

*Full Length Research Paper*

# Participatory identification of breeding objective traits of Woyto-Guji goat in Loma district, Southern Ethiopia

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Received 17 February, 2015; Accepted 5 October, 2015

**Woyto-Guji goat breeds suitable for diverse purposes in the different production environments or ecological zones in the district. Farmers in different production systems have different trait preferences and the strategies followed by them are also as diverse as the agro-environments within which they operate. Socio-economic (cash, asset, security) and production or yield attribute (meat) were ranked first and second preferred traits by farmers with index of 0.47, 0.44 in lowland; 0.45, 0.42 in midland and 0.47, 0.40 in highland areas. that body conformation, adaptation, twining ability, coat color, ranked as first to fourth traits with index value of 0.22, 0.18, 0.16, and 0.15, respectively, by farmers for selection of females. In order to design a viable breeding plan, farmers' preferences for the different traits need to be investigated. Participatory definition of trait preferences was undertaken to pave the way for deriving economic weights of traits to develop selection indices.**

**Key words:** Goat breeding, purpose, traits preference.

## INTRODUCTION

Ethiopia is home for diverse indigenous goat populations, numbering 22.78 million heads (CSA, 2011) and 15 breeds of goat (IBC, 2004) that have traditionally been an integral part of the farming systems in all agro-climatic conditions. It has been estimated that about 70% of the goat population is found in the low lands and the rest 30% is found in the high lands (Alemayehu, 1993). Goat and sheep account for about 90% of meat and 92% of skin and hide (Adane and Girma, 2008) export trade value in Ethiopia. Moreover, goats play an important role in the livelihood of resource-poor farmers and they provide a vast range of products and services such as meat, milk, cash income, skin, manure and security (insurance), banking, gifts, etc. (Adane and Girma, 2008). Currently, the role of goats in improving the income and

livelihood of rural people in the region is gaining importance (Feki, 2013).

They overlooked the significance of livestock in the tropics, which transcends economic considerations and enters the social, cultural and ritual realm (FAO, 2009). Community based breeding programs have now emerged as promising approach in the tropics where-in farmers actively participate from the designs to the implementation of breeding programs. However, sustainability of such programs would depend on producer's interest which could also be influenced by socio-cultural, economic and geographical factors (Ilatsia et al., 2012). An understanding of producer's trait or breed preferences and selection criteria would enable breeders in the regions to effectively design sustainable

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**Table 1.** Purpose of keeping goats and their relative importance as ranked by households (HH).

Objectives	Lowland				Midland				Highland				Overall			
	R1	R2	R3	I	R1	R2	R3	I	R1	R2	R3	I	R1	R2	R3	I
Socio economic	53.3	44.4	33.3	0.47	51.4	42.8	28.6	0.45	52.8	42.8	37.1	0.47	52.5	43.3	33	0.46
Production	44.4	46.6	40.0	0.44	42.8	40.0	45.7	0.42	42.8	34.3	40.0	0.40	43.2	40.3	42	0.42
Socio-cultural	3.2	8.8	26.6	0.09	5.7	17.1	25.7	0.12	4.3	22.8	22.8	0.13	4.3	16.23	25	0.12

genetic improvement programs that would make possible to develop and promote appropriate goat genotypes that match with the prevailing socio-economic and cultural environments (Gwaze et al., 2009; Bett et al., 2011). More importantly, an understanding of selection criteria of goat keepers would provide information for deciding how to approach small ruminant herders in order to establish community-based breeding programs (Mbuku et al., 2006). This study was therefore, undertaken to explore the purpose of goat keeping, breed preferences and selection criteria used by goat owner households in Loma district.

## MATERIALS AND METHODS

### Descriptions of the study area

The study was conducted in Loma district, located at 6°55'N and 7°01'30"N latitude, and 37°15' E and 37°19'E longitude with an altitudinal range between 501 to 3300 masl. Loma is one of the administrative districts under Dawuro Zone of Southern Nations, Nationalities and Peoples Region (SNNPRS-BoFED, 2004; Mathewos, 2008). The total surface area is 145,320 km<sup>2</sup>, with average density of 13 persons per km<sup>2</sup> making the district one of the sparsely populated in lowland region. The Agro – Ecology of the district comprise of 45.6% lowland (less than 1500 masl), 41.4% midland (between 1500 to 2300 masl) and 13% highland (greater than 2300) out of the total land size of the district. The annual mean temperature ranges between 15.1 and 29.5°C and the annual mean rainfall ranges 900 to 1800 mm (LAR, 2013).

### Data

A total of 230 goats keeping households were surveyed across the study sites for the participatory definition of selection criteria/breeding objectives and description of the production system. Identification of the breeding objectives traits in participatory manner are a recommended approach for the sustainable breed improvement programs in tropics (Sölkner et al., 1998; Gizaw et al., 2010b; Wurzinger et al., 2011). In the present study, participatory own flock ranking methods adapted from (Mirkena, 2011) were applied.

### Statistical analyses

The SAS (2010) program was used to describe the survey data. Chi-square test was employed when required to test the independence of categories or to assess the statistical significance. Indexes were calculated for ranking data from individual households for site according to a formula: Index = sum of (3 for rank 1 + 2 for rank 2 + 1 for rank 3) given for an individual reason (attribute) divided by the sum of (3 for rank 1 + 2 for rank 2 + 1 for rank 3) for overall reasons. Indexes so generated were then used to rank the pooled importance of each attribute as selection criteria in each of the three sites.

## RESULTS AND DISCUSSION

### Purpose of keeping goats

The households in the study area raise goats for multiple purposes. The ranking of goat breeding

objectives by households are presented in Table 1. The results revealed that socio-economic (cash, asset, security) and production or yield attribute (meat) were ranked first and second preferred traits by farmers with index of 0.47, 0.44 in lowland; 0.45, 0.42 in midland and 0.47, 0.40 in highland areas. However, the socio-cultural (rites, ceremony, prestige and dowry) purpose was ranked third in all agro ecologies. The purpose of goat keeping in the present study was in complete agreement with the earlier report of Tekleyohannes et al. (2012) from South Omo where in households ranked socio-economic and production traits as first and second preference for goat keeping.

### Purpose of goat marketing

These results showed (Table 2) that the main reasons for sale of goats were to generate income to meet demands of cash in all the three agro ecologies (94.4, 92.8 and 91.4% in lowland, midland and highland, respectively). This suggested that goats have high financial and insurance functions in the study area. Besides sale of goats are easy compared to larger animals. This makes them suitable commodity to mobilize in times of compelling and urgent financial needs. Farmers purchased goats mainly for production purpose in all agro ecologies (56.6,

**Table 2.** Purpose of goat marketing (%).

Factors	Lowland (%)	Midland (%)	Highland (%)	Total (%)
<b>Sale of live goat</b>				
Cash	94.4	92.8	91.4	93
Culling	2.2	2.8	4.3	3
Cash and culling	3.4	4.3	4.3	4
<b>Purchase of live goat</b>				
Production purpose	56.6	65.7	60	60.7
Fattening	26.6	17.1	18.6	20.7
Slaughter at festival	11.1	8.6	11.4	10.4
Combination of production, fattening and festival	5.6	8.6	10	8.2

**Table 3.** Own flock ranking for preferred female goats within different agro ecologies (%).

Factors	Lowland						Midland						Highland						Overall
	R1	R2	R3	R4	R5	I	R1	R2	R3	R4	R5	I	R1	R2	R3	R4	R5	I	I
Body conformation	37.7	31.1	15.6	4.4	3.3	0.25	31.4	14.3	5.7	24.3	5.7	0.19	28.6	24.3	11.4	20	11.4	0.22	0.22
Coat color	22.2	23.3	17.7	21.1	5.5	0.20	20.0	11.4	8.5	12.8	15.6	0.14	12.8	10.0	8.5	24.3	8.5	0.12	0.15
Mothering character	-	-	13.3	23.3	8.9	0.06	-	-	12.8	11.4	-	0.04	8.5	17.1	8.5	2.8	11.4	0.10	0.06
Lamb survival	-	-	15.5	15.6	8.1	0.06	12.8	22.8	24.3	20	-	0.18	15.7	5.7	17.1	5.7	18.8	0.12	0.12
Twining ability	24.4	13.3	9.0	23.3	24.4	0.18	22.8	14.3	30.0	24.3	8.7	0.21	12.8	14.3	-	-	-	0.08	0.16
Short kidding interval	1.3	15.6	4.4	3.3	8.9	0.06	1.4	5.7	8.5	-	11.4	0.04	1.4	7.1	14.3	5.7	-	0.06	0.05
Age at 1 <sup>st</sup> maturity	-	-	4.4	3.3	12.2	0.02	-	-	-	-	14.3	0.01	-	-	8.5	8.5	14.3	0.04	0.02
Adaptation	14.4	16.6	23.3	5.5	12.2	0.16	11.4	28.5	10.0	7.2	20	0.16	20.0	21.4	25.7	24.3	20	0.22	0.18
Longevity	-	-	-	-	16.6	0.01	-	2.8	-	-	24.3	0.02	-	-	5.7	11.4	15.6	0.04	0.02

65.7 and 60.0% in lowland, midland and highland areas, respectively).

Adaptation traits, including grazing ability, disease resistance and ability to walk long distances were also mentioned as important preference reasons. The production system's conditions of complete dependence on utilization of natural resources, lack of inputs and the rigorous environmental conditions make

adaptation traits the pervasively most important attributes both for survival and production.

#### Trait preference for does

The results of preferred female traits by farmers from own flock ranking experiments are presented in Table 3. Perusal of these results showed that

the sampled respondent preference for trait differed in the three agro ecologies. The results pooled overall three agro ecologies showed that body conformation, adaptation, twining ability, coat color, lamb survival, mothering character, short kidding interval and age at first maturity/longevity were ranked as first, second, third, fourth, fifth, sixth and seventh traits with index value of 0.22, 0.18, 0.16, 0.15, 0.12, 0.06,

**Table 4.** Own flock ranking for preferred male goats within different agro ecologies (%).

Factors	Lowland						Midland						Highland						Overall
	R1	R2	R3	R4	R5	I	R1	R2	R3	R4	R5	I	R1	R2	R3	R4	R5	I	I
Adaptation	34.4	26.6	17.7	23.3	13.3	0.26	32.8	28.6	14.3	17.1	5.7	0.24	25.7	31.4	17.1	15.7	11.4	0.23	0.24
Body conformation	40.0	31.1	13.3	16.6	12.2	0.27	44.3	32.8	25.7	11.4	14.3	0.31	37.1	28.6	11.4	28.6	17.1	0.27	0.28
Coat color	20.0	24.4	27.7	23.3	5.6	0.22	12.8	17.1	10.0	28.6	11.4	0.15	31.4	22.8	20.0	14.3	11.4	0.23	0.20
Early maturity	-	5.5	12.2	13.3	26.6	0.07	-	4.3	18.6	22.8	28.6	0.10	-	-	22.8	18.6	29	0.09	0.10
Pedigree	3.3	7.7	23.3	5.8	18.8	0.10	10.0	11.4	10.0	5.7	7.2	0.10	5.7	5.7	17.1	-	-	0.07	0.08
Multiple birth	2.2	4.4	5.5	17.7	23.3	0.07	-	5.7	17.1	14.3	32.8	0.10	-	11.4	11.4	22.8	31.4	0.10	0.10

0.05 and 0.02/0.02, respectively, by farmers for selection of females. The ranking of trait preference by the farmers in the three agro ecologies showed some variance. The ranking of trait preference in order of descent was body conformation (0.25), coat color (0.20), twinning ability (0.18), adaptation (0.16), mothering character/lamb survival/short kidding interval (0.06), age at first maturity (0.02) and longevity (0.01) in lowland agro ecology.

Similarly the sampled respondents in midlands ranked traits in descending order as twinning ability (0.21), body conformation (0.19), lamb survival (0.18), adaptation (0.16), coat colour (0.14), mothering character/short kidding interval (0.04), longevity (0.02) and age at first maturity (0.01). In highlands body conformation / adaptation (0.22), coat colour/lamb survival (0.12), mother character (0.10), twinning ability (0.08), short kidding interval (0.06) and age at first maturity / longevity (0.04) were ranked as I, II, III, IV and V preferred trait in selection.

### Trait preference for bucks

Table 4 shows the relative importance of different traits in male and female breeding goats as

ranked by farmers across the sites. Results from the trait preference ranking for bucks shows that body size and conformation is among the top ranked attributes across sites. This shows that male goats are mainly kept for sale across the sites. High priority was also attached to coat color in selecting bucks at all the sites. This could be in response to the marketing system reported across the sites to be based on visual appraisal of animals' size, conformation and coat color and not based on body weights. Similar preferences to coat color were reported in Eastern Ethiopia in selecting male goats (Gebreyesus et al., 2013).

### CONCLUSION AND RECOMMENDATION

The study shows that trait preferences reflect the general production environment and market preferences operating in specific sites. Results also show that adaptation traits need to be put into consideration apart from productive traits in designing breeding programs for three agro ecologies of Loma around Omo river Valley of southern Ethiopia. Based on the results of the participatory breeding objectives trait that the community based genetic improvement strategy, based on ranking of goat breeding objectives and

selection criteria by farmers, should be given consideration while planning schemes for conservation, genetic improvement and sustainable utilization of Woyto-Guji goats

### CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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