

## **On-farm Characterization of Sheko Breed of Cattle in Southwestern Ethiopia**

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### **Abstract**

A survey work was carried out in Bench Maji Zone of southwestern Ethiopia to characterize Sheko breed of cattle and their breeding tract. Reconnaissance tour, focus group discussion, semi-structured interview, field observation, secondary data and linear body measurement were used to generate the dataset. Findings of this study indicated as the geographical distribution of Sheko cattle is mainly restricted to Bench Maji Zone (BMZ) and partly in the adjoining parts of Kaffa and Shaka Zones. It was also revealed as Sheko cattle are blocky, predominantly polled (84.8 and 89.9% in male and female population, respectively) and have horizontally-oriented broad and short ear, broad muzzle and reduced type cervico-thoracic hump. They are dominated by glossy-red hair coat. The main identified threats are interbreeding with Zebu cattle, scarcity of feed resources and lack of conservation program and reliable information on the status of the breed. Current population of Sheko cattle is estimated at 4040, which is far low from previous reports. Trypanosomosis and internal parasite are reported as main diseases. However, over two-thirds of the respondents reported that Sheko cattle possess trypanotolerance character. Average age at puberty for male and female population is 41.6 and 42.1 months, respectively. Average age at first calving and mean calving interval is 54.1 and 15.6 month, respectively. Average reproductive lifespan of a cow is 14.7 year with average calf-crop of 8.3. Average age at castration is 5.7 year. Average lactation milk yield is 698.3 liter with associated average lactation length of 9.9 month. Nearly, 22.1 and 7.8 percent of the sampled Sheko cows were reported to produce on average more than 1000 and 1400 liter of milk per lactation, respectively. Sheko oxen on average start draught work at

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3.4±0.81 year and have an average draught work life of 8.5±2.67 year. Moreover, 76 percent of the respondents reported as Sheko oxen surpass their Zebu counterparts in draught stamina and speed.

**Keywords:** Sheko cattle, on-farm characterization, trypanotolerance, performance, adaptation, taurine, southwestern Ethiopia

### **Introduction**

According to CSA (2004) report, Ethiopia has 40.6 million heads of cattle and considered as home of present-day cattle breeds of East and South Africa (Beyene and Biruke, 1992). It has also endowed with 23 identified breeds of cattle (Workneh *et al.*, 2004); even though, this is still far from complete (Takele, 2005). Despite abundant cattle population and diverse animal genetic resources, exploitation of this has rarely gone beyond subsistence efforts of smallholder farmers.

Sheko, the only taurine breed of East Africa region is one of the identified indigenous cattle breeds in Ethiopia. It possesses genetically important attribute- trypanotolerance. Even though, it is endowed with this valuable adaptation trait today the breed is endangered by zebu introgression (DAGRIS, 2003; Takele, 2005). Despite its special qualities and uniqueness, little information is available on Sheko breed and its production environment. This study was, therefore, carried out to characterize Sheko breed of cattle and its breeding tract so as to collate information on special qualities and status.

### **Materials and Methods**

#### **The study area**

Bench Maji Zone, the natural breeding tract of Sheko breed of cattle located in the per-humid agro-ecological zone of southwestern Ethiopia. The soil is generally red brown with scattered tracts of red color. The annual average temperature ranged from 20 to 40 °C with the mean annual rainfall of 1200 to 2000 mm and the main rainy season lasts from June to September (BMZRDMD, 2004). The tract lies 850 to 3000 m.a.s.l, approximately between geographic coordinates of 5°12' and 36°18' N latitude and 34°30' and 36°12' E longitude.

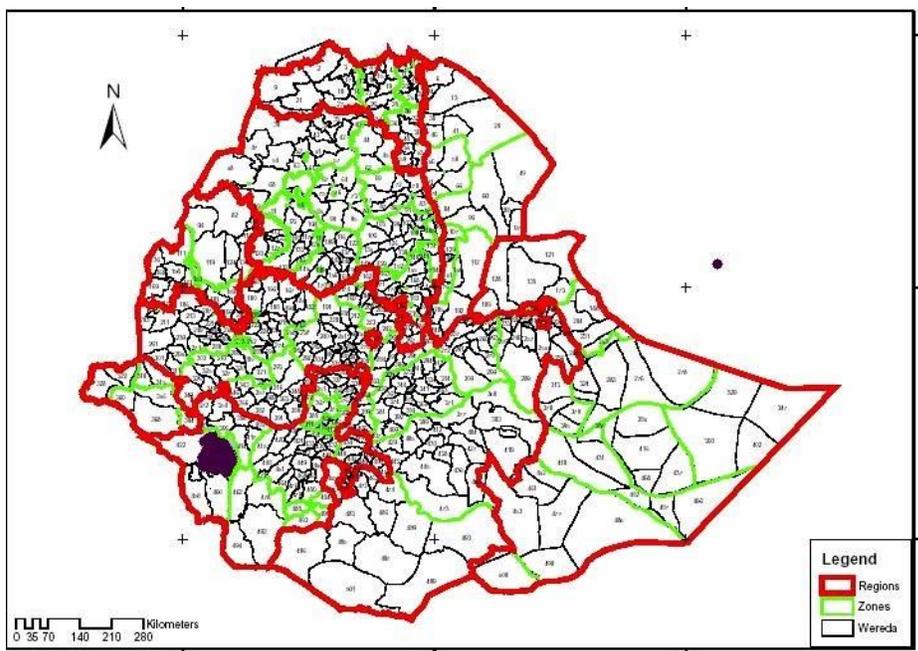


Figure 1. The study area (shaded part)

## Methods of sampling and data collection

### Reconnaissance and rapid surveys

A reconnaissance survey was made to familiarize with the existing agro-ecological zones and production systems. Information was then gathered using rapid survey encompassing collection of secondary data, wayside informal talks and key informant contacts. The information obtained from rapid survey indicated the heterogeneity of the breeding tract.

### Identification and stratification of the study area

Based on the results of the rapid survey three districts were identified as main distribution centers of Sheko cattle. Agro-ecological classification of the study districts was made into lowland (<1500masl) and highland (>1500masl), which constitute 52 and 48 percent of the study area, respectively. Similarly, distribution density of the breed in question was categorized into low (<2%), medium (2 to 5%) and high (>5%) density of Sheko cattle. Based on this information a sampling frame was developed to conduct focus group discussions.

### **Focus group discussions**

Based on the stratification made focus group discussions were held in 10 sites- Miruns, Giz Meret, Selale and Gaizika in Sheko district; Kite, Zozo, Debre Work, Temenja Yazhi and Genja in Bench district and Maha in Shei Bench district. Elders, village leaders and individuals endowed with extensive knowledge on socioeconomic situation and cattle husbandry system were selected by the help of local Agriculture and Rural Development staffs and Peasant Association leaders for group discussions. On average 7 persons (range 3 to 13) were participated in the discussion.

### **Key informants contact and way side informal talk**

Key informants contact and way-side informal talks were made side by side with focus group discussions to substantiate and to cross check ideas forwarded during focus discussion.

### **Interview**

Most of the dataset on phenotypic characteristics of Sheko cattle were gathered by individual interview of 129 Sheko cattle owning households using a pre-tested semi-structured questionnaire.

### **The nature of the data**

The questionnaire was designed based on the information check lists developed by FAO (2000). Both the qualitative and quantitative variables collected on morphological appearance were adapted from the standard breed descriptor list developed by FAO (1986). Linear body measurement was taken using standard measuring tape. Both qualitative and quantitative variables were recorded in pre-coded format.

### **Data analysis**

The data were analyzed using frequency and mean procedures of the descriptive statistics of SAS (1999).

## **Results**

### **Origin and geographical distribution**

No specific information was generated in this study about the origin of Sheko cattle. Sheko breed mainly found in BMZ and partly in the adjoining parts of Kaffa and Shaka Zones. Sheko breed derives its name from Sheko area and its breeder "Sheko ethnic group". It is known under numerous local names *viz* Goda, Tunt, Tunibey, Dello, Mulge, Mugul, Gombel, Semo and Dobe

(all of them literally describe as the breed is either polled or has floating type of horn), with Goda being the most commonly reported synonym.

### **Distinguishing features**

#### **Qualitative traits**

The distinguishing features of Sheko cattle are prominent eye, folded type of eyelid, horizontally-oriented broad and short ear, broad muzzle and blocky appearance. Moreover, majority of them are polled (while the rest have stumpy or curved type floating horn) and characterized by having reduced type cervico-thoracic hump. Sheko dominated by glossy-red coat appearance. Plates of Sheko cow and ox in their natural breeding tract are depicted in Figures 2 and 3, respectively.

Figure 2. Sheko cow on communal grazing land





Figure 3. Sheko ox at night enclosure

### Quantitative traits

Linear body measurements taken from Sheko cattle are summarized separately for female and male population in Tables 1 and 2, respectively.

Table1. Summary of linear body measurements for female population (cm)

Variable	N	Mean	Std. Dev	Minimum	Maximum
Chest girth	167	136.5	7.51	118.0	164.0
Body length	167	110.2	6.34	97.0	129.0
Height at wither	167	99.4	4.95	87.0	117.0
Pelvic width	167	33.5	2.23	29.0	40.0
Ear length	167	16.6	1.73	12.0	22.0
Teat length	167	3.4	0.75	2.0	6.0
Face length	167	39.5	2.59	31.0	46.0
Canon bone length	167	12.8	1.64	9.0	18.0
Canon bone circumference	167	13.4	0.84	11.5	18.0
Dewlap width	167	12.6	2.76	6.0	21.0
Naval flap width	167	2.7	1.93	0.3	9.0
Neck length	167	29.9	5.47	20.0	47.0
Horn length	17	14.8	9.03	3.0	33.8

Table 2. Summary of linear body measurements for male population (cm)

Variable	N	Mean	Std. Dev	Minimum	Maximum
Chest girth	46	141.2	9.21	120.0	159.5
Body length	46	114.6	7.51	98.0	127.0
Height at wither	46	103.6	5.98	93.0	118.0
Pelvic width	46	32.8	2.11	27.0	36.0
Ear length	46	16.6	1.75	13.6	20.0
Face length	46	40.8	2.46	36.0	49.0
Canon bone length	46	12.1	1.14	9.0	14.0
Canon bone circumference	46	14.8	1.13	13.0	18.0
Dewlap width	46	16.8	3.65	10.0	25.0
Perpetual sheath width	46	7.6	2.68	3.0	15.0
Neck length	46	30.2	5.69	20.0	45.0
Horn length	7	7.6	5.21	3.5	18.5

#### Threats and current status

Main constraints reported by focus group discussants and key informants in the breeding tract were shortage of feed, shrinkage of grazing land, encroachment of crop farming, indiscriminate interbreeding with local zebu, lack of reliable information on the status of the breed and conservation program, relatively more feed requirement, prevalence of diseases and nuisance from biting flies.

#### Population statistics and distribution density

The total population of Sheko cattle is estimated at 4040, which constitutes 2788 breeding females, 266 breeding males, 651 working oxen and 335 calves. The ratios of male to female and breeding bull to cow in the sampled herd were 1:2.9 and 1:10.6, respectively. Adult animals over 3 year constitute 91.7 percent of the herd.

In the sampled Peasant Associations (PAs) the minimum and maximum distribution density of Sheko cattle is 0.8 and 13.2 percent of the herd in Shimi and Kersheka PAs of Sheko and Bench districts, respectively. However, proportion obtained from accessed Sheko cattle owning households herd ranges from 8.3 to 100 percent with average value of 25.2 percent. Out of the interviewed 129 Sheko cattle-owning households only 3.1 percent of them keep pure herd of Sheko cattle.

Table 3. Summary of population estimate

District	Sampled PAs	Total cattle	Sheko (%)	Districts' total
Sheko	8	7809	1.6	300
Bench	21	74512	2.2	2130
Shei Bench	6	22637	1.4	1150
Adjacent districts*				310
Adjoining zones**				150
Total				4040

\* Meanit Goldia, Meanit Shasha and Gura Ferda

\*\* Kaffa and Shaka

### Management practices

Sheko, Bench, Maenit and Kaficho ethnic groups mainly involve in breeding and management of Sheko cattle. The husbandry practice is characterized by low-input low-output system. About 95.3 percent of the owners house their animals at night and part of the day at their home, while the rest keep at night enclosures and open yards. House wives perform milking and cleaning of the yard more frequently while the husband is mainly responsible for sale and purchase of cattle.

### Feeds and feeding

Sheko cattle are reared on natural pasture under continuous grazing system. Sheko cattle graze on fallow land, wetland, forest and bush, and bund of farm. Tethering and cut-and-carry are mainly practiced in areas where there is shortage of grazing land and herding labor. The practice of feed conservation is almost non-existent in the entire breeding tract. However, supplementation with non-conventional feed sources such as leftover of "Chemo" (a hot drink prepared from green leaf of coffee and spices such as garlic, red paper and ginger for human consumption), taro and grain husk is common. "Dekin" a seed collected from forest tree, "Attela" a local beverage byproduct, leaves from some trees, shrubs and herbs (*Vernonia amygdalina*, *Millettia ferruginea*, *Manilkara butigi*, *Ricinus communis*, *Sapium ellipticum* and *Dracaena steudneri*) also form part of the feed resource base.

Sources of mineral constitute table salt and the blue-green water-like mineral "Zaa". In most of the cases animals drink this non-conventional mineral source by themselves. "Zaa" constitutes about 21.8 percent of the mineral source in the sampled households.

### **Disease prevalence and health management**

Trypanosomosis and internal parasite were reported as main diseases. Over two-thirds of the respondents reported as Sheko cattle are endowed with trypanotolerance attribute. The reported main reasons for this attribute are summarized as black coat color which is known to attract biting flies is rare in Sheko cattle. They are sturdy, thus, they do not lose their body condition during lean seasons of the year. Moreover, it was reported as having thicker skin which is hard enough for biting flies attack. Sheko cattle are affected less frequently by trypanosomosis even during the main season of trypanosomosis challenge. Even when they are affected they do not need frequent medication and recover without treatment in most of the cases. Death due to trypanosomosis was also reported to be rare.

### **Milk production**

The reported average lactation length and daily milk yield of Sheko cows is presented in Table 4.

Table 4. Reported average lactation length (month) and milk yield (litre) (N=77)

Variable	Mean	Std. Dev	Minimum	Maximum
Lactation length	9.9	4.04	4.0	24
First lactation daily milk yield	3.3	1.45	0.5	9
Second lactation daily milk yield	2.3	1.11	0.3	8
Third lactation daily milk yield	1.3	0.85	0.3	6
Total lactation milk yield	698.3	478.02	40.0	2760

Nearly, 22.1 and 7.8 percent of Sheko cows were reported to produce on average more than 1000 and 1400 liter of milk per lactation, respectively. This is a promising potential to carry out breed conservation and improvement and to utilize this breed for crossbreeding.

### **Draught capacity**

Sheko oxen start ploughing at average age of  $3.4 \pm 0.81$  with a minimum and maximum of 2 and 6 year, respectively. On average they can perform this function for  $8.5 \pm 2.67$  with a minimum and maximum of 5 and 18 year, respectively (N=126). Seventy six percent of the respondents reported as Sheko oxen surpass their Zebu counterparts in draught capacity. Moreover, it was reported that Sheko oxen have appreciable speed and stamina. Therefore, as it is depicted on Figure 4, rope is usually knotted around the muzzle of Sheko oxen to minimize and thus to balance the draft speed with the accompanying zebu oxen.

### Reproductive performance

The reproductive performance of Sheko cattle is detailed in Table 5. Calving takes place year round. Visited households reported no case of multiple births. Natural mating is solely practiced in the entire breeding tract. Abortion as reproductive disorder was reported by 7.8 percent of the respondents.

Table 5. Reported reproductive performance of breedable animals

Variable	N	Mean	Std. Dev	Minimum	Maximum
Age at puberty in male (mo)	129	41.6	11.16	24.0	84.0
Age at puberty in female (mo)	129	42.1	11.52	24.0	96.0
Age at first calving (mo)	129	54.1	11.76	36.0	108.0
Reproductive lifespan of cow (yr)	129	14.7	3.24	6.0	23.0
Lifespan calf crop production (n)	129	8.3	2.08	3.0	13.0
Calving interval (mo)	129	15.6	4.56	12.0	24.0
Reproductive lifespan of bull (yr)	126	6.5	1.63	3.5	12.0
Castration age (yr)	117	5.7	1.40	3.0	10.0



Figure 4. Sheko ox (blocky and polled) on draught operation

## Discussions

### Origin of the breed

Origin of the breed was quite vague for the respondents. However, Alberro and Haile-Mariam (1982a), DAD-IS (2000) and DAGRIS (2003) reported as Sheko cattle are the only remaining representatives of the *Brachyceros* type and last remnants of original Humpless Shorthorn (*Bos taurus*) cattle in east Africa. Unlike their West African Shorthorn counterparts, which was revealed from extensive review of Rege *et al.* (1994), Sheko are good milk producers and dominated by polledness (84.8 and 89.9% in male and female population, respectively).

### Geographical distribution

A similar type of description was made about geographical distribution of Sheko cattle by DAGRIS (2003) and Alberro and Haile-Mariam (1982a). Sheko cattle which are known by few synonyms in the reports of Alberro and Haile-Mariam (1982a); DAD-IS (2000) and DAGRIS (2003) were found to have more synonyms which was substantiated by our study. Surprisingly, none of the study communities were familiar with the name Sheko as describer of this breed. Therefore, it is imperative to know vernaculars of the breed as component of descriptor list development.

### Qualitative traits

Similar to our findings red plain coat was reported as dominant coat color by DAGRIS (2003) under *ex situ* on station condition. However, the present finding was not in agreement with what had been described by Alberro and Haile-Mariam (1982a) about coat color of Sheko cattle under *in situ* condition. The phenotypic description made about presence of horn in Sheko cattle disagrees from the reports of both DAGRIS (2003) and Alberro and Haile-Mariam (1982a). According to our findings to be qualified as true-to-type Sheko breed either polledness or having floating type of horn is the required criterion. However, other phenotypic descriptor lists reported by DAGRIS (2003) and Alberro and Haile-Mariam (1982a) are in line with the findings of our study.

### Quantitative traits

Even though, few data are available on DAGRIS (2003) since data are taken from very few animals (3 animals only) and under *ex situ* on station condition, they may not reflect the real values of the morphometric measurements. Moreover, even though, Sheko were reported as small-sized breed (Alberro and

Haile-Mariam 1982a), they are quite large in size compared to some breeds of Shorthorn Abyssinia Highland Zebus like Gurage.

#### **Threats and current status**

The population of Sheko cattle estimated by this study is far below from the previous estimates of DAD-IS (2000) and DAGRIS (2003). This indicates that Sheko cattle population is decreasing. Even though, according to the criteria set by FAO (2000) which uses the number of breeding animals as indicator to categorize the status of a given breed may not place this breed under endangered category; sparse distribution density of the breed coupled with declining tendency for controlled pure breeding declares an alarming state of affairs on its status (Table 3). Interbreeding with local zebu is still the main threat for endangerment of Sheko breed, which is in agreement with the previous report (DAGRIS, 2003).

#### **Feeds and the feeding practice**

Farmers feeding strategies are on gradual shift from herding to tethering and cut-and-carry feeding system as herding requires a significant amount of labor largely provided by school-aged children. Moreover, in agreement with what had been described by UNDP (2003) family labor is predominately devoted to growing food crops. Despite reported feed shortage, feed conservation practice is non-existent in the study area as seasonal inadequacy of feed have rarely been corrected by conservation in developing countries (Makkar, 2002). However, this may be partly compensated by the use of non-conventional feed sources similar to what had been described by Jackson (1980). Thus, better utilization of non-conventional feed resources which do not compete with human food is imperative (Makkar, 2002). In this regard there is still a potential to use non-conventional feed sources to overcome the effect of feed shortage. To achieve this, efforts need to be geared towards developing methods of better utilization of the existing non-conventional feed sources.

#### **Health management**

Tsetse fly has infested estimated area of 135,000-220,000 km<sup>2</sup> (Bourn *et al.*, 2001) in west and southwest of Ethiopia. Thus, the breeding tract of Sheko cattle, which is found at the fringe of southwestern Ethiopia classified as trypanosomosis endemic area. It was also reported by Lemecha *et al.* (2006) that trypanosomosis is as one of the major impediments to livestock sector development in west and southwest Ethiopia. Moreover, due to warm and humid to per-humid agro-ecological zone (Lemecha *et al.*, 2006) internal

parasite infestation is a commonly encountered disease types in the study area.

Even though, the breeding tract is tsetse infested, it was substantiated under *ex situ* on station condition (Lemecha *et al.*, 2006) and by on farm studies (Takele, 2005), that Sheko cattle possess trypanotolerance character. Reported indicators about trypanotolerance attribute of Sheko from on farm study go in line with what had been described by van der Waaij (2001). Sheko survives in trypanosomosis endemic area. Furthermore, as taurine allele is probably the oldest one on the continent (Bradley *et al.*, 1996; Hanotte *et al.*, 2000), this long survival of the taurine Sheko in tsetse infested area may be resulted in the development of trypanotolerance character as a natural mechanism to mitigate the challenge of trypanosomosis. Sheko has genetic relationship with Shorthorn West African cattle (Alberro and Haile-Mariam, 1982a), which are proved to possess this genetic attribute (Murray *et al.*, 1984; Roelants, 1986; Maule, 1990).

#### **Milk production**

The reported mean lactation yield is higher than what had been described by DAD-IS (2000) for Sheko cattle, Workneh and Rowlands (2004) for Oromiya Region and FAO (2004) for the national average. Moreover, the reported mean lactation length is more than the report of DAD-IS (2000) for Sheko cattle. However, the lactation length found in this study is similar to what had been reported by Yitaye *et al.* (2000) for indigenous cattle in southern Ethiopia.

#### **Draught work**

A similar report was described about average of starting draught work in Ethiopia by Watson (1981), even though, as low as 2 year of age was reported for starting of draught work in the case of Sheko. However, age at first plowing is lower than the reports of Alganesh *et al.* (2004) and Chala *et al.* (2005).

#### **Reproductive performance**

Averages of age at puberty, age at first calving and mean calving interval in Sheko cattle were found to be less than what had been reported by Alganesh *et al.* (2004) for indigenous cattle of west Wellega and by Zewdu (2004) on Semien, Wogera Sanga and Fogera cattle in Northwestern Ethiopia. Reported average lifetime calf crop production in Sheko cow (Table 5) is higher than what had been reported by Gebregziabher and Mulugeta (2006) as highest for Horro cows ( $5.2 \pm 0.24$  calves). Similarly, reproductive lifespan of Sheko cows

also longer from what had been described for Horro ( $10.1 \pm 0.01$  year) (Gebregziabher and Mulugeta, 2006).

### **Conclusion**

Sheko breed has special qualities of trypanotolerance and adaptation to terrain stress and warm and humid condition of its breeding tract. It also has a promising potential of milk production and draft power. However, its genetic integrity is highly threatened by zebu introgression. This condition in turn results in genetic dilution and numeric scarcity. To halt this situation and to utilize this unique breed for food and agriculture production there is urgent need of planning a community-driven and government-supported conservation and breed improvement program.

To explore the genetic potential of this unique breed, we recommend an in depth extensive research for development study especially under on-farm condition. Moreover, effective management of major constraints has to be given special attention to utilize the special qualities of this unique breed and to increase its population size.

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