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Research Article

Participatory demonstration of concentrate based Arsi-Bale sheep fattening technology at Dodola and Kofele districts in West Arsi-Zone, Oromia regional state, Ethiopia

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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.

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

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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 25years [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 104grams daily weight gain [10]. Hence, this study was designed to demonstrate the concentrate based yearling rams fattening selected districts of West Arsi Zone.

Objective

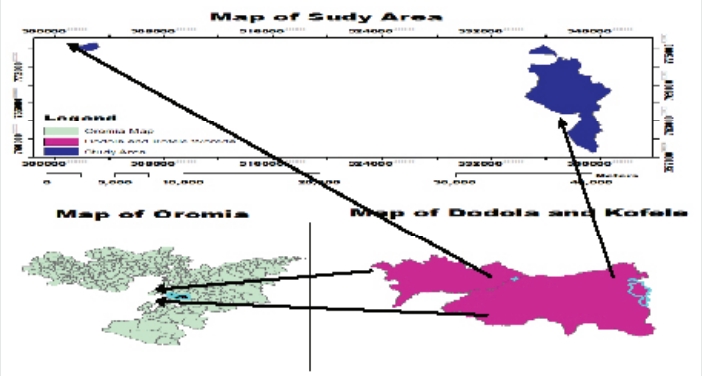
- To demonstrate concentrate based sheep fattening technology to attain export market weight demand at on-farm level
- To evaluate financial profitability of concentrate based sheep fattening at on-farm level
- To increase youth and women income though sheep fattening at on-farm level conditions.

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 kebeles 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 90km and Wabe-Gefersa at 56km East of Shashamane towards Bale-Robe town; Oromia regional state, Ethiopia.

Map of technology demonstration area



Sheep fattening group formation

Sheep fattening was conducted following a Farmer Research Extension Group (FREG) approach. Youth and women selection was carried out based on the information collected from development agents and the discussion held with them. Relatively jobless youth and women were selected to create income for them. The main selection criteria were willingness to undertake the sheep fattening and willingness to do in group. Accordingly, one youth group (both sexes) was formed in Keta-Bereda while youth and women only groups were formed in Wabe-Gefersa kebele. Each group members agreed to work together till the end of the fattening. Moreover, all groups selected their leader and cashier.

Roles and responsibilities of participants

Each group purposely selected an area which is near the home of one member for construction of the sheep fattening house. Each group members then contributed materials for the house construction. The sheep houses were built by group members. Each group members were also responsible to look after the rams, clean shade, mix concentrate feed and provide feed for the animals turn by turn. Adami Tulu Agriculture Research Center (ATARC) provided concentrate feed, plastic for roof covering, nails, wood for preparing feeding troughs, medicaments, money for purchase of rams and technical support during the fattening exercise.

Capacity building

Theoretical training was provided for youth, women, famers, kebele leaders, livestock experts and development agents at kebele Farmers Training Center (FTC). Practical training was also provided mainly on dietary ration preparation (mixing concentrate feeds in appropriate ratio), feeding management, housing and health care at their fattening spot. Furthermore, they were trained on criteria of ram selection for fattening by observing at market.

Participant on demonstration

Table 1 shows the number of youth and women grouped for rams fattening. It also shows the number of farmers,

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Table 1: Number of stakeholders participated on the technology demonstration.

	FREG members			Training participants			Field day participants		
Participants	M	F	Total	M	F	Total	M	F	Total
Farmer	20	18	38	33	25	58	40	24	64
DA	-	-	-	5	1	6	5	1	7
Experts	-	-	-	3	1	4	5	1	6
Others	-	-	-	3	-	3	8	2	10
Total	20	18	38	44	27	71	58	28	86

FREG: Farmers Research and Extension Group; DA: Development Agent; others: invited guests; M: Male; F: Female; Farmers term includes youth and women.

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.

Table 2: Chemical composition and total digestible nutrients of the concentrate ingredients.

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:

$$ADW=\frac{(FBW-IBW)}{D}, \text{TWG} = \text{FBW}-\text{IBW}$$

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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Table 3: Growth performance of rams at different location.

	Experimental site		
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	96.6±2.8	100.3±2.81

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

fed faba bean haulms as basal diet and supplemented with different proportion of barley and linseed meal [12]. Study conducted at Debrezeit Agricultural Research Center (Getahun, [13]) indicated that Black Head Ogaden rams which were fed teff straw ad libtum and 450g concentrate per head per day registered lower average daily weight gain of 65.2g/day. Rams reared in Raya–Alemata district which were fed air dried Ziziphus leaf had also gained lower average weight of 90.5g/head/day [14].

The current rams fattening technology demonstration results indicated that Arsi-Bale rams reached export market weight demanded at a range (between 25-30kg) in seventy five feeding days. This finding is also in accordance with the report of Aman, et al., [10]. Other studies report that Afar lambs reached the minimum live weight (25kg) in demand for export market at about 70days of feeding while Black Head Ogaden rams that took 112days [13].

Financial analysis

The result of the financial analysis of concentrate based Arsi-Bale sheep fattening at on-farm level is given in Table 4. The youth and women invested about 1573.73 Birr for one ram in seventy five fattening days. The average total gross output for a ram was about 309.92 ETB during the fattening period. Financial results generally indicated that youth and women benefited from the fattening exercise. This study was similar to Aman, et al., [10], where the Arsi-Bale rams, which received cotton seed cake, gave positive gross margin. Numerically, youth in Dodola district got better gross margin per ram than the youth and women groups in kofele district. This difference associate due to average rams purchase price has a little difference. Moreover, the Dodola group sold their ram fairly better price. Overall, the financial analysis indicates that the sheep fattening has positive gross margin.

Youth and women opinion on the technology

Youth and women shared their opinion on the ration basing their own observation on differences between their traditional fattening experience and current demonstration. The animals were fattened in short period of time. They appreciated the processes involved animal selection criteria, feeding management, dietary ration preparation and the house construction. The fattening technology demonstrated perceived as easily manageable and profitable. They also considered the fattening work as an income source and job creation as the sheep can be fattened in short period of time.

Table 4: Economic return at different location.

	Experimental site		
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

ETB: Ethiopian Birr; Keta-Bereda kebele located at Dodola while Wabe-Gefersa kebele at Kofele district

Conclusion and recommendation

A total of seventy Arsi-Bale sheep were kept on feeding for 75days 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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