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Community-based improvement scheme for washera sheep: Lessons from Yilmanadensa and Quarit Districts in Westren Amhara Region, Ethiopia

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This paper evaluates performance of community-based improvement scheme for Washera sheep in Yilmanadensa and Quarit districts. Primary data were collected from 63 farmers and analyzed using descriptive statistical techniques. Since the inception of the scheme (ram shortage) was solved, the number of lamb born per ewe was increased. However, smallholder farmers did not provide proper management for common ram. This is due to the adverse effect of existing social taboo in the study districts. Small holder farmers were given higher priority for body conformation to select both rams and ewes. In contrast, they were given less focus for the inheritance (prolificacy and mothering ability) of animal that selects for breeding purpose. Farmers practice of selecting breeding ewes and rams might result loss of prolific trait of Washera sheep. Furthermore, farmers' practice of inbreeding coping might result to loss of best performing breeding sheep. About 21, 35, and 43% of keepers adopted urea treatment of straw, improved forage grass production, and administration of anthelmint in recommended amount and frequency, respectively. The primary source of feed in the community was communal grazing. The main crop residue which is the second source of feed was teff straw. The scheme should understand farmers' practice of sheep production, introduce common ram with co-payment strategies, distinguish the feed which is easily adopted by farmers for sheep and emphasize awareness creation on disease prevention strategies and inbreeding coping mechanism.

Key words: Community-based approach, common ram, washera sheep, yilmanadensa, quarit.

INTRODUCTION

Sheep production significantly contributes towards the livelihood of the farm households in terms of financial income, food and non-food products, and socioeconomic and cultural functions as well. In the mixed crop-livestock production systems of central highland of Ethiopia, sheep represents less than 10% of the farm capital in livestock, yet contributes as much as 22 to 63% to the net cash income and 19 to 23% to the food subsistence value derived from livestock production (Zelalem and Fletcher, 1993). Despite the importance of sheep both at household and national levels of the economy, production and productivity of the sheep sub-sector has been quite low (Gizaw et al., 2010; Mengesha and Tsega, 2012) for the reason including inadequate feed and nutrition,

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Table 1. Socio-economic characteristics of respondents.

Variable	Mean	Std. deviation
Age (year)	43.22	11.59
Family size (no)	5.71	1.92
Land holding (ha)	1.08	0.38
Allocated for crop	0.97	0.33
Allocated for grazing	0.17	0.15

widespread diseases and poor health, poor breeding practice, inadequate livestock development policies with respect to extension, marketing, credit and poor infrastructure (EEA, 2005).

Government of Ethiopia (GoE) and Non-Governmental Organizations (NGO's) have been working on sheep production performance improvement via indigenous breed selection and cross breeding with the exotic breeds. Andassa Livestock Research Center (ALRC) had implemented a project "Community-Based Improvement Scheme (program) for Washera Sheep" in order to improve sheep performance through introducing different technologies and management practices at Yilmanadensa and Quarit districts. The objective of this study is to evaluate performance of the scheme in these districts and to draw lessons from it for further similar work.

RESEARCH METHODS

The study was conducted in Yilmanadensa and Quarit districts of Amhara region in which "Community-based Improvement Scheme (program) for Washera Sheep" had been carried out from 2004 to 2010. During the project time different sheep improvement technologies and management practices like improved breeding methods (selection, controlled breeding, culling, etc), improved forage seeds and feeding methods, and improved animal health management had been introduced.

Primary data were collected from farmers who are participants of the scheme. Sampling technique employed was both probability and non-probability sampling methods. Study districts were selected using purposive sampling methods in which the scheme was implemented. Respondents were drawn using random sampling methods. A total of 63 household heads, that is, 40% of participant farmers were interviewed using semi-structured questionnaire during the 2010 cropping season. Qualitative analysis, descriptive analysis and chi-square test (χ^2) were employed to analyze the data using SPSS (version16).

RESULTS AND DISCUSSION

Socio-economic characteristics of respondents

Characteristics of the sample households are summarized in Table 1. The mean age of the household heads was 43 years with an average size of 5.71 people. Land holding of households, on average, was 1.08 ha. Only 45% of respondents allocate small portion of land (15.74%) for grazing purpose and the larger portion (84.26%) were allocated for crop production.

Sheep flock size and categories

The average flock size obtained during the study, 4.19 sheep per household, is twofold lower than the preliminary survey report of Chipman (2003) and the performance study report of Mengistie et al. (2010). This implies that, sheep flock size was drastically declined in a short period of time in the study districts. The reason for the decline could be continuously shrinking of the communal grazing land due to farming and gully formation (Mengistie et al., 2010) which in turn forces farmers to sale and reduce their flock size. The other reason could be disease out breaks occurred during the study year (Table 2).

Sheep production system and management

The existing production system of the study areas is mixed crop-livestock farming system in which crop and livestock productions are integrated on the same farm (Mengistie et al., 2010). Furthermore, there are uncontrolled and year-round sheep breeding.

Common ram

In the study districts, lack of matured and selected breeding rams was a serious problem. Farmers had no practice of keeping breeding rams instead they sell ram lambs before breeding age (Asresu et al., 2013). The first reason is that, farmer's need to sell their ram lambs at weaning just before losing body condition because of weaning shock. The other thing is because, the numbers of ewes in a flock are small and the benefit gained from a ram is negligible for the farmer as compared to the cost of keeping a ram. In the study districts, if a farmer has a ram, his ram should serve the community for free and they cannot exclude his ram from giving service for others. Because it is socially a taboo to exclude and to cost a breeding ram. This reflects ram exhibit the

Table 2. Average sheep flock size in Yilmanadensa and Quarit districts.

Flock categories	Yilmanadensa	*Quarit*	Overall
	Mean (SD)	Mean (SD)	Mean (SD)
Flock size	4.20(2.07)	4.00(2.26)	4.19(2.04)
Number of lambs (< 6 months),	1.03(0.87)	1.00(1.17)	1.02(1.00)
Number of ewe lambs (6 - 12 months)	0.10(0.41)	0.48(0.85)	0.27(0.66)
Number of ram lambs (6 - 12 months)	0.45(1.02)	0.30(0.56)	0.38(0.84)
Number of mature rams	0.28(0.46)	0.13(0.34)	0.21(0.41)
Number of mature ewes	2.34(1.11)	1.74(1.32)	2.08(1.23)
Castrate ram	0.14(0.44)	0.26(0.54)	0.19(0.49)

Table 3. Farmer's used selection criterion for breeding rams and ewes.

Selection criterion	N	Ranks			χ^2	Sig.
		1st	2nd	3rd		
Ram						
Conformation	61	60.7	36.1	3.3	30.33	***
Colour	61	37.7	45.9	16.4	8.49	*
Heredity	59	1.7	18.6	79.7	59.53	***
Ewe						
Conformation	61	68.9	19.7	11.5	35.25	***
Colour	60	13.3	51.7	35	13.30	***
Heredity	58	19	29.3	51.7	9.76	***

***1, **5 and *10% level of significance.

characteristics of public goods that is nontrivial and nonexclusive (Pindyck and Rudinfeld, 1996). Since small holder farmers can enjoy nonexclusive ram benefits without paying for it, they act as free rider. The presence of free rider creates shortage of matured and selected rams in the community. This was the inception of the project to use common ram.

The scheme distributed selected rams into group of farmers within a common grazing land taking sheep population into account (Table 3). As a result, the probability of ewes taking long time to come in to pregnancy and being out of breeding was reduced. In addition, since the ram was selected considering consumers preference of animal attributes in the local market, small holder farmers optimize their benefit from sheep production.

There was a consensus between groups of farmers to take care of the ram in rotation in a monthly base. During his turn, a farmer should offer the ram with proper care, concentrate feed and protection for predators and theft which is evaluated as the body condition of the ram during that period of time. Based on the evaluation, some of the farmers managed the common ram as their own reflected with better body condition while others were negligent about the ram. With the existing social taboo, management or not can access communal ram. This was however, smallholder farmer whether they have good one of the challenges of the scheme faced during implementation.

Local knowledge and practice

Almost all of the respondents (98.4%) practice selection of breeding ewes and rams based on body conformation, colour, and heredity (prolificacy and mothering ability). Analogous selection criterions were used for both ewe and ram which is ranked as body conformation, colour and heredity (such as mothering ability and prolificacy). Among selection criteria set by farmers, least priority was given for heredity. As a result, prolific traits of Washera sheep tend to disappear.

In the study districts, smallholder farmers have practice of sheep culling; removing unproductive sheep from the flock which is an improved flock management system, because of old age, low birth weight of lambs, skin colour (black), infertility, and high morbidity. Farmers have also a tradition of changing their flock whenever they think the productivity of the flock is decreasing.

This implies that, farmers have carried out restocking of flock (ex-post in breeding coping mechanisms) although the scheme promoted ram exchanging mechanism (ex-ante inbreeding coping mechanisms). In the study areas, it is difficult to find best performing sheep in the market

Table 4. Feed sources and crop residues available for sheep in the study areas.

Ranks	Feed sources (%)			χ^2	Significant
	Communal grazing	Crop residues	Private grazing		
First	65.5	15.5	19.0	27.138	***
Second	20.8	50.9	28.3	7.849	**
Third	14.3	38.3	46.4	4.786	*
	Crop residues (%)				
	Teff	Maize	Chickpea		
First	81.0	17.5	1.6	66.667	***
Second	15.3	83.1	1.7	67.254	***
Third	9.1	4.5	86.4	27.909	****

***1, **5, and *10% level of significance.

due to asymmetric information. This is an indication that re-establishing best performing flock is not easy. As a result farmers might lose their better breeding sheep during restocking process and/or they can restock with best performing sheep in the long run through try and error.

Feeds and feeding of sheep

Feed sources

The common sources of feed for sheep in the study districts were communal grazing, crop residues, and private grazing. As Mengistie et al. (2010) stated, this is similar with other areas of the country. Nowadays, the available feed sources of sheep become inadequate in terms of quantity and quality because communal grazing lands which are predominant feed sources for sheep diminished due to over grazing, land slide and land use change. The second most important feed sources for sheep was crop by products (crop residue and stubble). In other words, crop by products were the first privately owned feed sources for sheep. Table 4 indicated the main crop residues available in the study districts were teff, maize and chickpea residues, respectively. The first two crop residues have poor nutritive value and they are less palatable and digestible. The scheme promoted urea treatment as a means to improve the shortcoming of dominant crop residues in the study areas.

Improved forage and urea treatment

Annual (Oat-Vetch) and perennial (Rhodes, Alfalfa and Sesbania) improved forage species and urea treatment were demonstrated in the study districts about 35% of the respondents allocated land for Oat-Vetch at their farm and for Rhodes at their backyard. However, there was a limitation in harvesting and saving seed for the next production season. At Quarit district, significant number of respondents (68.8%) developed improved forage trees at the backyard around the fence (such as Sesbania). Small number of the respondents (21%) adopted urea treatment of crop residues to improve its nutritive value, palatability and digestibility.

Feeding of sheep

Given feed shortage, farmers provided less priority for sheep rather for large ruminants especially for ploughing oxen and milking cows. Feeding of sheep by mixing different crop residues (e.g., cereal crop residue with legume) thought to have benefits to improve the feed. However, farmer's feed one type of crop residue one time and another at another time for all livestock species. This implies farmers have poor crop residues management.

Sheep rarely grazed on private grazing land especially during summer season. Moreover, farmers have limited practice to feed forage trees (like Sesbania) to sheep. This reveals lack of appropriate feeding of sheep outweighed feed shortage problem in the study districts. As a result, sheep highly suspended on overgrazed, degraded, and minimizing communal grazing land, and crop stubble.

Sheep health

Disease prevention and control

ESGPIP (2009) reported that, morbidity rates in indigenous sheep breeds can be 70 to 90% with mortality ranging from 5 to 10%. Morbidity highly influence productivity, in turn, like mortality, reduces commercial off take rate. In order to reduce morbidity and mortality ofsheep, community-based sheep improvement scheme included sheep health as an important counter part of the scheme. The scheme brought economically feasible

Table 5. Smallholder farmers' situation on improved forage and urea treatment utilization.

Variable	N	Adopter	Non- adopter	$\chi 2$	Significant
Forage tree					
Yilmanadenesa	29	48.3	51.7	.034	NS
Quarit	32	68.8	31.2	4.5	**
Overall	61	59.0	41.0	1.984	NS
Forage grass					
Yilmanadenesa	29	31.0	69.0	4.172	**
Quarit	31	38.7	61.3	1.581	NS
Overall	60	35.0	65.0	5.4	**
Urea treatment					
Yilmanadenesa	29	27.6	72.4	5.828	**
Quarit	33	15.2	84.8	16.03	***
Overall	62	21.0	79.0	20.903	***

N = number of respondents, ***1, **5, and *10% level of significance, NS = non-significant.

Table 6. Massive anthelmint administration in a year in the study districts.

District	Minimum	Maximum	Mean	Sd. dev.
Yilmandensa	1	10	3.68	1.99
Quarit	1	14	4.87	3.40
Overall	1	14	4.29	2.83

disease control (vaccination against black leg, anthrax, and ovine pasteurellosis) and preventive strategy (in addition to housing and feeding, strategic de-worming against internal parasite and spraying against external parasite).

Disease prevention strategy

Although the scheme brought disease control and prevention strategies, this paper gives focus for disease prevention strategies. In the study districts, sheep vaccination (de-worming) are mostly performed by veterinarian (smallholder farmers), respectively. The scheme promoted massive anthelmint administration to be two times per year at before and after rainy season. However, some farmers administered anthelmint under and beyond the recommended level (Table 6). The average anthelmint administration was 4.29 times per year which exceeds the recommended level. This is because of farmer's perception, that is, administration of anthelmint improves body condition of sheep with no any change on feed supply.

Table 7 reveals respondents anthelmint administration season. Majority of respondents (68.5%) at Yilmanadenesa district administered anthelmint without considering seasons which are promoted by the scheme. While at Quarit, more than half of respondents (52.2%) considered this season but with high frequency of administration (Table 5).

Anthelmint drugs administration

The dose and source of anthelmint also affects the efficiency of strategies used for disease prevention in the study districts. As Table 8 indicated, majority of respondents (84.6%) at Yilmandensa district administered anthelmint to sheep without consulting veterinarian. This was due to lack of access to animal health clinic station hence, 24.1% were forced to purchase anthelmint from open market. Most of respondents (66.7%) at Quarit district have better veterinarian consulting practice than Yilmanadensa district thus farmers who bought anthelmint from open market were relatively low (11.5%).

Training and farmers field day

The scheme provided training for smallholder farmers about sheep production and management, breeding, and forage development. In addition, the scheme prepared farmers field day to demonstrate forage that are adaptive and productive in the respective districts. In fact, the training session and field day was less frequent, on

Table 7. Respondent's anthelmint administration season.

Season	Study districts				Overall	
	Yilmandensa		Quarit			
	N	%	N	%	N	%
Before and after rainy season	6	31.6	12	52.2	18	42.9
Only before rain starts	12	63.2	5	21.7	17	40.5
Only after rain stops	1	5.3	4	17.4	5	11.9
Neither of the two season	-	-	2	8.7	2	4.8
$\chi 2$		9.579		9.870		19.143
Significant		***		***		***

N = number of respondents, % = percentage, ***1, **5, and *10% level of significance.

Table 8. Source of anthelmint and its administration procedures.

Variable	Study districts				Overall	
	Yilmandensa		Quarit			
	N	%	N	%	N	%
Anthelmint administration procedure						
By consulting veterinarian	4	15.4	20	66.7	24	42.9
Without consulting veterinarian	22	84.6	10	33.3	32	57.1
$\chi 2$		12.462		3.333		1.143
Significant		***		*		NS
Market place for anthelmint drugs						
Open market	7	24.1	3	11.5	10	18.2
Drug supplier (private)	9	31.0	-	-	9	16.4
Veterinary clinic (public)	10	34.5	20	76.9	30	54.5
All sources	3	10. 3	3	11.5	6	10.9
$\chi 2$		3.999		22.231		26.236
Significant		NS		***		***

N = number of respondents, % = percentage, ***1%, **5%, and *10% level of significance, NS = non-significant.

average 2.42 and 1.72 times over the projects life span, respectively, given agricultural office of the study districts provide less focus for small ruminants extension services.

Conclusion

Community-based sheep improvement scheme was followed holistic approaches. During implementation period of the scheme, the shortage of matured and selected rams was entirely solved. However, some farmers were negligent about common ram management. The existing social taboo in the study districts regarding ram service has adverse effect on ram keeping. Farmers practice of selecting ewes and rams for breeding might result loss of prolific trait of Washera sheep. Furthermore, farmers' practice of coping inbreeding might result to loss of best performing breeding sheep. Most of farmers were feed crop residues that have poor nutritive value for sheep without improving using urea treatment. The other drawback was inefficient feeding of crop residues that are rich in nutritive value (e.g, chickpea straw). Frequency of administrating anthelmint, season in which anthelmint administered, supplier of anthelmint and lack of consulting veterinarian were the main hindering factor of disease prevention strategies in the study districts. The scheme was brought training to smallholder farmers once per two years over the project lifetime which seems inadequate to reverse these limitations.

RECOMMENDATION

Understanding of how the existing selection criteria set accordingly and why practiced them today would be important to improve and conserve Washera sheep. The scheme should introduce common ram with co-payment strategies. Regarding to feed, the scheme should

distinguish which one of feed options could be easily adopted by farmers. The scheme should emphasize awareness creation for effective and continuous disease prevention strategy and for almost costless inbreeding coping mechanism.

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