

## **Breeding Practices and Reproductive Performance of Traditionally Managed Indigenous Sheep and Goat in Ilu Abba Bora Zone of Oromia Regional State, Ethiopia**

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**Abstract:** The aim of this study was to assess the breeding practices and reproductive performance of sheep and goats in three districts of Ilu Aba Bora Zone, Ethiopia. A total of 270 (90 from each district) households were randomly selected for the study and the heads of the households were interviewed using pre-tested, structured questionnaire. Findings of the study indicated that 26% of respondents had breeding rams and bucks, while 74% of them share breeding rams and bucks with their neighbors. Breeding was predominantly uncontrolled. Kidding/lambing occurred all the year round with 37.8 and 38.1% of lambs and kids were dropped in wet season. Coat color, body conformation and pedigree performance were considered as the most important criteria in selecting breeding rams and bucks showing significant ( $P<0.05$ ) difference between districts. Age at puberty was 5-8 months in sheep and 5-6 months in goats. The average age at first parturition was 10-11 months in 43 and 52% of sheep and goats, respectively. Parturition interval was 9-10 months in 62 and 61.9% of sheep and goats, respectively. About 59, 38 and 1.5% respondents reported that ewes give single, twine and triple births, respectively, while 58, 40 and 1.1% of respondents revealed that does give single, twine and triple births, respectively. The study observed that reproductive performance of sheep and goats was generally found to be low. Thus, small ruminant productivity would be improved if adequate attention is paid to alleviate the technical constraints, increase adoption of improved technologies and appropriate delivery of extension messages.

**Key words:** Goats • Breeding • Sheep • Selection • Puberty • Age at First Lambing/Kidding

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### **INTRODUCTION**

In Ethiopia, reproductive performance of small ruminants is considered to be low with annual lambing and kidding rates of 1.2 for ewes and 1.5 for does [1]. The current annual off-take rate of sheep and goats is estimated to be 33 and 35%, respectively. The average carcass weight of Ethiopian sheep and goat is 10kg, which is the second lowest in Sub-Saharan Africa [2]. They are said to be late in age at first lambing/kidding. They are characterized by low fertility, prolificacy and weaning rate and mature body weight is about 30-40kg. In Ethiopia, Horro ewe lambs attain puberty at seven months of age and produce viable lambs [3]. According to Mukasa-Mugerwa *et al.* [4] the Ethiopian highland Menz sheep

attain puberty at 10 months of age. In southern Ethiopia, age at first lambing for Kofele and Adilo ewes was found to be 11.8 and 14.6 months respectively [5]. At Yerer watershed, central highlands of Ethiopia, the average age at first parturition of Arsi-Bale breeds of sheep and goats was reported to be 17.0 and 13.2 months, respectively [6].

Up-to-date information on breeding practices and reproductive performances is very important consideration for small ruminant improvement programs. Unfortunately, this information is not readily available in the study area. The objective of this study was, therefore, to assess breeding practices and reproductive performance of sheep and goats in three districts of Ilu Aba Bora Zone.

## MATERIALS AND METHODS

**Study Area:** The study was conducted in Bacho, Mettu and Darimu districts of the Ilu Abba Bora Zone of the Oromia Regional State, South Western Ethiopia. Ilu Abba Bora Zone is one of the 18 administrative zones in Oromia Regional State found in the south-western part of the country. The zone has 1.6 million ha of land of which 10% is high land, 67% is medium and 23% is low land. The altitude of the zone ranges from 500-2575 meter above sea level. Ilu Abba Bora zone has 24 districts of which 2 are urban, 12 and 10 are characterized coffee livestock and cereal grain livestock based mixed farming system respectively. There are two major rainy seasons (small and big) and the annual precipitation of the zone ranges between 1500 and 2200mm. Eutric Vertisols, Humic alisols and Humic Nitosols are the dominant soil types in the zone [7]. Human population of the zone is estimated to be about 1.6 million of which 88% is rural. The major cash crops grown in the coffee-livestock based farming system include coffee, Khat (*Catha edulis*), spices and fruits whereas; the major food crops grown include maize, sorghum, teff (*Eragrostis tef*), barely and pulses. Teff, maize, sorghum, barley, wheat and pulses are widely grown in the cereal grain livestock based farming system [7].

**Sampling Procedures:** Systematic stratified sampling technique was used to select the study districts. The three districts were systematically stratified into three regions based on altitude variations viz. Darimu (low), Mettu (medium) and Bach (high) altitude, respectively. A total of 270 households, 90 from each district were randomly selected for the purpose of the study.

**Data Collection and Analytical Techniques:** Before conducting the formal survey, group discussion was made with key informants such as elders and experts in the respective Office of Zonal and District Agriculture and Rural Development to have an overview about small ruminant production system in the study areas. A single-visit-multiple-subject formal survey technique [8] was used to interview the household heads using structured questionnaire. The questionnaire was pre-tested and modified as necessary. Finally the formal survey was conducted by trained enumerators under close supervision and participation of the first author. Data was obtained on sources of breeding males, selection criteria of breeding males, breeding systems and reproductive performance of sheep and goats.

The quantitative and qualitative data was coded and analyzed using the means and frequency procedures of Statistical Package for Social Sciences (SPSS version 16). Chi-square test was used to examine differences between levels of significance of different quantitative variables among districts and analysis of variance (ANOVA) using the general linear model procedure of SPSS. List significant difference (LSD) test was made for mean separation, when there was significant deference among districts.

## RESULTS AND DISCUSSION

**Selection Criteria for Breeding Rams and Bucks and Sources of Breeding Males:** Respondents considered coat color (16.3%), body conformation (57%) and pedigree performances (25%) as the most important criteria in selecting breeding rams, while 14.4, 58.5 and 24.8% respondents considered color, body conformation and pedigree performance as criteria for selecting breeding bucks, respectively. In both species, body conformation was the most important trait farmers considered for selection of breeding males. For selection of rams, large body size, muscling and long large and broad tail were the most desirable physical traits, while for breeding bucks farmers paid attention for good muscling, large body length and height. About 26% of the respondents own their own breeding rams and bucks, while 74% of the respondents share breeding rams and bucks with their neighbors. The result of this study agrees with the findings of Belete [9] who reported that 20-29% of the farmers had their own breeding rams and bucks. Males and females run together during the day and are housed together overnight. Thus, none of the respondents practiced controlled breeding.

**Seasonality in Lambing/Kidding:** Lambing/kidding occurred the year-round, with the majority of lambing/kidding occurring in September to October and late April to June. This period of high lambing/kidding percentage is characterized by small rainy seasons with adequate feed. Lambing/kidding was lowest in January to early April, which characterize dry period under the Ethiopian conditions. The high lambing/kidding rate recorded during September to October and April to June might be attributed to availability of adequate feed. This result is in agreement with the findings of Belete [9] who reported intensive lambing/kidding during April to October and lowest lambing/kidding rate during October to January in Gomma district. The higher percentages of

Table 1: Selection criteria for breeding rams and bucks and sources of breeding males

Parameter	Districts			Overall	X <sup>2</sup> p-value
	Bacho	Mettu	Darimu		
Selection criteria of breeding ram (%)					
Color	1.1	21.1	26.7	16.3	0.000
Body conformation	73.3	42.2	55.6	57.0	0.000
Pedigree	21.1	36.7	17.8	25.2	0.000
Selection criteria of breeding buck (%)					
Color	0	14.4	28.9	14.4	0.000
Body conformation	74.4	44.4	56.7	58.5	0.000
Pedigree	18.9	41.1	14.4	24.8	0.000
Source of breeding males (%)					
Own	17.8	26.7	34.4	26.3	0.001
Neighbor	41.1	31.1	47.8	40.0	0.001
Both	38.9	42.2	17.8	33.0	0.001

Table 2: Lambing/kidding seasons of small ruminants as perceived by respondents in the study area

Lambing/kidding season	Districts			Overall	X <sup>2</sup> p-value
	Bacho	Mettu	Darimu		
Lambing (%)					
Dry season	38.9	16.7	11.13	22.2	0.000
Wet season	40.0	47.8	22.2	38.1	0.000
Both season	15.6	35.6	66.7	39.3	0.000
Kidding (%)					
Dry season	44.4	16.7	18.9	26.7	0.000
Wet season	40.0	51.1	21.1	37.4	0.000
Both season	13.3	32.2	60.0	35.2	0.000

Table 3: Percentage of respondents regarding litter size of sheep and goats

Prolificacy	Districts			Overall	X <sup>2</sup> p-value
	Bacho	Mettu	Darimu		
Sheep (%)					
Single	53.3	60.0	64.4	59.3	0.019
Twin	38.9	40	35.6	38.1	0.019
Triplets	4.4	0	0	1.5	
Goats (%)					
Single	48.9	61.1	64.4	58.1	0.039
Twin	45.6	38.9	35.6	40.0	0.039
Triplets	3.3	0	0	1.1	

lambing/kidding during the rainy seasons were also reported by Mukasa-Mugerewa [10] in Ethiopian high lands. The higher rate of lambing/kidding during wet season is attributed to high fertility resulting from availability of adequate and high quality feeds from natural pasture.

**Prolificacy Rate:** of the total births reported, about 59, 38 and 1.5% respondents reported to obtain single, twine and triple birth from their ewes, while 58, 40 and 1.1% of the respondents said to obtain single, twine and triple birth from their does. Thus, most of the ewes and does

gave single birth. The reasons for more single births in Mettu and Darimu districts is that they are located in middle and low altitudes, where small ruminants are more affected by constraints such as nutrition, diseases (trypanosomosis) and poor management. On other hand study conducted by Getahun [5] showed a litter size of 1.28 for sheep in Kofele and Adilo with single, twin and triple births of 74%, 25% and 1% respectively. Most estimates of litter size in tropical sheep range from 1.0 to 1.5 indicating that twinning rate is generally between 0 and 50% (Mukasa-Mugerewa and Lahlou-Kassi [11]).

Table 4: Age at first parturition and inter-parturition intervals (months) of sheep and goats in the study area

Particulars	Districts			Overall	X <sup>2</sup> p-value
	Bacho	Mettu	Darimu		
Age at 1 <sup>st</sup> lambing (months)					
8-9	3.3	0	0	1.1	
10-11	66.7	42.2	20	43	0.000
12-13	18.9	41.1	60	40	0.000
14-16	3.3	16.7	20	13.3	0.000
> 16	5.6	0	0	1.9	
Age at 1 <sup>st</sup> kidding (months)					
8-9	3.3	0	15.6	6.3	0.000
10-11	71.1	45.6	48.9	52.2	0.000
12-13	21.1	41.1	23.3	28.3	0.000
14-16	2.2	13.3	12.2	9.3	0.000
Parturition intervals of sheep (months)					
7-8	8.9	2.2	16.7	9.3	0.000
9-10	62.2	52.2	73.3	62.6	0.000
11-12	26.7	36.7	10	24.4	0.000
> 12	1.1	8.9	0	3.3	
Parturition intervals of goats (months)					
7-8	10	14.4	32.2	18.9	0.000
9-10	73.3	57.8	54.4	61.9	0.000
11-12	14.4	18.9	13.3	15.6	
> 12	0	8.9	0	3.0	

**Age at First Parturition and Parturition Interval:**

Female sheep and goats attain sexual maturity (puberty) at 5-8 and 5-6 months, respectively. Average age at first lambing/kidding was between 10 to 13 months (Table 4). Few lambing/kidding occurs beyond 13 months of age. Result of this study is in agreement with that of Belete [9] and Solomon *et al.* [3], who reported that age at first lambing and kidding was 12.97 and 12.46 months, respectively. Majority of the respondents indicated that inter-parturition interval of small ruminants was from 9-12 months, while few of the respondents reported 7-8 months and longer than 12 months. The parturition intervals reported in the present study was longer than that of 7.87-8.04 months reported by Mukasa-Mugerwa and Lahlou-Kassi [11] in Ethiopian highlands and that of Belete [9] in Gomma district. The study revealed that reproductive performance of sheep and goats in the study area was generally low with low age at first parturition and parturition interval. Nutrition (shortage, seasonal unavailability and low nutritive value), high disease prevalence, poor management and low genetic potential of the indigenous breeds (late maturing) imposed a serious limitation on reproductive performance of small ruminants in the present study.

**CONCLUSIONS**

The results obtained from this study show that farmers practice uncontrolled breeding system and majority of the farmers had no breeding males. Thus, absence of breeding males needs to be alleviated to improve breeding efficiency of small ruminants in the area. Breeding was seasonally influenced with quantity and quality of forage availability. Colour, body conformation and pedigree performance were the most important qualitative traits considered for selection of breeding males and this needs to be considered in decision making of small ruminant breeding improvement programme in the study area. Reproductive performance of sheep and goats was generally found to be low. This may be attributed to poor nutrition, disease and poor management. Thus, to improve the productivity of small ruminants in the study area, there is a need to alleviate the technical constraints, increase adoption of improved technologies and appropriate delivery of extension messages.

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