

Full Length Research Paper

Correlates of off-take with sheep market and breed conservation

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Abstract

This study aimed to examine the rate of commercial off-take and mortality of Washera sheep targeting its effect on emerging market and breed conservation. The main sheep disposal reasons were sale (66%) and death (24%). In the five years off-take data, gross commercial off-take rate of sheep was 39%, which is high relative to the national figure. While mortality rate of sheep (14.53%) is moderate as compared to the highland part of the country. Within the study districts, high gross commercial off-take rate and mortality rate was observed at Quarit district. The highest disposal via sale (40.87%) and death (63.41%) occur at the age of below one year. The result indicates commercial off-take rate can be further enhanced by reducing lamb mortality and culling un-productive old ewe. Value addition (flushing) of lambs is recommended to enhance smallholder farmers' income and to attract export markets. However, lamb selling has clear counter-balance effect on breed conservation and improvement. Therefore, breeders should design and implement breeding strategies compatible to contradicting features of market and breed conservation.

Keywords: Commercial Off-take Rate, mortality rate, Washera sheep

INTRODUCTION

In the study areas, the common agricultural production system is mixed crop-livestock production system. The majority of people of the study districts keep Washera sheep as an adjunct to other agricultural activities along with other livestock species. The sheep production system is traditional smallholder production system. Washera sheep, sheep breed which is found in the highlands of western Amhara region, has potential for commercial mutton production for the local as well as export market and relatively high reproductive and productive performances (Chipman, 2003; Solomon et al., 2008; Taye et al., 2009).

In the mixed crop-livestock production system, sheep

provide cash income, meat, manure, skin and coarse wool for the smallholder farmers (Tibbo 2006). Rural households are producers and consumers of agricultural products. Market is not the only reason for sheep production by smallholder farmers. Farmers mainly benefit from selling and slaughtering of sheep. However, it is difficult to find statistical data regarding the proportion and the characteristics of sheep disposed due to selling, slaughtering and mortality in the total flock size.

Off-take rate has an implication on the emerging export markets and breed conservation and improvement schemes. Huge sheep population is not enough to attract exporters and abattoirs but commercial off-take rates accompanied with animal attributes plays vital role (Negassa and Jabber, 2008). Understanding the important characteristics of sheep required by the market provides inputs to biological researchers in an attempt to

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improve the breed. Moreover, it is an input for local government to quantify smallholder farmers' incomes generate from sheep production that helps in the development of strategic plans.

On the other side, when mortality rate is significant (above socially acceptable level), smallholder farmers becomes uncertain to invest on sheep production. Hence, it hinders smallholder farmers' to exploit the emerging markets and to lift out of poverty. Sheep mortality clearly reduces the poor rural peoples' income. And also reduces the efficiency of the market, which is invisible in the market.

In general, estimating commercial off-take and mortality rate adjunct to animal attributes is important to attract emerging markets, to enhance farmers' income and to support the effort of breed improvement and conservation programs. Therefore, the objective of this study was to examine commercial off-take rate and mortality rate of Washera sheep in Yilmana Densa and Quarit districts.

METHODOLOGY

Data collection

The study was conducted at Yilmana Densa and Quarit districts, located in Western Amhara Region, Ethiopia. Data were collected by enumerators using prepared recording data sheet from 2005 to 2009. Opening stock, ending stock, the number of sheep disposed including its characteristics (sex, age, color, live weight and body condition), disposal reasons and the purpose of the buyers' were collected.

Following Yami and Mekel (2009) estimation guideline, age was estimated using the type and number of teeth and categorized in six age groups. Color was recorded as red, white, red and white, black, and others. Sex was taken as male and female. Body condition was assessed by enumerator and give score as poor, medium and fat. The purpose of buyer's was found as consumption, resale/profit, reproduction, growing, and scarification.

Data Analysis

The study had employed descriptive analysis and graphical illustrations. The former method was employed to relate commercial off-take and mortality with animals' attributes. The latter was used to illustrate the pattern of mortality across months. The statistical software employed was Statistical Package for Social Sciences version 16.0 (SPSS, 2009).

Conventionally, the terms off-take and disposal are used in exchangeable. However, the term off-take is defined as the sum of sale, slaughter, gift and others but it does not include death while disposal include it (ILCA, 1990). The study focused on the two largely expected disposal reasons, i.e., sale and death. We followed Negassa and Jabber (2008) to compute commercial off-

take rate and ILCA (1990) to estimate mortality rate. Those formulas are specified as follows:

$$\text{Gross commercial off-take rate in period (t)} = \frac{\text{sales}}{0.5 (\text{Opening stock} + \text{Ending stock})} * 100$$

$$\text{Mortality rate in period (t)} = \frac{\text{died}}{0.5 (\text{Opening stock} + \text{Ending stock})} * 100$$

Normally, the estimation of commercial off-take and mortality rate is on year bases. However, it might have high variability due to crop success and failure, price variation and disease out-breaks. To overcome this, we employed the mean of the five years data in the above estimation formulas.

RESULTS AND DISCUSSION

Disposal Reasons

In the study districts, sheep were reduced from the flock for sale, slaughter, death, and scarifice. Of the total sheep disposed (2053): 65.8, 24.1, 9.7 and 0.4% of sheep were sold, died, slaughtered, and scarified, respectively. The magnitudes of animals disposed with respect to their reason were statistically different ($\chi^2 = 2044.81$; $p < .001$). The result indicates that sheep selling and death were the major cause for sheep disposal. Therefore, commercial off-take and mortality of sheep have high implications on farmers' income from sheep production.

Commercial Off-take Rate

The gross commercial off-take rate (or sales rate) of sheep from 2005 to 2009 was 39%, which is higher than the national figure (Negassa and Jabber, 2008) but lower than Sub-Saharan Africa countries (Tibbo, 2006). Based on Taye et al. (2010) report, i.e., people in the Washera sheep production area keep 9.58 sheep per household, the scale of sale per year was 3.74 sheep.

The gross commercial off-take rate of sheep at Yilmana Densa and Quarit district was 33% and 46%, respectively. The possible reason for this difference could be the households' income sources diversity. At Quarit, the income of farmers is relatively low and their income source is limited. Hence, farmers more often obliged to market sheep to satisfy their cash needs.

Sex and Age Group for Sale

Fifty eight percent of sheep were sold at the age of less than six months, followed by age between six months and one year (19.4%), which indicates majority of Washera sheep sold at its younger age. Selling of sheep at younger age attracts the export market, however, at

Table 1: Sheep selling in sex and age groups

Age	Study areas									
	Yilmanadensa				Quarit				Overall	
	Male		Female		Male		Female		Both	
	N	%	N	%	N	%	N	%	N	%
A ≤ 0.5	180	72.6	164	60.1	249	69.2	183	40.9	779	58.4
0.5 < A ≤ 1	59	23.8	36	13.2	82	22.8	80	17.9	258	19.4
1 < A ≤ 2	8	3.2	27	9.9	23	6.4	66	14.8	124	9.3
2 < A ≤ 3	1	0.4	21	7.7	6	1.7	42	9.4	71	5.3
3 < A ≤ 4	NV		15	5.5	NV		39	8.7	54	4.1
A > 4	NV		10	3.6	NV		37	8.3	47	3.5

A = Age in year, N = Number of observation, %= percentage, NV = no value

Table 2: The purpose of buyers

Purpose of buyers'	Study areas			
	Yilmanadensa		Quarit	
	N	%	N	%
Reproduction	38	5.0	297	38.5
Resale	379	85.7	176	22.8
Consumption	10	2.3	198	25.6
Growing	NV	NV	98	12.7
Others	15	3.4	3	0.4

N = Number of observation, %= percentage, NV = no value

this age the average live weight is < 18 kg which is less than the minimum weight requirement of export market, i.e., 30 kg.

Beyond three years old, there was no male sheep supplied to the market, because farmers hardly keep ram (Yitayew et al., 2013). As a whole, as the age of sheep increased, the number of sheep sold decreased. The possible reason is that farmers keep small flocks for breeding purpose and sale of lamb crop. Farmers do not sale their breeding females unless there is no option for the sale.

The Purpose of Buyers

The majority of transactions (86%) were conducted with buyers' who target profit making, which indicates that traders were dominant market actors at Yilmana Densa district. While at Quarit, the higher proportion of sheep (38%) were sold for producers'. The remarkable reason is that the former is near to and suitable to transport to big markets (secondary and tertiary market). Identifying the dominant market actors in a specific market helps to understand buyers' preference and market situation in the rural market where traders are dominant actors, transaction is fast, however, the market are not perfect because buyers (traders) and sellers have no equal information.

Animals' Attributes

Sheep below six months with red and white coat color were preferred for reproduction, resale and consumption

purpose. At Quarit, female sheep were mostly preferred for all above mentioned purpose. In contrast, female sheep were mainly preferred for breeding purpose while male sheep have high preference for resale and consumption at Yilmana Densa. This is related with buyers' preference particularly, at Quarit, farmers prefer male sheep for home consumption.

The body condition of more than 70 % of sheep sold at Quarit was good while at Yilmana Densa it was less. The number and the composition of market actors lead the quality of sheep supplied to the market. Mostly traders' buy sheep at primary market level and then truck to secondary and tertiary market in order to make profit. Thus, they give emphasis for sheep with medium body condition to reduce weight loss due to trucking. As shown in Table 2 since traders are the main market actors in Yilmana Densa, many of sheep sold have medium body condition.

Mortality Rate

In the study districts, mortality rate of sheep was 14.53%. There was sheep mortality discrepancy across districts; 6.72% and 21.47% at Yilmana Densa and Quarit district, respectively. In the later district, a household lost 2.06 sheep per year (computed by taking 9.58 flock size per year per household), which is significant loss for poor rural people. In contrast, at Yilmana Densa, based on the findings of Tibbo (2006) on sheep mortality in the central highlands (8-50%), mortality was low.

Table 3: Cross tabulation of the purpose of buyer's with animal characteristics

Animal characteristics	Buyer purpose and districts					
	Reproduction		Resale		Consumption	
	Yilmanadensa	Quarit	Yilmanadensa	Quarit	Yilmanadensa	Quarit
	%	%	%	%	%	%
Age, N	39	294	396	175	11	195
A ≥ 0.5	41.0	43.5	65.7	69.1	72.7	42.1
0.5 < A ≤ 1	20.5	15.6	19.7	20.0	18.2	28.7
1 < A ≤ 2	20.5	19.4	6.1	4.6	9.1	7.7
2 < A ≤ 3	10.3	7.1	4.0	3.4	NV	7.2
3 < A ≤ 4	NV	10.5	3.0	2.3	NV	7.7
A > 4	7.7	3.4	1.5	0.6	NV	6.7
Sex, N	39	295	396	176	11	197
Male	35.9	8.8	48.0	69.3	45.5	53.8
Female	64.1	91.2	52.0	30.7	54.5	46.2
Color, N	39	294	392	174	11	194
Red	43.6	26.5	36.5	24.7	27.3	23.2
White	5.1	13.9	8.9	17.2	9.1	12.9
Red and white	46.2	56.8	45.2	50.6	54.5	59.3
Black	NV	1.0	1.8	3.4	NV	2.6
Others	5.1	1.7	7.7	4.0	9.1	2.1
Body condition, N	38	288	342	170	11	195
Medium	97.4	13.2	90.0	27.1	100	22.1
Fat	2.6	86.8	10.0	72.9	NV	77.9

A= Age in year, N= Number of observation, %= percentage, NV = no value,

Table 4: Mortality by age and sex across districts

Age	Study areas							
	Yilmanadensa				Quarit			
	Male		Female		Male		Female	
	N	%	N	%	N	%	N	%
A ≤ 0.5	15	55.6	17	20.5	99	86.8	86	33.7
0.5 < A ≤ 1	5	18.5	10	12	13	11.4	36	14.1
1 < A ≤ 2	4	14.8	10	12	1	0.9	39	15.3
2 < A ≤ 3	3	11.1	3	3.6	1	0.9	28	11
3 < A ≤ 4	NV		20	24.1	NV		29	11.8
A > 4	NV		23	27.7	NV		37	14.5
							60	12.4

A = Age in year, N= number of observation, % = Percentage, NV = no value

Mortality by Age and Sex

The magnitude of mortality in age categories was in line the age composition of the flock. Mortality was high at the age of less than six months (45%). Mortality in sex group shows variation resulted with the number and duration of animals in the flock. Sheep disposal at early age due to sale and slaughter was high for male sheep, therefore, the number of male sheep in the flock was small whereas the number of female is large. Accordingly, mortality of female sheep was high.

Cross tabulation analysis of mortality in sex and age groups indicates that male sheep at the age of below six months was high; 55.6% and 86.8% at Yilmana Densa and Quarit, respectively. As shown in Table 4, mortality of

too young and old female sheep at Quarit and Yilmana Densa, respectively, was high.

In general, lamb mortality was said to be large in the study areas. Of course, the monetary value of lambs is low but its future value is quite significant. On the other hand, mortality of old ewe especially at Yilmana Densa was to some extent high. This is related with the perception of farmers on the performance of ewe. They believe that ewes' performance improved when its age increased, which is against scientifically recommended flock management.

Occurrence of Mortality in Months and Seasons

Sheep mortality differs both with season and month. As shown in Figure 1 sheep mortality was high in dry season

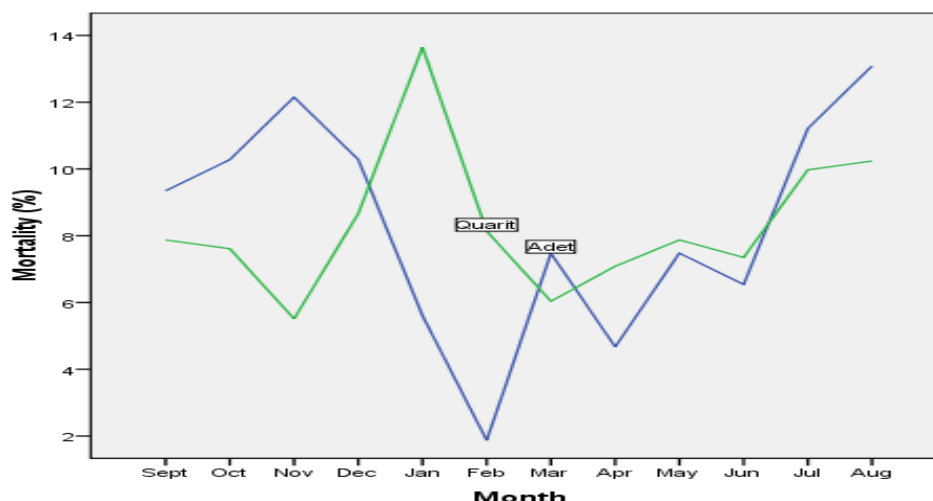


Figure 1: Monthly mortality across the study districts

(December to June) at Quarit as compared to Yilmana Densa. While in wet season (July to November) was the vice versa. At Quarit, the prevalence of death was high in January. This is because of diseases outbreak such as pasteurellosis in the area (Andassa Livestock Research Center 2010, unpublished). While at Yilmana Densa, the incidence of death inflated in August, which is mainly related with serious feed shortage because farm lands are covered by crops and common grazing areas are degraded. Across districts, it is not only month or season in which high mortality appeared vary but also the cause of mortality also quite different.

CONCLUSION

High commercial off-take rate indicates that the magnitude of market participation is relatively high. But this does not mean that farmers optimize the benefit that can obtain unless they can supply what the market needs. Selling age of sheep has an implication on the market and breed improvement and conservation programs. Farmers have remarkable practice of selling of lambs, which has pros to penetrate the export market but it is also a threat for breed conservation and improvement.

RECOMMENDATIONS

- Introduction and promotion of prevention and treatment of lambs, and awareness creation about old ewes culling to reduce mortality as means of increasing commercial off-take rate.
- There should have access to market information and fattening technology to adjust farmers supplies what

the market needs in order to boost income generated from sheep production.

- Breeders should develop breeding strategies for Washera sheep targeting producers' marking behavior.

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