

*Original Research***Farmers' Trait Preferences for Breeding of Small Ruminants in Ada Barga and Ejere Districts of West Shoa Zone, Oromia, Ethiopia***Yadeta Neme^{1*}, Manzoor Ahmed Kirmani¹ and Gemedu Duguma²¹Department of Animal Science, College of Agriculture and Veterinary Medicine, Jimma University, P.O. Box 307, Jimma, ETHIOPIA²Livestock and Irrigation Value-Chain for Ethiopian Smallholders (LIVES) Project, International Livestock Research Institute (ILRI), PO Box 5689, Addis Ababa, ETHIOPIA**Part of the thesis submitted by senior author in partial fulfillment of requirements for the Degree of M. Sc. (Animal Breeding & Genetics) to Jimma University, Jimma, Ethiopia, during 2016.****Corresponding author:** yadetaneme@gmail.com

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Abstract

Earlier studies showed that small ruminant production in Ethiopia needs to be addressed by describing production systems and genetic improvement need to consider trait preferences of producers in designing breeding programs. Thus, present study was initiated to identify traits preferences of small ruminant producers in three agro-ecologies of two districts of Oromia. Results revealed that body size was primary selection criteria for both ram and buck selection as parents of next generation in all agro-ecologies. Similarly body size was number one criteria for selection of breeding ewes. The overall age at first lambing / kidding, weaning age, age at sexual maturity of male, reproductive life span of both sheep and goat were significantly affected by AEZS. The body size of rams and bucks, associated with high carcass output and premium price by most of the farmers, included wide chest, conformation and long body size.

Key words: Agro Ecology, Ethiopia, Goat, Farmers Trait Preference, Sheep**How to cite:** Yadeta, N., Kirmani, M., & Duguma, G. (2018). Farmers' Trait Preferences for Breeding of Small Ruminants in Ada Barga and Ejere Districts of West Shoa Zone, Oromia, Ethiopia. International Journal of Livestock Research, 8(9), 49-61. doi: 10.5455/ijlr.20170927021331**Introduction**

More than 85% of the Ethiopian population depends on agriculture for their livelihoods. The subsector contributes about 16.5% of the national Gross Domestic Product (GDP) and 35.6% of the agricultural GDP (Metaferia *et al.*, 2011). It also contributes 15% of export earnings and 30% of agricultural employment (Behnke, 2010). The small ruminants (sheep and goat), contribute substantial amounts to income, food (meat and milk) and non-food products like manure, skins and wool in Ethiopia. These small ruminants

also serve as means of risk mitigation during crop failures, property security, monetary saving and investment in addition to many other socio-economic and cultural functions (Solomon *et al.*, 2010). The earlier studies have indicated that small ruminant production in Ethiopia needs to be addressed systematically by describing the genetic resource bases, production and marketing systems (Tesfaye *et al.*, 2010, 2011; Zewudu *et al.*, 2012). Some workers suggested that breeding systems or genetic improvement efforts need to consider traits preferences of producers in designing breeding programs (Gemeda *et al.*, 2010 and Tadele, 2010). The productivity levels of available small ruminant populations / breeds in their habitat with active participation of producers and buyers are prerequisites to set up genetic improvement program at smallholder level. The Ada Barga and Ejere districts (Woredas), West Shoa Zone, Oromia Regional State, Ethiopia, have huge potential for small ruminant production, but there was paucity of scientific information on their production systems in these two districts. Thus, the present study was carried to assess the production and reproduction performances of small ruminants under farmer's management and to investigate producers' preferences for the different traits in these two districts.

Materials and Methods

The Study Area

Ada Barga district (Woreda) is located at a distance of 60 km, West of Addis Ababa, capital city of Ethiopia. It receives an average annual rainfall ranging from about 887 to 1,194 mm. The minimum, medium and maximum daily temperatures of the area are 10, 15 and 25°C, respectively. The district has relatively high vegetation cover that serves as a source of livestock feed, natural habitat for different wild life and potential area for small ruminant, dairy, apiculture and irrigated agriculture. The major soils of the Ada Barga district are: platy 44%, red 39% and brown (mixture) 17%. The district comprises of 29% highland (>2300 m.a.s.l), 34% midland (1500 to 2300 m.a.s.l) and 37% lowland (< 1500 m.a.s.l) areas as per Zonal Basic Data, 2000. The livestock species reared in the district include cattle, sheep, poultry, equines and goats. The small ruminants consist of 57,511 sheep and 43,574 goats (Fanos Mekonnen, 2012). The district has high potential for both sheep and goat production.

Ejere district (Woreda) is located at a distance of 40 km, West of Addis Ababa, capital city of Ethiopia. The district receives an average annual rainfall ranging from about 900 mm to 1,200 mm. The minimum and maximum daily temperatures of the area are 22 and 28°C, respectively. The district has relatively high vegetation cover that serves as a source of livestock feed, natural habitat for different wild life and also a potential area for small ruminant, dairy, apiculture and irrigated agriculture. The major soils of the Ejere district are: red soil 58%, black soil 32% and loam soil 10%. The district comprises of only two agro-ecological zones, viz. highland (>2300 m.a.s.l) and midland (1500 to 2300 m.a.s.l) according to Zonal Basic Data, 2000. The livestock species inhabiting the district include cattle, sheep, poultry, equines and

goats. The small ruminant population comprises of 41,368 sheep and 10,197 goats and the district has high potential for both sheep and goat production (Fanos Mekonnen, 2012).

Data Sampling Procedure and Sample Size

Secondary data relating to livestock population, farming practices, demography, etc. collected from the respective District Agricultural Department Offices and Livestock Development Agencies, were used for the present study. The kebeles (Peasant Associations, PA) in the two districts were stratified into three agro-ecological zones (AEZS), viz. low lands (<1500 MASL), midlands (1500-2300 MASL) and high lands (>2300 MASL) (Ministry of Agriculture, 2000 and Dereje, 2011). After discussions with District Livestock Head and experts the study kebeles were selected, based on their potential for small ruminant production, as shown in Table 1.

Table 1: Selection of study Kebeles in two districts

Ejere District			Ada Barga District		
Highland	Midland	Lowland	Highland	Midland	Lowland
12 kebeles	18 kebeles	Nil	11 kebeles	13 kebeles	15 kebeles
1 kebele (Damotu) selected	Two kebeles (Chiri and Kimoye) selected	Nil	One kebele (Ulagora) selected	One kebele (Laku Karsa) selected	One kebele (Wogidi) selected

A total of 180 households (HH), owning four or more sheep / goat, were purposively selected from the total number of house-holds (1833 rearing small ruminant) in the six kebeles for the present study (Table 2).

Table 2: Number of households (HH) selected per six kebeles

Agro ecological zone (AEZs)	Selected kebeles	Total number of household possessing small ruminants	Proportionate number of households selected/kebele
Highland	Damotu	413	41
	Ulagora	290	28
Midland	Kimoye	178	17
	Chiri	249	24
	Laku Karsa	331	33
Lowland	Wogidi	372	37
Total	6 Kebeles	1833	180

The numbers of households (69, 74 and 37 in HL, ML and LL, respectively) from each selected kebeles were determined according to proportionate sampling technique as indicated below:

$$W = \left[\frac{A}{B} \right] \times N_0;$$

Where, W= Number of household to be calculated from each selected kebele;

A=Total number of households per kebele;

B = Total number of households all six kebeles; and

N_0 = the calculated sample size.

The sample size of 180 house hold was determined (Arsham, 2002) as under:

$$N = \left[\frac{(0.25)}{SE^2} \right]$$

Where, N = Sample size; and

SE = Standard error (0.0373) with 95% confidence level

During this study farmers having an average flock size of ≥ 4 sheep or goats were interviewed for this study. The sheep and goat rearing farmers were interviewed separately. However, some of the farmers rearing both sheep and goats were interviewed two times and this resulted in the total sum of interviews exceeding sample size of 180 household and total percentages above 100%.

Data Collection

The data on productive and reproductive performances (age at first lambing/kidding, weaning age, slaughter age, age at sexual maturity of male, lambing / kidding interval, litter size and reproductive life span of female) and farmers traits preferences for breeding of both sheep and goat were collected from selected sheep / goat producers in the study areas using a structured questionnaire. Focused group discussions were also undertaken using checklists to collect information on these traits. Group composed of 6-9 members of key informants was formed for gathering information. Key informants such as elders, community leaders, women representative, animal health technician and development agents were targeted for the FGD.

Data Analysis

The data collected was organized, summarized and analyzed by the Statistical Package for Social Sciences (SPSS VER.20, 2013). Comparison was done by one way ANOVA followed by Tukey's range test. The General Linear Model (GLM) of SPSS VER. 20 was used to compare production system parameters across the agro-ecologies and their significant difference was tested. The following one way model on various performances parameters of sheep and goat was used-

$$Y_{ij} = \mu + AEZ_i + e_{ij};$$

Where, Y_{ij} = j^{th} observation in i^{th} class

μ = Overall mean

AEZ_i = effect of i^{th} agro ecologies, (where $i = 1, 2, 3$)

e_{ij} = Random error

The index (I) was calculated to provide ranking of trait preferences (for both male and female sheep and goats) as under-

$$I = \left\{ \frac{\sum [(3)(\text{No. of HH rank I}) + (2)(\text{No. of HH rank II}) + (1)(\text{No. of HH rank III})] \text{ for a particular variable}}{\sum [(3)(\text{No. of HH rank I}) + (2)(\text{No. of HH rank II}) + (1)(\text{No. of HH rank III})] \text{ for all variables}} \right\}$$

Results and Discussion

Productive and Reproductive Performances

The results on productive and reproductive performance, viz. age at first lambing, weaning age, slaughter age, age at sexual maturity of male, lambing interval/kidding interval, litter size and reproductive life span, for both sheep and goat are presented in Table 3.

Table 3: Average of productive and reproductive performance of sheep and goats in three AEZS

Parameters (in months)	High land (N=69)	Midland (N=74)	Lowland (N=37)	Overall Mean	P-value
	Mean ± SE	Mean ± SE	Mean ± SE	Mean ± SE	
Sheep					
AFL** (months)	14.12±0.11 ^a	14.36±0.10 ^a	15.22±0.32 ^b	14.29±0.08	0.001
Weaning age** (months)	3.84±0.44 ^a	3.93±0.40 ^a	4.44±0.52 ^c	3.92±0.46	0.001
Slaughter age** (months)	6.34±0.50 ^a	6.37±0.53 ^a	7.33±0.70 ^c	6.43±0.59	0
ASMM** (months)	8.79±0.05 ^a	8.93±0.04 ^a	9.67±0.16 ^b	8.91±0.04	0
LI** (months)	8.73±0.55 ^a	8.83±0.58 ^a	9.56±0.17 ^c	8.83±0.44	0
LS (in number)	1.21±0.49	1.18±0.45	1.16±0.43	1.19±0.42	0.458
RLSF* (months)	129.49±14.55 ^a	124.57±16.54 ^a	112.00±14.69 ^c	126.41±15.89	0.005
Goats					
AFK** (months)	15.33±0.42 ^a	13.82±0.15 ^b	13.60±0.19 ^b	13.85±0.12	0.002
Weaning age** (months)	4.67±0.51 ^a	3.82±0.39 ^b	3.52±0.50 ^c	3.77±0.52	0
Slaughter age (months)	6.50±0.54	6.39±0.53	6.03±0.49	6.27±0.54	0.011
ASMM** (months)	9.67±0.21 ^a	8.38±0.06 ^b	8.16±0.07 ^b	8.39±0.06	0
KI** (months)	9.33±0.21 ^a	8.22±0.59 ^b	8.10±0.54 ^b	8.25±0.52	0
LS number)	1.25±0.41	1.32±0.33	1.21±0.31	1.28±0.33	0.151
RLSF** (months)	98.00±9.03 ^a	100.65±17.46 ^a	120.41±13.78 ^c	107.29±18.37	0

N=Number of respondents; SD= standard deviation;

Same superscript indicates non-significant differences; Different superscript indicate significant differences at $P < 0.05$ level; AFL age at first lambing; AFK age at first kidding; ASMM age at sexual maturity in males; LI Lambing interval; KI kidding interval; LS litter size; RLSF reproductive life span in female.

Age at First Lambing (AFL) / Kidding (AFK)

The differences in both AFL and AFK (Table 3) were found to be highly significant (P value = 0.001 and 0.002 in sheep and goat, respectively) across the three AEZS. The pair-wise comparison showed that HL-LL and ML-LL differences were significant for AFL whereas HL-MI and HL-LL were significant for AFK. The differences among the three AEZS may be ascribed to variations in rearing management across the AEZS. The AFL and AFK is an indication of the overall flock productivity. The AFL of current results was 14.12, 14.36 and 15.22 months for sheep and AFK was 15.33, 13.82 and 13.60 months for goats in high, mid and lowland respectively (Table 3). The present results in respect of both species were lower than

the age at first lambing, ranged between 16.2 and 16.9 months, reported in mixed farming systems of sub-Saharan African countries (FAO, 2002); average AFL of 18.10 months at eastern Amhara region (Mesfin *et al.*, 2014) and AFL of 15.90, 15.85 and 15.63 months and AFK of 2.09, 2.07 and 2.16 years in Seka, Mana and Dedo districts of South-western Ethiopia (Yisehak *et al.*, 2013). Both AFL and AFK in the current study were indicators of early sexual maturity in ewes and does, respectively. The current result for AFK (Table 3) in highland (15.33) area was similar with the reported average age at first kidding of 15.01 months in different agro-ecological zones (high, mid and lowland) in Tigray, Ethiopia (Assen and Aklilu, 2012). However, the current results were higher than 12.7 months for AFL and 12.1 months for AFK in Alaba southern Ethiopia (Tsedeke, 2007) an average AFL of 12.4 months in Gamo gofa Zone, Southern Ethiopia (Fсахatsion *et al.*, 2013).

Weaning Age

The differences in weaning age in both species (Table 3) were found to be highly significant (P value = 0.001 and 0.000 in sheep and goat, respectively) across the three AEZS. The pair-wise comparison showed that HL-LL and ML-LL differences were significant in sheep and goats. The weaning ages of lambs were 3.84, 3.93 and 4.44 months in high, mid and lowland of agro-ecologies, respectively, in the present study. The result obtained in all the three agro ecologies for weaning age of lambs were lower than the overall average weaning age of 4.80 months (for both sexes) of indigenous sheep in western and south-western Ethiopia (Tsedeke, 2007 and Zewudu *et al.*, 2012). The weaning ages of kids were 4.67, 3.82 and 3.52 months in high, mid and lowland, respectively (Table 3). These findings were lower than the reported weaning ages of 6.27, 5.09 and 4.73 months for goats in moist dega, weyina dega and kola, respectively, in Dale district (Endeshaw, 2007) and in respect of goats in Alaba, southern Ethiopia (Tsedeke, 2007). However, weaning age of lambs (4.44 months) and kids (4.67 months) in low and highland of the current study were in agreement with reports of 4.4 and 4.7 months for lambs and kids in high and midland of Tigray zone, respectively (Assen and Aklilu, 2012). The possible reasons for lower weaning age in both species in the current study may possibly be (a) ewes / does suckle their lambs/kids for short period of time, (b) early weaning allows ewes / does to express estrous cycle earlier resulting in improved reproductive efficiency, and (c) farmers preference for more lamb / kid crop / unit time to earn more income. The latter two reasons impose stress on both lambs and kids affecting their weaning weight. Thus, special management is required at this stage for early weaned lambs / kids so that early weaning stress are overcome.

Slaughter Age /Market Age

The effect of AEZS on slaughter age (Table 3) was highly significant (P value = 0.000) in sheep but the same influence in goat was non-significant. In sheep the differences between HL-LL and ML-LL were

significant. The average slaughter ages were 6.34, 6.37, 7.33 months in sheep and 6.5, 6.39, 6.03 months in goats in high, mid and lowland areas, respectively. The results with respect to sheep showed that sheep in HL grow faster than the other two AEZS. This may possibly be due availability of better/ nutritious grasses in the grazing fields together with good climatic conditions in highlands. Perusal of results further showed that in both species young stock were slaughtered at an early age before attaining sexual maturity. The earlier reports also suggested that male lambs were sold as early as three to four months in mixed crop-livestock system of Horro and Bonga areas (Gemed, 2010). This practice of slaughter of young stock may decrease effective population size in both sexes thereby resulting in increased inbreeding coefficient.

Age at Sexual Maturity of Male (ASMM)

The ASMM in both species (Table 3) showed highly significant (P value = 0.000 in both species) differences among the three AEZS. The differences between HL-LL and ML-LL were significant in sheep whereas HL-LL and HL-ML differences were significant in goat. The ASMM were 8.79, 8.93 and 9.67 months in rams and 9.67, 8.38 and 8.16 months in bucks in HL, ML and LL, respectively. The current findings with respect to ram were higher than the reported ASMM of 8.42 and 8.8 months in HL and ML of Tigray region, respectively (Assen and Aklilu, 2012) and the average age of 7.1 months for Afar rams (Tesfaye, 2008). The age at first sexual maturity may be affected by weaning season and post weaning nutrition and thus through good management age at first sexual maturity could be substantially improved. The earlier reports showed that that well fed / supplemented ram lambs of Horro breed reached age at first sexual maturity at the age of 6-7 months at Bako Agricultural Research Centre (Galnessa *et al.*, 2003). The comparison of slaughter age and ASMM of the current results (Fig.1) showed that males of both species were slaughtered before they attain sexual maturity.

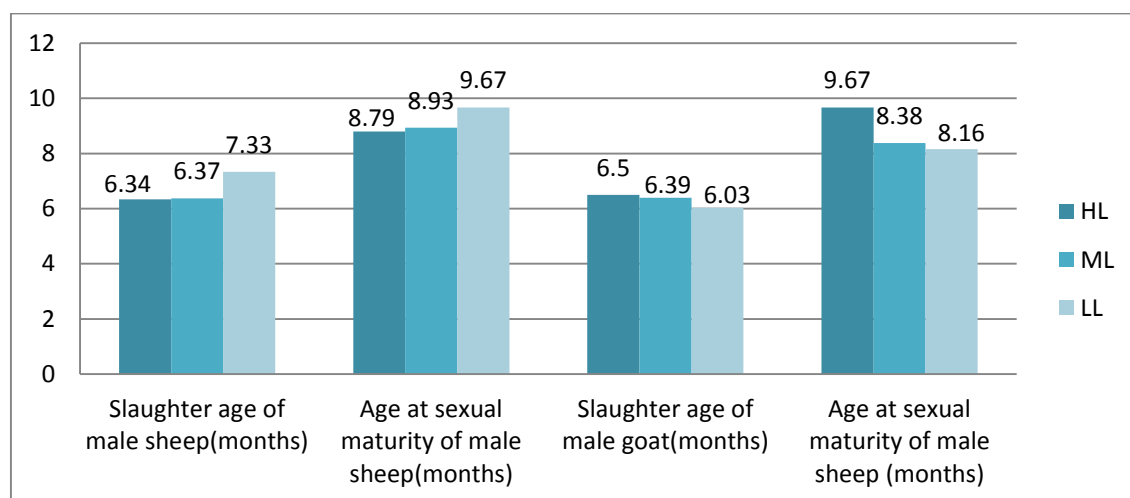


Fig. 1: Comparison of slaughter age and ASMM of male sheep and goat in three AEZs

This indicated that a good number of males were eliminated from the flocks at an earlier age and thus narrowing the selection base of males. This reduction in selection base of males will be a limiting factor in the improvement of both these species. Similar trends were reported by earlier workers (Gemeda *et al.*, 2010; Solomon *et al.*, 2010; Tesfaye, 2010 and Yenesew *et al.*, 2013). In order to stop this practice the farmers need sustained counseling / guidance so that male animals were retained after they attain sexual maturity and pass on their genes, if found good, to the next generation. This was important for sustainable utilization of available resources and to improve overall productivity.

Lambing (L) / Kidding Interval (KI)

Lambing or kidding interval is the interval between two consecutive parturitions that determines reproductive efficiency in small ruminant production. The AEZS had highly significant (P value = 0.000 in both species) influence on both lambing and kidding interval in the present study. The differences in the lambing interval between HL-LL and ML-LL were significant (Table 3). Similarly differences in the kidding interval between HL-ML and HL-LL were significant. The lambing intervals in the study areas were reported to be 8.73, 8.83, 9.56 months and kidding interval was 9.33, 8.22 and 8.10 months in high, mid and lowland, respectively. The lambing /kidding interval in the present study were higher than the earlier reports in small ruminants (Getahun, 2008, Belete, 2009 and Fсахastion *et al.*, 2013).

Litter Size (LS)

The litter size in both species was not influenced significantly by AEZS (Table 3). The litter size in sheep was 1.21, 1.18 and 1.16 in high, mid and lowland, respectively. The current results were within the range (1.08 - 1.75) reported for tropical breeds (Girma, 2008). The current litter size were higher than the reported close to one lamb per lambing for Menz and Afar sheep breeds (Tadele, 2010); 1.13, 1.11 for Bonga and Washera sheep, respectively, (Solomon *et al.*, 2010). The litter size in goats was 1.25, 1.32 and 1.21 in HL, ML and LL areas, respectively. These results were within the range of 1 - 1.7 from on station, on farm monitoring and breeds survey studies for different Ethiopian goat breeds (Solomon, 2014).

Reproductive Life Span of Female Sheep / Goat (RLSF; Months)

The variations in the reproductive life span of females in both species were significant (P value = 0.005 and 0.002 in sheep and goat, respectively) due to AEZS (Table 3). The pair-wise comparison showed significant differences between HL - LL and ML - LL areas in both species. The reproductive life spans were 129, 125 and 112 months in sheep and 98, 101 and 120 months in goat in HL, ML and LL AEZS, respectively.

Farmers Trait Preference for Small Ruminant Breeding

Source of Rams and Bucks

The results (Table 4) showed that there were only two sources for rams and bucks, viz: owned ram / buck and neighbor's ram / buck, in the three AEZs. The majority of respondents were using neighbors ram for mating and the values were 24.4, 13.9 and 3.3 % in HL, ML and LL, respectively. Similarly majority of respondents used neighbors buck in HL and ML (2.2 and 17.2 %, respectively) whereas in LL majority (9.4 %) used their own buck for mating. The current results were in disagreement with earlier reports indicating that majority of farmers reared their own ram in on-farm studies (Tesfaye *et al.*, 2010; 2011 and Fсахatsion *et al.*, 2013). The FGD showed that there were no cross or pure exotic sheep and goat breeds in the study areas.

Table 4: Source of breeding Ram and buck (in percentage) in three AEZs

Particulars	HL	ML	LL	Total
	N (%)	N (%)	N (%)	
Source of breeding ram				
Own	23 (12.8)	17 (9.4)	3 (1.7)	43 (23.9)
Neighbours	44 (24.4)	25 (13.9)	6 (3.3)	75 (41.7)
Total	67 (37.2)	42 (23.3)	9 (5.0)	118 (65.6)
Source of breeding buck				
Own	3 (1.7)	18 (10.0)	17 (9.4)	38 (21.1)
Neighbours	4 (2.2)	31 (17.2)	13 (7.2)	48 (26.7)
Total	7 (3.9)	49 (27.2)	30 (16.6)	86 (47.8)

Traits Preferred By Farmers for Selection of Breeding Rams and Bucks

The criteria for selection of breeding rams and bucks by farmers are presented in Table 5. The respondents ranked body conformation (size) as number one for selecting a breeding ram in all the three AEZs (0.51, 0.53 and 0.48 in HL, ML and LL, respectively). However second and third rank for selecting breeding ram differed in the three AEZs. In HL second and third rank was tail and age at maturity (0.27 and 0.13). However in ML and LL AEZs colour (0.25, 0.29 in ML and LL, respectively) and tail (0.10 and 0.11 in ML and LL, respectively) were ranked as second and third by the farmers.

This finding was in consonance with the earlier results that body size is a primary ram selection criteria in both crop-livestock (0.29) and pastoral (0.35) production systems in Menz and Afar areas (Tesfaye, 2008); ram selection based on body size (0.34), colour (0.28) and tail formation (0.27) in Adiyu Kaka district of Kaffa zone of Southern Nations, Nationalities of Ethiopia (Zewudu *et al.*, 2012); and body size as primary criteria in ram selection in weyna-dega in Gamo Gofa zone (Fсахatsion, 2013). The respondents ranked bucks (Table 5) on the basis of body conformation (size), colour and age at first maturity as first, second and third rank in all three AEZs in the present investigation. The indices estimated were 0.43, 0.51, 0.52 for body conformation; 0.34, 0.27, 0.40 for colour and 0.20, 0.17, 0.05 for age at first maturity in HL, ML and LL, respectively.

Table 5: Rank of desirable traits for selecting breeding rams and bucks for mating

Trait for	High land				Midland				Lowland				Over-all
	R1	R2	R3	I	R1	R2	R3	I	R1	R2	R3	I	I
(A) Rams													
Body conformation (size)	32.2	4.4	0	0.51	20.6	2.8	0	0.53	4.4	0.6	0	0.48	0.51
Age at first maturity	0	0	27.2	0.13	1.1	1.1	5	0.08	0.6	0	0	0.06	0.09
Colour	2.2	1.1	0	0.04	0	15	1.1	0.25	0	4.4	0	0.29	0.19
Libido	2.8	0	0	0.04	0.6	0	0	0.01	0	0	1.1	0.04	0.03
Adaptability	0	0	1.1	0.01	1.1	0	0	0.03	0	0	0.6	0.02	0.02
Tail	0	27.8	0	0.27	0	4.4	3.3	0.1	0	0	3.3	0.11	0.16
(B) Bucks													
Body conformation (size)	2.8	0	0	0.43	25.6	1.7	0	0.51	12.8	3.9	0	0.52	0.48
Colour	0	3.3	0	0.34	1.7	18.9	0	0.27	3.3	12.8	0	0.4	0.33
Age at first maturity	1.1	0	1.1	0.2	0	6.7	12.8	0.17	0.6	0	2.2	0.05	0.14
Libido	0	0	0.6	0.03	0	0	6.7	0.04	0	0	1.7	0.02	0.03
Adaptability	0	0	1.1	0.05	0	0	2.2	0.01	0	0	1.1	0.01	0.02

The current finding was in agreement with the reports that body conformation (size) followed by coat colour were found as the most important selection criteria of breeding bucks with the index values of 0.33 and 0.22 for Western Lowland goat keepers and 0.31 and 0.25 for Abergelle, respectively, (Solomon, 2014). The results revealed that in all the three agro-ecologies body size was the primary selection criteria for both ram and buck selection as parents of next generation. The possible reason may be that body size was an important economic trait that influenced market price, particularly in the traditional markets of Ethiopia. The body size of rams and bucks, which most of the owners associated with high carcass output and premium price across all the production systems, included wide chest, conformation and long body size.

Traits Preferred by Farmers for Selection of Breeding Ewes and Does

The farmers ranked (Table 6) body size, coat colour and lamb survival as first, second and third for selection of breeding ewes in all three AEZS, with indices of 0.45, 0.44, 0.44 for body size; 0.28, 0.31, 0.39 for coat colour; and 0.10, 0.17 and 0.17 for lamb survival in HL, ML and LL areas, respectively. The present results were in agreement with earlier report that body size (0.46), coat colour (0.17) and lamb survival (0.15) were the three criteria in ewe selection in eastern Ethiopia (Helen *et al.*, 2013). The criteria of doe selection showed minor variation in the ranking across three AEZS in present study (Table 6). In HL coat colour followed by body size and kidding interval were ranked first, second and third (0.36, 0.28 and 0.18, respectively) by the respondents. In ML body size, coat colour and kidding interval were ranked first,

second and third with index of 0.47, 0.26 and 0.11, respectively. However in LL body size, coat colour and kidding survival with index values of 0.47, 0.30 and 0.08 ranked first, second and third, respectively.

Table 6: Rank of desirable characteristics for selecting ewes and does for breeding

Traits for	High land				Midland				Lowland				Overall
	R1	R2	R3	I	R1	R2	R3	I	R1	R2	R3	I	I
Ewes													
Body size	32.2	0	0	0.45	20.6	0	0	0.44	4.4	0	0	0.44	0.44
Colour	0	30	0	0.28	1.1	20	0	0.31	0.6	5	0	0.39	0.32
Twining ability	2.2	2.8	6.7	0.09	0	1.1	0	0.03	0	0	0	0	0.04
Age at first lambing	2.8	0.6	0.6	0.05	0.6	1.7	0	0.04	0	0	0	0	0.03
Lamb survival	0	0	21.1	0.1	1.1	0	21.1	0.17	0	0	5	0.17	0.16
Lambing interval	0	3.3	1.7	0.03	0	0	0	0	0	0	0	0	0.01
Adaptability	0	0	0.6	0	0	0	0.6	0	0	0	0	0	0
Tail	0	0	0.6	0	0	0.6	1.7	0.01	0	0	0	0	0
Does													
Body size	1.7	0.6	0	0.28	22.2	4.4	0	0.47	12.2	4.4	0	0.47	0.41
Colour	1.1	2.2	0	0.36	2.2	17.2	0	0.26	2.8	10	0.6	0.3	0.31
Twining ability	1.1	0	0	0.15	1.1	2.2	0	0.05	0	0	3.3	0.03	0.06
Age at first kidding	0	0	0.6	0.03	0	1.1	3.3	0.03	0	0.6	0.6	0.02	0.04
Kids survival	0	0	0	0	1.7	1.1	1.1	0.05	1.7	0.6	1.7	0.08	0.04
Kidding interval	0	0.6	2.8	0.18	0	0	17.8	0.11	0	0	7.2	0.07	0.13
Adaptability	0	0	0	0	0	1.1	1.1	0.02	0	1.1	0	0.02	0.01

The current study indicated that overall attention was focused on observable traits, like body size, coat colour and twining ability / lamb survival (sheep) and body size, coat colour, kidding interval / kidding survival (goat), compared to production and reproduction traits in selecting breeding ewes and does. The possible reason may be absence of animal recording, illiteracy and other infrastructure (weighing balances etc) in Ethiopia.

Conclusion

The farmers practice of weaning of lambs / kids at early age may impose stress on them affecting their weaning weight. Thus special management is required for early weaned lambs / kids. The study showed that (a) majority of farmers do not own their breeding rams / bucks but use services of neighbor's rams /



bucks and (b) Good numbers of males were eliminated from the flocks at an earlier age for sale. Both these factors were narrowing the selection base of males and also reducing their effective population size thereby increasing the inbreeding level among the flocks. Thus a sustained farmers awareness programme needs to be organized on feeding requirements of early weaned lambs/kids, regular selection / management of superior body size males, regular culling of inferior animals so that sufficient number superior male animals were retained until they attain sexual maturity. This will broaden selection base of males, reduce inbreeding levels and thereby facilitate genetic improvement.

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