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Full Length Research Paper

Impact of washera sheep on household income and livelihood of washera sheep producers in southern Gonder districts (Farta and Lai-gaint)

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The study was conducted at Farta and Lai-gaint districts where there is huge sheep production. However, this production was not able to give expected benefits. To alleviate this problem Andasa Livestock Research Center had conducted developmental research. The research was adapting and scalling up of washera breed sheep with other supplement research activities. Potential sheep producers (N=118 fatter) were selected with the collaboration of the woreda and community leaders. This developmental research was conducting since 1999E.C. Finally, social economical impact study was conducted using baseline and project evaluating data. Majority of the participants (86.27%) were continuing with washera sheep production. They were able to getting considerable benefits from the sector. Some of the benefits are number of washera breed sheep was increased (null to 578±4.70 sheep/household) and Farta sheep breed become decreased (12.49±10.33 to 1.76 ± 2.9 sheep/HH). The great proportion of income of the participants of the project comes from livestock sector (4141.53±3995.45 birr/year) as compared to other sources of income. From livestock sector, sheep subsector takes the greater portion (1679.25 ± 2744.52 birr/ year) in source of income. From the three breeds, pure washera breed sheep gave larger contribution (1571.76±2625.58 birr/year). Sheep production in the study districts was economical by 1007.4 birr/year with 2.07 marginal revenue. Majority of the respondents were using the money to cover their household regular costs (salt, oil, coffee, fuel...) (77.8%), cover school cost (44.4%) and purchase inputs for crop production (35.6%). Therefore, to make the sector more economical in large scale washera breed sheep should be scaled up in to similar farming system and different research support developmental work should be done in the study districts. Besides, introducing improved highland forage, adequate veterinary service and expert's follow up are very important.

Key words: socio-economical impact, washera breed, source of income

INTRODUCTION

Small ruminant production is the predominant livestock practices of the high land part of Ethiopia. Sheep and goats production are among the major economically important livestock in Ethiopia (Adane Hirpa and Girma Abebe, 2008). The sheep enterprise in the Ethiopian highland crop and livestock system is the most important form of investment and cash income and provides social security in bad crop years (Getachew, 1988). However, like all other livestock species, sheep in Ethiopia are kept under traditional extensive systems with no or minimal inputs and

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Table1. The average sheep holding before and after the project

Breed type	1999E.C. Mean	Std.	2003 E.C. Mean	Std.
Washera	0.00	0.00	5.78	4.70
Cross	0.00	0.00	1.29	2.26
Farta	12.49	10.33	1.76	2.90

According to the current survey study, the average holding of washera moved from null to 5.78±4.70 sheep/household and Farta from 12.49±10.33 to 1.76 ± 2.9 sheep. This implies that, the trend of keeping sheep in terms of breed type was shifting from Farta to washera breed types.

improved technologies, which results in characteristically low productivity. They are virtually kept as scavengers, particularly in the mixed crop–livestock systems (Solomon et al., 2010). As a result, the country is not able to get expected amount of benefit from sheep production due to varies reasons. Among the reasons, the major are low potential of the breed, disease and inadequate animal feed in quality and quantity. On the other hand the demand for live animals (especially sheep) is increasing due to the growing urban population, while farm areas are shrinking considerably as a result of an increase in the rural population (M. Siegmund-Schultze et.al, 2009).

In the region particularly in the study districts, sheep production is also one of the most important livestock sub-sector but its production and productivity is also very low. As the result, sheep producers are not able to get expected benefit from the sector. To improve production and productivity of the sector, Andasa Livestock Research Center had conducting a kind of developmental research in South Gonder zone (Lai-Gaint and Farta districts). The technologies that introduced for this developmental research were superior breed (Washera breed sheep), improved forage types and health management practices. Washera sheep is one of the most productive breeds in Ethiopia and it is found in the mixed crop-livestock production systems of the western highlands of Amhara region (Mengistie et al, 2009), particularly in Gojjam areas. In many cases Gojjam areas have great similarities with the study areas that are Lai-Gaint and Farta districts.

Much of current small ruminant research is dominated by descriptions of production systems and traits (Sumberg and Cassaday, 1986). Little economic analysis of the frequently reported constraints has been done. The economic role of goats and sheep has, however, been described and some economic analysis of technological innovations and production prospects has been conducted (Gryseels et al, 1986). Therefore, this research was initiated to assess socio economic impacts that brought by the intervention of ALRC.

RESEARCH METHODOLOGY

To conduct this socio economical impact study, both baseline and impact assessment data were collected. For the former study, 72 interviewees were sampled randomly from the total participants (108 farmers) in the project areas. To collect impact assessment data from the participants, two stages stratify sampling technique were employed to select representative respondents. First, the participants were grouped in to those who are continuing with the project and those who are not continuing with the project. Second, the continuing group was further stratified in to those who were using 10 ewes with one ram and those who were using only one washera ram with their local ewes. In both grouping stages, proportional random sampling was used. A total of 51 participants were selected for interviewing. To collect first hand data, semi-structured questionnaire was developed and interviewed.

With and with-out the project economic analysis technique was used to assess the impact of ALRC intervention in the districts. To analysis the profitability of sheep production in the study districts, partial budget analysis was used. To predict its profitability, sensitivity analysis was also employed. To organized and analyzed the data, SPSS (version 16) software was used and data were presented using frequency table, graph etc…

RESULTS AND DISCUSSIONS

Change in sheep breed types and flock size

As the table 1 show, participants of the project were rearing sheep on both before and after the intervention of ALRC. However, the size and types of sheep breed holding were varied. Before the intervention of ALRC, all the participants were keeping Farta sheep breed. The average sheep holding capacity per household level was also 12.49±10.33 sheep which is higher than the average size of Fogera district, 10.9 sheep/HH (Solomon Gizaw et al. 2010) whereas, now a day the participants were keeping washera, Cross (washera cross with Farta) and pure Farta

Table 2. Means and their average income

	1999			2003		
Income sources	**Mean**	**Std.**	**% from the total mean**	**Mean**	**Std.**	**% from the total mean**
Cereals	1410.41	1903.59	34.12	797.08	1294.39	8.24
Livestock	1554.00	1984.53	37.60	4141.53	3995.45	42.81
Horticulture	222.42	616.83	5.40	661.86	1290.63	6.84
Trees	454.28	840.96	10.99	2122.55	7395.87	21.94
Non-farm activities	492.55	1046.33	11.92	1,950.43	7977.73	20.16

As the above table indicates, the average total income obtained from livestock before intervention of ALRC was 1554.00±1984.53 birr/year. From cereals was 1410.41±1903.59 birr/year. On the other hand, the average total becomes increase to 4141.53±3995.45 birr/year where as average total income become decreased to 797.08±1294.39birr/year. It implies that, participants shift from cereal production to livestock production, particularly productive sheep production (i.e. washera breed), and off-farm and non-farm activities. The objective of the intervention of ALRC was increase the household income of the participants through sheep production because the areas were less crop productive areas.

Table3. Average income increment from different livestock types

	1999E.C. Mean/birr/	2003E.C. Mean/birr/	Difference(D)= (final –initial)	Index of income increment (I)	Actual income increment(I*D)
cows	227.08	724.51	497.43	0.6866	341.54
ox selling	381.94	894.12	512.18	0.5728	293.38
heifer selling	50.00	68.63	18.63	0.2715	5.06
bull selling	37.50	176.47	138.97	0.7875	109.44
calf selling	14.44	94.12	79.68	0.8466	67.46
sheep	727.8036	1708.67	980.87	0.5741	563.12
goat	9.5833	26.47	16.89	0.6381	10.78
Bee colony	15.2113	0.00	-15.21		
livestock byproduct	95.5286	227.08	131.55	0.5793	76.21

Note: Index of income increment computed by deducting income in 1999 from income in 2003 and the difference divided by income in 2003

breeds. They are keeping either solely one breed type or one more breed or all breed types.

Impact on source of income

The comparison of with and with-out of ALRC intervension interms of income across different measns of income are presented at the above table 2. According to base line and impact survey results, livestock had took great proporrtion for source of income at both before and after ALRC intervention, 37.60% and 42.81% respectively. Before ALRC intrven to the areas, the second most important source of income was creel(34.12%) and followed by non-farm activities 11.92%. The contribution of trees(10.99%) and horticulture(5.40%) to house hold income were less. where as, after ALRC intervention the second most important source of income was trees(21.94%) and followed by non-farm activities. The contribution of cereals(8.24%) become very lows as compared to other means.

Livestock types and their economic role

Though the value of all types of livestock were increasing, their contribution in the household income has varied based on economical important of livestock type in the area.

The vast majority of the rural population's livelihood is partly based on livestock production (Solomon et al., 2010). The livelihood of Farta and Lai-gaint districts farmers also relay partly on livestock production. As table 3 indicates that recognizable amount of money comes from livestock sector. The efforts of ALRC on this sector particularly on sheep production bring considerable impact in source income. As it is observed from the table, the amount of income from sheep production (563.12 ETB) was much higher than income from other types of animal like income from selling cows (341.54 ETB), oxen (293.38ETB) and bull selling (109.44 ETB). Therefore,

Table4. Forage development before and after ALRC intervention

Forage develop	Before		After	
	N	Percentage	N	Percentage
Yes	6	11.76%	38	74.5%
No	45	88.24%	13	25.5%
Total	51	100%	51	100%

Regarding to forage types (Oat/vetch mixture, oat, vetch and tree Lucerne) in the study districts, there was no difference before and after intervention. However, land allocation for improved forage development has shown considerable difference before and after ALRC intervention. As table 5 shows, the average land allocation for improved forage development per household before ALRC intervention was 0.01±0.03ha, whereas after ALRC intervention its average land size that allocated for improved forage development were growing to 0.26±0.25ha/HH.

Table5. Types of improved forage grow up and average allocation size before and ALRC intervention

Type of forage	Before			After		
	N	% from 6	Mean size allocation/ha(SD)	N	% from 38	Total size allocation/ha(SD)
Oat/vetch mixture	1	16.67%	0.01(0.03)	3	4.4%	0.26(0.25)
Oat	0	0%		36	94.74%	
Vetch	1	16.67%		24	63.16%	
Tree Lucerne	4	66.67%		5	13.16%	

income of HH from sheep production increased due to washera breed that introduced in to the locality.

Pattern of improved forage development

The main feed resource for sheep was native pasture. Grazing took place on fallow land, communal grazing areas, and on stubble, depending on the season(Agyemang K. et al, 1985). However, participants in sheep production of the project could develop improved forage. The development of such kind of improved forage was varied before and after ALRC intervention. According to survey result, from the total interviewed participants (n=51), 11.76% of them had developed improved forage before ALRC intervention. However, after ALRC intervention improved forage development by the participants has become increased in to 74.5% (Table 4). It shows that one of ALRC intervention comedy i.e. improved forage development has its own contribution for grows up of this proportion among sheep producers.

Economic of sheep production

The economics discipline has a broad mandate. Farmers' goals and objectives - what the farmer attempts to maximize or minimize in his production activities - have first to be identified (Wilson R T and Azeb M, 1989.). So that, the cost (to be minimized) and benefits (to be maximized) of sheep production in one year are the most important parameters to measure economical benefit of the production. From the total years of the project (2000 to 2003 E.C.), it is taken 2003 E.C. production year for this economic analysis of the sheep production in the study districts. Therefore, it is consider all the costs that incurred to sheep production and total earn from the production in the year of 2003 production. All the possible parameters are indicated in table 6.

As indicated in table 6, the partial budget analysis indicated that sheep production in the study areas was economical with gross profit of 1007.4 birr/year. The marginal revenue indicated that 1 birr investment on inputs for sheep production provides gross profit of 2.07 birr. This implies that sheep production can give considerable profit to producers if they are able to invest more on the sector.

Economical value of the sheep breeds

In many case different breeds may not have equal economic value in particular areas. It is due to their biological nature of the breed, social prefer ability and environmental adaptability of the breeds.

The overall benefits obtained from washera sheep production

The total average sheep obtained, consumed, died, sold and total earn from initially distributed sheep from ALRC

Table 6. Partial budget analysis of sheep production

Items	Amount in ETB
1. Benefits from sheep production	
Live animal selling	
• Washera	1571.76
• Washera cross with Farta	173.37
• Farta	114.31
Byproducts	
• Wool	0.00
• Sheep skin selling	87.27
A. Total gross benefit	**1946.71**
2. input cost	
• Health cost	100.33
• Forage development input (seed, fertilizer, chemical....)	263.14
• Hay purchasing	314.51
• Concentrated feed purchasing	169.72
• Conventional feed purchasing	70.00
• transportation to the market	21.61
B. Total input cost	**939.31**
Gross Profit (A-B)	1007.4
Marginal Revenue(A/B)	2.07
4. Sensitivity Analysis (10%)	
C. Total gross benefit from sheep production	1752.05
D. Total cost of sheep production	1033.24
• Gross profit(C-D)	718.81
• Marginal revenue(C/D)	1.44

It is difficult to predict future price of input and output of the production in the study areas. However, as indicated above sensitivity analysis tool is very important. From the equation result, if there will be 10% price increment for input costs and 10% decrease for outputs prices. The result of sensitivity analysis indicated that sheep production (mainly washera breed) will be economical with gross profit of 718.81ETB. The marginal revenue indicated that 1 ETB investment on inputs for sheep production provides gross profit of 1.44 ETB. It shows that, this production is till economical with 10% of increment of input price and with the decreasing output price of the production.

Table7. Average marketing prices of sheep types across breeds

Sheep types	Breed types					
	Pure washera		Cross		Farta	
	Mean(ETB)	Std	Mean(ETB)	Std	Mean(ETB)	Std
Ewe	485.98	122.88	409.17	94.39	360.80	100.63
Ram	673.18	243.87	605.06	218.29	543.21	157.26
Ewe lamb	365.56	91.93	356.02	98.76	293.50	80.36
Ram lamb	380.07	116.47	364.66	93.79	303.67	75.78

There are different parameters that can be used to measure economical value of the breads. For this research, marketing price, marketing age and marketing price at marketing age of the breeds were used to evaluate economical value of the three breads. The average marketing price of sheep types across breed types are illustrated at table 7. According of the survey result, all sheep types (ewe, ram, ewe lamb and ram lamb) of pure washera breed have large marketing price than the two breeds (cross and Farta). The average marketing price of washera, cross and Farta ewes were 485.98±122.88, 409.17±94.39 and 360.80±100.63 ETB, respectively. Even at ewe lamb
level of sheep type, marketing price of washera ewe lamb (365.56±91.93 ETB) was higher that cross (356.02±98.76 ETB) and Farta (293.50±80.36 ETB). For more see the table 7. This result shows that pure washera breed has greater economical value as compared to the two breed in term to marketing price across all sheep types.

are illustrated at table 9. Within four years, the average total number of pure washera sheep that participants obtained from initially distributed ewes/ram was 16.45±10.54 sheep/HH and cross with Farta was 2.73±4.66 sheep/HH. Participants have used these sheep for different purposes. According to the survey result, from the total average pure washera sheep obtained (16.45 sheep), 3.10±3.04 sheep were used for consumption,

Table 8. Average marketing age and prices across breed types

Breed types	Marketing age in month		Marketing price	
	Mean	Std	Mean	Std
Washera	4.74	1.18	402.32	116.01
Cross	5.53	1.24	374.42	130.07
Farta	8.54	3.08	282.15	100.83

Besides, pure washera sheep can also be reached to be marketed with in short period of time than cross and Farta breeds in the study districts. As the table 8 indicates, the market age of washera, cross and Farta breeds in the study districts were 4.74±1.18 months, 5.53±1.24 months and 8.54±3.08 months. It implies that washera can be sold after four months where as Farta breed take longer time to be sold. With this marketing age, washera breed sheep (402.32±116.01 ETB) can earn more money than cross (374.42±130.07 ETB) and Farta breeds (282.15±100.83 ETB). This result implies that washera sheep have great economical value than the two breed based on the aforementioned parameters. Therefore, sheep producers in the study districts can get greater values from keeping washera breed as compared to economical values from the others two breeds.

Table 9. Number of pure washera/cross breed sheep obtained from the initial washera ewes/ram provision within four years (2000-2003E.C.)

Breed types	Obtained	Consumed	Died	Sold	Total earn(ETB)
	Mean(SD)	Mean(SD)	Mean(SD)	Mean(SD)	Mean(SD)
Washera	16.45(10.54)	3.10(3.04)	4.37(5.24)	7.06(6.86)	2357.40(2292.67)
Washera cross with Fart	2.73(4.66)	0.78(1.83)	0.47(1.21)	0.92(1.98)	310.59(698.49)

As the above table indicates, sheep producers have obtained 2357.40±2292.67 ETB from selling of washera breed sheep for the last four year. The average total earn from selling washera cross was 310.59±698.49 birr/four year. All these implied that sheep producers could get considerable economical benefit from the sector.

Table 10. Purpose of sheep selling across the breed(2000-2003)

Purpose	Breeds			
	Washera		Cross	
	N	%	N	%
Reduce flock size	4	8.9	1	6.7
Cover school cost	20	44.4	3	20.0
Cover traditional ceremony cost	8	17.8	2	13.3
Purchase inputs for crop production	16	35.6	6	40.0
Replacement and further expansion of sheep production	7	15.6	5	33.3
Cover household regular costs (salt, oil, coffee, fuel...)	35	77.8	8	53.3
When they are need by the community as improved breed	2	4.4	2	13.3
Pay credit	8	17.8	4	26.7
Buy flour mill	2	4.4	1	6.7
House construction	6	13.3	1	6.7
Purchase other animals other than sheep	3	6.7	3	20.0
Total	**111**	**246.7**	**36**	**240.0**

Like the reason of pure washera sheep selling, participant farmers had also sold their cross breed sheep to cover household regular costs (salt, oil, coffee, fuel...) (24.2%). There were also other reasons that the participants mentioned for selling their cross breed sheep. Some of them were purchasing inputs for crop production (18.2%), replacement and further expansion (15.2%) and paying credit loan (12.1%). There were also few respondents who sold their cross breed sheep to cover the cost of school (9.1%), house construction (3%) and purchasing of other animals (3%). Therefore, it implies that farmers who participate in washera breed sheep keeping are more benefited by keeping the breed.

7.06±6.86 were sold and only 4.37±5.24 sheep were died. From the total average cross breed (2.73 sheep) obtained, participants used for consumption (0.78±1.83) and sold (0.92±1.98). Some of them were died (0.47±1.98 sheep).

Participants sold their sheep (both pure washera and cross with Farta) for different purposes. As table 10 shows, majority of the participants (31.5%) sold their pure washera sheep to cover household regular costs (salt, oil, coffee,

fuel...). Considerable proportion of producers had sold their pure washera breed sheep to cover their children school and related costs (18.0%) and to purchase inputs for their crop production (14.4%). A few respondents had also sold their pure washera sheep to pay credit loan (7.2%), cover traditional ceremony cost (7.2%), replacement and further expansion sheep production (6.3%), house construction (5.4%). There were also sheep producers who sold their pure washera breed sheep to purchase other animals (2.7%) and flour mill (1.8%).

CONCLUSIONS AND RECOMMENDATIONS

As survey result revealed that adapting and up scaling of washera breed sheep in Farta and Lai-gaint districts have brought multi dimension impact in their livelihood and sheep production system besides the breed adapting the environment. In the study districts the number of pure washera breed become increased and on the other hand number of pure Farta breed become decreased. Besides, improved forage development likes oat/vetch mixture, sole oat and vetch forage cropping system and tree Lucerne were expanding among sheep producers farm land.

Regarding to the breeds, at any ages of the sheep, washera breed had superior marketing price and they can also be marketed at shorter aged. Participants had used the money that come from selling pure Washera and cross breed sheep. They used the money for cover their HH regular costs, school costs and to purchase inputs for crop production. Sheep production using washera breed sheep in the study area was profitable by 1007.4 ETB with 2.07 revenues.

Therefore, efforts should be made by local government and non-government organization to scale up this little success story to the reset of similar farming system. Furthermore, different research supported developmental extension works should be done to make the sector more economical beneficiary to sheep producers in Amhara Region.

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