

Sheep Production and Breeding Practice in Adyio Kaka District of Kafa Zone, Southern Ethiopia

Metsafe Mamiru, Sandip Banerjee, Aynalem Haile
1 Animal Research Process, Bonga Agricultural Research Center (BARC), Kafa, Southern Ethiopia
P.O.Box: 101

Abstract

The study was conducted in adyio kaka district of Kafa zone with the objectives of describing the production system; breeding practice and evaluation of reproductive performance of Bonga sheep breed in the study area. Results comprise the findings from the assessment of the production system and reproductive studies on Bonga ewes and lambs over the period of five years (2009-2013). Data generated was presented by frequencies and descriptive statistics. The results show that the average land holding per household was 1.9 ± 1.4 ha. Sheep was the predominant livestock species owned by producers followed by cattle. Most of the ewes were mated in dry season and most of parturitions take place during the subsequent wet season. The mortality of lambs was primarily because of poor management. Farmers dominantly use controlled mating. There are attempts to intensify the production system in the area.

Keywords: Bonga sheep, performance, Kafa, Ethiopia

1. Introduction

Ethiopia is considered as a center of sheep diversity, because the country is situated on the route of sheep migration from Asia to Africa (Devendra & McLeroy 1982). It has large sheep population, which is estimated at about 25.5 million (CSA, 2013). The country has diverse indigenous sheep breeds, at least 9 breeds and 14 traditional sheep populations are known to be distributed across the diverse agro-ecology, production systems and are reared by different communities (ethnic groups) (Galal, 1983; Solomon et al., 2007).

In spite of such a wide range of genetic diversity and vast number of sheep in the country, the average productivity is generally below optimum. The productivity in the country is largely constrained by feed shortage, disease, poor infrastructure, lack of market information and technical capacity, besides lack of planned breeding programs and breeding policies (Solomon et al., 2013).

The sheep producers are benefitted by a vast range of products from their flock, which are both tangible and intangible in nature. Some of the tangible benefits are that the sheep can provide immediate cash income, meat, milk, skin, manure and risk management, while the intangible benefits include social prestige (functions) among the community members (Adane and Girma, 2008). Moreover, sheep play great role in the economy of the country by being exportable items and thus are sources of much needed foreign currency (Berhanu et al., 2006).

2. Materials and methods

2.1 Description of the study area

The study was conducted in Adiyio Kaka district of Kaffa zone. The district is located to the south western part of the country in Southern Nations, Nationalities and Peoples Regional State (SNNPRS). The area is characterized by large areas of natural forest and it is also known bamboo tree (*Yushania alpina*) growing area. The district is purposely chosen because it is known as center of distribution for Bonga sheep breed. The existence of community based Bonga sheep breeding program in the area is another condition to choose the district prior than others. The district is situated within longitude of $36^{\circ} 47''$ E and latitude of $7^{\circ} 26''$ N with altitude ranging from 500 to 3500 meters. The temperature in the area can be as high as 36° C and can also reach the lowest value of 3° C (SUDCA, 2007). The prominent farming system is mixed crop-livestock production. It has livestock population of 107657, 30819, 28825, 47176 and 7699 cattle, sheep, goat, chicken and equines respectively (report of Agricultural and rural development office of Kafa zone, 2012).

2.2. Sampling procedure and data collection

The study area was selected purposely due to the existence of community based breeding program (CBBP) for Bonga sheep in the area. The respondents were randomly selected by generating random number using excel sheet from those who are involved in CBBP. A total of 116 respondents were selected for detailed interview. A semi-structured questionnaire was prepared and pre-tested before administration and some re-arrangements in accordance with respondent's opinion were done. Using the questionnaire, information was gathered regarding: livestock species owned and their trend, structure of sheep flock, purposes of keeping sheep, sheep breeding practices (mating type, season of mating, season of lambing), and pre-weaning mortality of lambs and its causes.

2.3 Data Management and Analysis

Data collected through questionnaire were entered into statistical package for social sciences (SPSS) version 16.0 for windows. Screening outliers were employed before conducting the main data analysis. The survey data were presented in the form of descriptive summaries (frequencies and percentages). An index was calculated to provide ranking of the purpose of keeping sheep according to the formula: Index = Σ of [3 for rank 1 + 2 for rank 2 + 1 for rank 3] given for particular purpose of keeping sheep divided by Σ of [3 for rank 1 + 2 for rank 2 + 1 for rank 3] for all purpose of keeping sheep. Reproductive traits like lambing interval, age at first lambing and life time lambing were analyzed by descriptive statistics. Other parameters like pre-weaning mortality, twinning rate, litter size, annual reproductive rate and survivability/mortality rate were computed on percentage basis using their respective formulas below.

$$ARR = LS (1-M)/LI \quad (1)$$

Where ARR- Annual Reproductive Rate, LS - Litter size, M- Pre weaning mortality rate

LI - Lambing interval (Ibrahim, 1998)

$$\text{Litter size} = \text{number of lambs born}/\text{number of ewes lambing} \times 100\% \quad (2)$$

$$\text{Pre-weaning mortality rate} = \text{no. of lambs died}/\text{total number of lambs born} \times 100\% \quad (3)$$

$$\text{Weaning rate} = \text{no. of lambs weaned}/\text{total number of ewes lambing} \times 100\% \quad (4)$$

$$\text{Pre-weaning survival rate} = \text{no. of lambs weaned}/\text{total no. of lambs born} \times 100\% \quad (5)$$

3. Result and Discussion

3.1. General household characteristics

Males in age level below fifteen years holds the largest proportion in the family; while females above fifteen years of age (including mother) is the next dominant in the study area. The average family size per household found in the present study (Table 1) is comparable to 6.7 ± 0.18 and 6.7 ± 3.0 heads, reported by Tsedeke (2007) for Alaba special woreda and Dejen (2010) for Chena woreda in Kafa zone, respectively. Higher family size (8.60 ± 4.48 heads) than the present result was reported to the same district previously by Zewdu, (2008). Thus, it could be suggested that there was better family planning than before in the area.

Almost all respondents in the study were aged below 60 years, which means most are in working age level (15 to 60 years). Household characteristics in the study area are presented in Table 2. As it was indicated in the table, male headed households were dominant in the study area. Most of the participants of the study were illiterate followed by those with junior level (grade 7-10) education. With regard to religion, majority of people in the woreda are Orthodox-Christians.

3.2. Land holding and its trend in the study area

Average land size per household of the study area is 1.9 ± 0.1 (Table 3). Lower land size per household (1.5ha) than the current finding was reported in Gamogofa zone by Fishatsion (2013). As it was stated by all respondents, the land owned by farmers was allocated to two main purposes, crop cultivation and grazing/pasture land. The result further revealed that the size of land allocated for grazing was narrower nearly by half than that for crop cultivation. Above half of people in the district use their own land for both crop cultivation and grazing. The study further indicated that, the rented land is mainly used as grazing land in response to shrinkage of communal grazing land in the area. The trend of land holding in the area is decreasing (Table 3) from time to time according to the respondents. They reported that population growth, urbanization, need of land for social services and land degradation were the basic reasons for the decline of size of landholding in order of their influence. The decrease may also be attributed to lower per unit inheritance of the ancestral property by the current generation which may be the fallout of the larger family size.

3.3. Livestock species Composition and its trend in the area

Sheep, cattle, chicken, goat and equines (horse and mule) were the most dominant livestock species reared in the study area. Sheep was owned by all the respondents as the study purposely considered for those who have sheep. Sheep was the predominant livestock species in the study area. Cattles were the second most dominant species which was followed by chicken, horse, goat and mule in their descending order. The average number of livestock species per household was presented in Table 4.

As indicated in the table, the population of livestock species showed an increasing trend. The respondents indicated that the sheep population is increasing rapidly over the other species. Improved management in terms of health care, feeding and breeding was the main reason mentioned by participants which contributed to the raise of livestock population. Besides this, retaining of productive age class of sheep in the flock (since the start of community based breeding program) played role to the increment of flock size. Interestingly participants stated as rising of temperature (climatic change) in the area favored the adaptability of goats, which in turn contributed to the increase of goat population.

3.4 Flock demography of sheep population in the area

Average number of sheep in different sex and age classes per household is presented in Table 5. Females (ewes) above one year of age were most dominant in the flock of the respondents, which was kept by almost all respondents in the study. Ewe and ram lambs below six months of age were the next most dominant age classes in the flock. Average number of rams or males above one year of age was comparatively few; which is perhaps due to the practice that farmers keep only few breeding rams in the flock and sell the remaining to other areas purposely for cross breeding. The result is lessor than that reported by Zewdu (2008) in the same area. Furthermore, culling of the aged rams and those with inferior performance led to fall in overall numbers of the ram in the population. The present finding for breeding ewes is higher than 3.66 and 3.95 heads in Adiyio and Horro woredas respectively reported by Zewdu (2008).

3.5 Leasing out and in of sheep ('rebi') in the area

The study indicated that nearly half of the respondents lease out their flock in Adiyio kaka district. Females were the most dominantly (96.2%) leased class of sheep. Lack of grazing land to the leaseholder, sharing of benefit among the leaseholder and lease receiver, lack of manpower, strengthening of social relationship, and other allied causes were listed out as some of the reasons for initiating the practice.

3.6 Breeding practice of sheep in the area

Predominantly controlled mating was reported by respondents in the study district, as it was indicated by 96.6% of total households interviewed. They stated that this practice is being used following the start of community based breeding program and retention of selected rams in the area. It was stated that a breeding ram (selected) was shared by ram use group organized. However, participants in the group discussion stated that, the number of rams could be doubled depending on the number of breeding ewes within the group. A number of signs were used by farmers to distinguish ewes in estrus, either any one of the signs or a combination of two or more of such signs are used to identify the ewes. The signs includes swinging of tail, mounting others, loss of appetite, bellowing and restlessness were the most dominant signs used to identify ewes in heat by 43%, 19.7%, 15.2%, 13.9% and 6.7% of households interviewed respectively. People in the area keep their ewes from unwanted mating by various ways. Out of total households interviewed, 86.7% prevent dams from unwanted mating by tethering. Castration of the low-grade rams, keeping unselected rams separately and selling of inferior rams were reported as controlling mechanisms of unwanted mating in the area.

3.7 Castration practice in the area

Castration of sheep is a common practice in the study area. The study indicated that castration was carried out traditionally by crushing the testis with a big stone; the observations are in accordance with the findings of Mengistie (2010) from Amhara region. The same castration practice was also reported by Shigdaf (2012). However, castration currently is in modern way using burdizzo. According to the elders, lambs were castrated after/around birth of their successors; which they approximated to be at 6-7 months of age. Castration of unselected lambs was reported by various authors (Solomon *et al.*, 2005; Tsedeke, 2007; Belete, 2009). Castration of rams with good body conformation which has been reported by Zewdu (2008) is in contrary to the present result where only culled (inferior) lambs were subjected for castration. Castration for improving fattening potential of the rams found in the present study is in accordance to reports of Deribe (2009) and Dejen (2010). Respondents reported castration for control breeding and temperament; which is in line with the result reported by Dejen (2010).

3.8 Season of mating and parturition in sheep

Like most of the tropical breeds of sheep the Bonga breed is photo insensitive thus the breeding season prolongs throughout the year. However, according to the respondents, most of parturitions in the area occur during the wet season (May to October). The respondents associated the situation with the mating of most of the breeding ewes during dry season (November to April). As it was stated by the farmers, during this period animals feed freely on fallow lands following the harvesting of crop and as a result of abundant crop aftermath, the ewes are able to obtain the flushing ration.

3.9 Reproductive problems in the study area

According to the farmers, abortion and dystocia were the dominant reproductive problems in the area. 57.4% of respondents reported the occurrence of abortion in their flock, among which the largest proportion reported the incidence of abortion during the dry season. According to the farmers, abortion transpires mainly due to disease (not specified), heat stress, and mechanical trauma (mounting of pregnant ewes by rams and trauma caused by human beings). Besides this, heavy rain/hailstorm during wet season and consumption of plants which are locally called "Koro" (*Pycnostachys abyssinica*) and "Kato" (*Rhamnus prinoides*) results abortion. The higher

proportion of abortion occurs during the first parity as stated by respondents and it was followed by random occurrence. (appendix 3).

The incidence of dystocia (difficulty of parturition) was also reported as one of reproductive problems in Adiyoka district. Its incidence was reported by above half of the participants. The respondents also indicated that most of the time dystocia occurs during parturition of ram lambs, which may be attributed to the fact that the ram lambs are usually larger than the ewe lambs. According to the respondents, the higher incidences of dystocia occurs during the first parity.

Over conditioning of dams and incorrect position of fetus during the delivery were also other factors resulted in dystocia as stated by the respondents. Almost all households interviewed did not take any measure during the incidence of dystocia. However, single respondent stated the presence of traditional medicine to the existing problem. According to the respondent, leaf of three plants, which are locally called 'shedo' (*Sapium ellipticum*), 'wago'/Bisana (*Croton macrostachyus*) and 'Ataro'/anfar (*Buddleja polystachya*) were mixed and crushed to obtain the concoction; which was drenched to the ewe to ease the delivery of fetus (personal communication by Emito Andisho).

3.10 Death of lambs in the area

About 77.6% of households reported the frequent mortality of the neonate lambs in the study area. Most of the deaths were resulted due to disease (not specified), cold stress (in wet season), and predators. According to the respondents, most of the time death of lambs occurs in wet season. This could be associated with the prevalence of parasitic diseases during the wet season besides chills and prevalence of toxic plants during the season.

4. conclusion

From the study, it is concluded that there are attempts to intensify the breeding practice in the area and thus, it is important to fulfill the whole management package of sheep to improve the production and productivity of the enterprise as to contribute to the livelihood of smallholder farmers.

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Table 1: Descriptive statistics of family size at different age levels in the study area (N=116)

Family size	Mean ±SE
Males under 15 years	2.1±0.1
Females under 15 years	1.5±0.1
Males above 15 years	1.5±0.1
Females above 15 years	1.6±0.1
Overall	6.7±0.4

N-number of observations, SE-Standard Error

Table 2: Characteristics of households in the study area

Descriptor	No. HHs (%)	Descriptor	No. HHs (%)	Descriptor	No. HHs (%)
Education level		Age		Religion	
Illiterate	46.1	<30	37.4	Orthodox	84.2
Reading and writing	34.8	30-40	35.7	Protestant	2.6
7-10	19.1	40-50	17.4	Catholic	13.3
		50-60	8.7		
		60-70	0.9		
Sex	No. HHs (%)	Marital status	No. HHs (%)	Position	No. HHs (%)
Male	83.6	Married	93.1	Household head	93.1
Female	16.4	Widowed	6.9	Spouse of household	6.9

%-Percent, No.-number, HHs-Households

Table 3: The overall land holding, its allocation and trend in the study area

Land allocation	Land size (ha)		Trend of landholding	HHs (%)	Land used	HHs (%)
	N	Mean ±SE				
Cropping	116	1.3±0.1	Increasing	0.9	Own	65.5
Grazing	111	0.7±0.1	Decreasing	94.7	Rented	9.5
Total	116	1.9±0.1	Stable	4.4	Both	25.0

ha-hectare, N- Number of observations, SE-Standard Error, HHs-Households, %-Percent

Table 4: Average livestock holding and its trend in the study area

Livestock species	HH (%)	Mean± SD	Trend of livestock species		
			Increasing (%)	Decreasing (%)	Stable (%)
Cattle	98.3	6.5±3.1	55.9	35.7	8.4
Sheep	100	9.7±4.3	73.0	26.1	0.9
Goat	39.7	0.9±1.4	39.8	29.6	30.6
Chicken	81	6.0±5.5	-	-	-
Horse	47.4	0.97±1.2	-	-	-
Mule	6.9	0.08±0.3	-	-	-

HH-Household, %-Percent, SD-Standard Deviation

Table 5: Structure of sheep flock in the area

variables	No. HHs owning (%)	Mean± SE
Male		
Below 6months	69.8	1.47±0.1
6months-1year	37.9	0.57±0.1
Above 1year (intact male)	25	0.43±0.1
Castrates	35.3	0.52±0.1
Female		
Below 6months	78.4	1.64±0.1
6months-1year	42.2	0.62±0.1
Above 1year (breeding ewe)	97.4	4.45±0.2

HH-Household, %-percent, SE-Standard Error