheat brain +35% cotton seed cake. One kilogram salt was mixed in 100kg dietary ration. Before mixing the concentrate, the cotton seed cake was down sized to small sizes to be easily fed by the rams.

Chemicals composition of feed

The Table 2 indicates the chemical composition and total digestible nutrients of the wheat bran and cotton seed cake used in the ration.

| Ingredient        | DM % | CP % | TDN % |
|-------------------|------|------|-------|
| Wheat bran (13.67)| 65   | 8.45 | 43.55 |
| Cottonseed cake (28,75)| 35 | 9.80 | 18.25 |
| Total             | 100  | 18.25| 69.8  |

DM: Dry Matter; CP: Crude Protein; TDN: Total Digestible Nutrient; Number in parenthesis indicate that CP and TDN percentage in individual feed.

Growth performance assessment

Animal body weights were taken at 15days interval using spring balance. The total and average daily body weight gains were calculated as follows:

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

$$TWG = FBW - IBW$$

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

Field day

Field day is a method of encouraging people to adopt new practices. Mini field was arranged to create awareness on new rams fattening technology, to share knowledge of fattening to other farmers and to compare their experience with the current technology. FREG members, other model farmers, development agents, livestock experts and invited guests participated on the field day.

Financial analysis

All costs incurred during the fattening period were recorded. Total variable costs such as animal purchase, transportation, feed costs, labor and veterinary costs were included in analysis. Shade and feeding trough construction costs were also included in the cost benefit analysis. At the end of the fattening period, the gross revenues were obtained based on the prices of the rams sold at farm gate.

Statistical analysis

Collected data were coded and entered in micro soft excel 2007 and checked for any error. Data on economic parameters were analyzed using descriptive statistics. Data on all live weights and economic parameters were analyzed using Statistical Analysis System (SAS ver. 8).

Results and discussion

Growth performance of Arsi-Bale rams

Growth performances of the sheep were analyzed the end of the fattening period. Final body weight, total and average daily weight gains of the sheep at both districts are depicted in Table 3.

According to the growth performance result, there is no statistically significant difference in final body weight, total weight gain and daily weight gain between the rams allocated to the Dodola and Kofele districts. Both experimental sites found in similar agro–ecology. This might be similar effect on the rams’ growth performance. Moreover, all the rams were fed similar dietary ration for the same seventy five fattening days. Also both participants applied the same management as they were given similar training and technical support as to how they should conduct the work.

Current average daily weight gain of the rams is more or less similar to the on-station result (104grams) at Adami Tulu Agriculture Research Center [10]. The Arsi-Bale sheep supplemented with 300grams/day linseed cake and wheat bran gained up to 104grams/day [11]. Current average daily weight gain higher than Arsi-Bale sheep (55–88grams/day)

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| Participants | M | F | Total |
|--------------|---|---|-------|
| Farmer       | 20| 18| 38    |
| DA           | - | - | -     |
| Experts      | - | - | -     |
| Others       | - | - | -     |
| Total        | 20| 18| 38    |

FREG: Farmers Research and Extension Group; DA: Development Agent; others: invited guests; M: Male; F: Female; Farmers term includes youth and women.
Table 3: Growth performance of rams at different location.

| Biological parameter | Dodola (keta Bereda) | Kofele (Wabe-Gefersa) | Overall |
|----------------------|----------------------|-----------------------|---------|
| Initial body weight  | 19.2±0.34            | 19.7±0.29             | 19.5±0.29 |
| Final body weight    | 27.1±0.43            | 27.6±0.41             | 27.4±0.41 |
| Total weight gain    | 7.8±0.31             | 7.9±0.26              | 7.9±0.26 |
| Daily weight gain    | 105.3±4.09           | 96.5±2.8              | 100.3±2.81 |

Keta-Bereda kebele located at Dodola while Wabe-Gefersa kebele at Kofele district.

Table 4: Economic return at different location.

| List of items (ETB) | Dodola(Keta-Bereda) | Kofele(Wabe-Gefersa) | Overall |
|---------------------|---------------------|----------------------|---------|
| Feed cost /ram      | 360.50              | 337.40               | 348.95  |
| Labor cost /ram     | 87.50               | 65.61                | 76.55   |
| Veterinary cost /ram| 50.00               | 50.00                | 50.00   |
| Purchasing price /ram| 950.00            | 1000.00              | 975.00  |
| Transport cost/ram  | 15.10               | 14.80                | 14.95   |
| Feeding trough cost /ram | 72.00         | 78.80                | 75.40   |
| Total cost/ram      | 1535.10             | 1612.37              | 1573.73 |
| Total revenue /ram  | 1866.66             | 1825.00              | 1845.83 |
| Gross margin/ram    | 336.66              | 283.19               | 309.92  |

Conclusion and recommendation

A total of seventy Arsi-Bale sheep were kept on feeding for 75 days at on-farm level. The demonstration result indicated that the daily weight gain of the animals obtained at the end of the fattening period was similar to the on-station result. The participant youth and women were easily managing the sheep as well as the fattening technology in the way they are told by guiding researchers. As a result, the youth and women were benefited a lot from fattening exercise. The sheep fattening demonstrated showed that its one option to create job opportunity for rural landless and it could be an alternative source of income for the community. Therefore, further scaling up of this fattening technology is recommended to reach rural youth and women in the process of creating employment opportunity.

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