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Full Length Research Paper

Husbandry and reproduction practices of cattle in Mursi and Bodi pastoral communities in Southwest Ethiopia

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This study was conducted with the objectives of documenting the husbandry and breeding practices of Mursi and Bodi communities who keep Mursi cattle breed in the pastoral production system of southwest Ethiopia. The pastoral communities raise more number of cattle (54.27 heads) compared to goat (6.47) and sheep (1.24). Sale of cattle is the main income source, while sale of honey and goat ranked second and third. The main purpose of keeping cattle is for milk production and blood as source of food, sources of income and social functions. The number of milking cows was higher (P<0.001) in Mursi (10.22) than Bodi (6.02 heads) community herds. The proportion of milking cows on average was 45.02% of the total breeding females. The ratio of breeding male to female was 1:9.8. This ratio was bigger (P<0.05) in the Mursi (1:11.28) than Bodi (1:7.73) community. The pastoralists select breeding animals based on their trait preferences. The traits preferred were milk yield, adaptive ability, coat color and ability to survive and produce on low quantity and quality feeds. Breeding males were selected based on coat color, body size and fertility by both pastoral communities; whereas, female animals were selected on the bases of milk yield, coat color, fertility and udder size. Male cattle are castrated at the age of 4.17 years, which is different (P<0.01) between Bodi (3.58) and Mursi (4.59) communities. Indigenous husbandry and breeding practices would be used as a basis for designing and implementation of appropriate breed improvement programs.

Key Words: Breeding practice, husbandry practice, Mursi cattle breed, pastoral production system, selection criteria, trait preference.

INTRODUCTION

Ethiopia is home to large indigenous cattle populations with diverse breeds, ecotypes and characteristics. The cattle populations are categorized into five major breed groups viz: Large East African Zebu, Small East African Zebu, Senga, Zenga and the Taurine (humpless shorthorn) types (Rege 1999; Rege and Tawah, 1999; Workneh et al., 2004) and they are classified into 23 indigenous breeds/eco-types. Of the total cattle population found in the country, 99.4% are indigenous types owned and managed by smallholder farmers and pastoralists (IBC, 2004; Workneh et al., 2004; Rowlands et al., 2006). The different cattle breeds are adapted to the diverse agro-ecology and production systems in the country.

The distribution and survival of cattle populations across the different agro-ecology of the country provide various use options to the smallholder farmers and pastoral communities. Milk, meat, income and other social functions are the main purposes for which cattle are kept for. However, the productivity of these local cattle are low due to absence of genetic improvement interventions, low level of inputs, traditional husbandry practice as well as high environmental stress on which they are inhabited (Azage et al., 2009; Azage et al., 2010). Nevertheless, the breeds have desirable traits for which they are preferred by the keepers and produce subsistence amount within the existing challenges. The

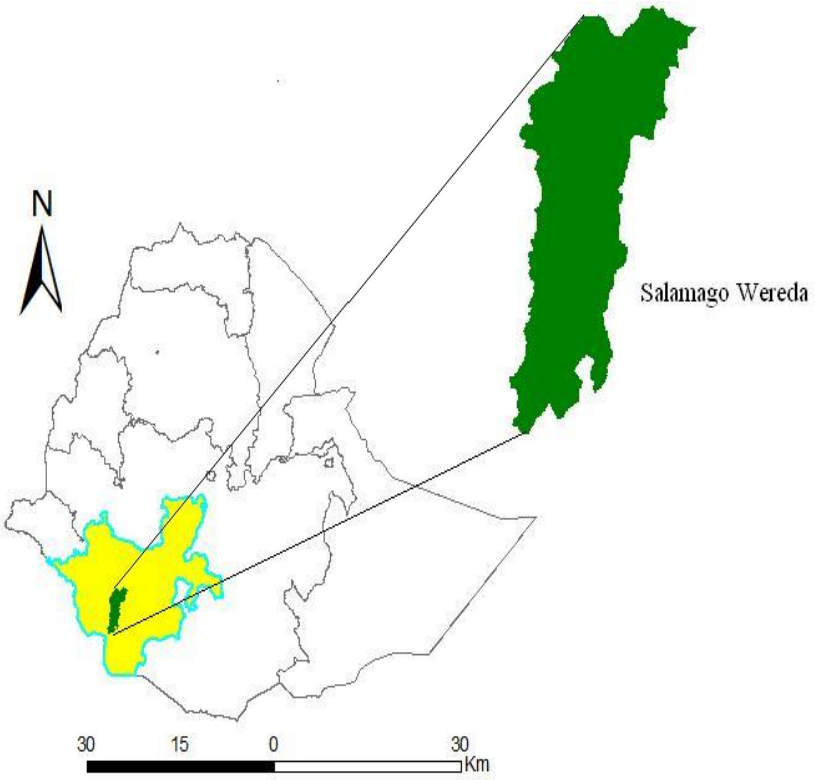

Figure 1. Map of Ethiopia showing the present study area, Salamago Wereda.

Mursi cattle which are found in the South Omo district of southwest Ethiopia (Figure 1) (Rege and Tawah, 1999; DAGRIS, 2007) are categorized as Small East African zebu cattle. This cattle breed is found in the tsetse belt of trypanosomosis epidemic area of southwestern Ethiopia, where the breed survives, produces and reproduces with no or little therapeutic or prophylactic treatments against the disease. This study was therefore conducted in order to characterize (that is, to identify husbandry practices, herd composition, owners' trait preferences and breeding practices) the Mursi cattle in its production environment. The study also aimed at generating baseline information that would inform possible improvement strategies and options for the breed.

MATERIALS AND METHODS

Study location

The study was conducted in South Omo administrative zone in *Salamago Wereda*. The *Wereda* is located at 870 km to the South-west of Addis Ababa. The study area lies between 6° 19´ and 7° 10´ N latitude and 15° 12´ and 22° 25´ E longitude, with total land size of 451.12 km^2 (Figure 1). The area receives bimodal rainfall in which the long rainfall occurs in the months of March to June while the short rainfall season is in the months of August to October. The annual average temperature of area was recoded to be 29°C (range of 20 to 37.5°C). The vegetation type of the area is dominated by scattered woodland, savanna and large plain grassland. *Acacia, Combretum* and *Grewia* are common woody plant species, whereas *Cynodon, Brachiaria, Heteropogon, Cymbopogon, Aristida,* and *Chloris* are common grass species found in the area and is dominated by sandy clay and clay loam soil (Muluneh, 2008).

Two locations in the Wereda were selected after series of consultations with the local development professionals and agencies (that is, zonal and Wereda agriculture and rural development office professionals) on Mursi cattle breed and its distribution in the zone. The selected locations included two pastoral ethnic groups: the Bodi and Mursi people who keep the Mursi cattle. The two pastoral communities were assumed to have different cattle husbandry and breeding practices.

Data collection

The study was conducted from December 2009 to January 2010. A total of 102 heads of households were randomly selected and interviewed. Data was collected using structured questionnaire, and information was obtained through interviewing the household heads. Additional information on the production system and cattle husbandry practices was collected from a serious of focused group discussions with community elders. The information collected included: household characteristics, purpose of keeping the cattle breed, herd composition, trait preference, selection criteria used by the communities as well as the general cattle husbandry and breeding practices as is the case with the two communities.

Data analysis

Data was interred and cleaned using Statistical Package for Social

Sciences (SPSS, 2007) software package. The same software was employed to analyze descriptive statistics for qualitative data. While, quantitative data was analyzed using the general linear model of SAS (Statistical Analysis Software) (SAS, 2002) and T-test was employed to compare the significance level of the two location means (*Bodi* and *Mursi*). Indices were calculated to analyze the ranking of individual response on income source, purpose of keeping Mursi cattle, trait preference, selection criteria and major cattle production constraints. The index was calculated as: Index = Sum of (3 times rank 1 + 2 times rank 2 + 1 times rank 3) given for an individual reason divided by the sum of (3 times rank 1 + 2 times rank 2 +1 times rank 3) for overall reasons.

RESULTS

Household characteristics and income source

The household characteristics of the two communities are presented in Table 1. In this study, male headed household is defined as a married person who maintains and is running a household; whereas female headed household is a widow or divorced woman who maintains and is managing a household. Of the total households sampled, the majority (97.1%) were male headed while only 3% were female headed households. The overall average family size of households was 6.67 persons and the average family size in the two locations was no significantly different, with 6.42 persons per household in the Bodi and 6.88 persons in the Mursi pastoral communities. The female to male ratio in each household family member was found to be 1:1.1 and was not different for the two communities (Table 1). Income sources of the two pastoral communities, the Bodi and Mursi, were similar and mainly came from sales of livestock and apiculture. The respondents' income source ranking index computed (Table 2) showed that income derived from cattle sales ranked the highest (0.62) followed by honey (0.21) and goat (0.12) sales. Milk and milk products are the main sources of food for the households in two of the communities. These products are rarely sold and therefore make negligible contributions to family income. However, households that have access to local markets reported that they often sell milk and butter during the wet season, when milk is abundant.

Livestock are sold and the revenue used to purchase food grain and medications. However, there is poor access to livestock market in the study districts. There is almost no road access these areas, leading to high transportation costs. Given the limited financial capacity of the local traders, their involvement in livestock trade is limited. As a result, people barter their cattle for food grains with traders from elsewhere, especially the nearest town.

Species of livestock and number kept by Bodi and Mursi pastoral communities

The Bodi and Mursi pastoral communities raise cattle, goat and sheep and rarely chicken. The mean cattle number possessed per household were estimated to be 54.27 head (Table 3). The Mursi people keep significantly ($P < 0.001$) larger herd per households (62.95 head) than the Bodi (41.47 head). While, goat are the second largest livestock species owned by the two pastoral communities (6.17 heads per household) with the Bodi keeping on average 8.57 goats per household, which was significantly ($P < 0.01$) higher than those kept by the Mursi people (4.19 heads). Cattle is the most valuable livestock species in the study area, and comprises of 96.7% of the total TLU (Tropical Livestock Unit) followed by goat (2.7% TLU) and then sheep (0.5% TLU) (Table 3).

Cattle herd structure

Herd structure including age and sex of Mursi cattle breed in the sampling population is summarized in Table 4. On average, it was observed that a large number of castrated (9.79 heads) animals were kept by households. In proportionate terms, this comprised 19.2% of the total animals in the herd and was significantly ($P < 0.01$) lower in the Bodi herds (8.04 heads) than in Mursi herds (11.08 head). The mean number of breeding bulls kept by pastoralists were the fewer (2.65 head per household) in the herd compared to other age groups. The mean number of milking cows per household was found to be 8.42 head (that is, 16.2% of total herd size), and 45.02% the total breeding females. The mean number of milking cows was found to be significantly ($P < 0.001$) higher in the Mursi (10.22 heads) than in the Bodi (6.02 heads) communities.

Overall female to male cattle ratio was 1:1.3 for both communities, and 45.33% of the herds were males while 54.67% were females. While, the ratio of breeding bulls to breeding female was 1:9.78 (that is, approximately 10 breedable females for every breeding bull) in the community herds. Among the Mursi herds, the female to male ratio was significantly ($P < 0.05$) higher in the Mursi (1:11) than in the Bodi (1:8).

Purpose of keeping Mursi cattle

Major functions ranking indices of Mursi cattle breed are summarized in Table 5. Mursi cattle are multipurpose animals raised for their different functions. The local pastoralists keep these cattle primarily for milk production [Bodi (0.45) and Mursi (0.51)]. The second most important purpose for keeping these cattle was identified by the Mursi communities was blood as food (0.30). On the contrary, the Bodi community ranked blood for food a distant 3rd (0.08), with the social functions of the breed being ranked second (0.20) by the same community after milk production. Keeping of the cattle as income source was not as important and was ranked third (0.07) by the

Mursi and fourth (0.08) Bodi people. Slaughtering cattle for domestic meat consumption is not commonly practiced by both Mursi and Bodi pastoralists; and except for key cultural community level and household level ceremonial occasions, only the old, weak and unproductive animals are often slaughtered.

Trait preferences

The majority (79.2%) of the respondents stated that the cattle breed they have owned belongs to the local cattle type, which they know as 'Mursi cattle' (Rege, 1999). Phenotypically the breed looks very distinct and can be differentiated from the cattle types in their bordering districts. Trait preference ranking indices (Table 6) showed that communities in the Bodi areas prefer the cattle breed for its better milk production (0.37), adaptability to the local environment (0.17), utilization ability of the available feeds (0.15), coat color (0.09) and large body size (0.08) in their orders of importance. While, the Mursi communities' preferred the Mursi cattle for its better milk yield (0.44), coat color (0.23), body size (0.10), adaptability (0.10) and fertility (0.08) in their orders of importance. Generally, the pastoral communities cited the breed's better milk production ability and adaptive capability to the local environmental stresses, such as intense heat, diseases and parasites as the key attributes for which this breed is preferred.

Selection and breeding practice

The pastoral communities in the Bodi and Mursi areas are well aware of the importance of selection, especially with regard to choice and use of breeding bulls to enhance herd productivity. Most (92.2%) of the respondents from two of the communities reported that they practice selection, especially of breeding bulls. Similarly, 94.1% the communities revealed that they select females to enhance the preferred traits. The stated selection criteria for male cattle were coat color, fertility, body size, horn shape and its dam's milk yield (Figure 2). Surprisingly, coat color, although not directly linked to the preferred production traits, was ranked first as bull selection criteria in both locations, with ranking indices among the Bodi being 0.36 and for the Mursi being 0.46 (Table 6). Next to coat color, the Mursi people prefer large body sized bulls while for the Bodi, fertility ranked second after coat colour for bull selection criterion traits. Similarly, breeding cows are selected based first on their milk yields (that is, the Bodi (0.36) and Mursi (0.47)). Coat color, fertility and udder size, are also used for selection of female animals in the Bodi and Mursi communities.

All the respondents from two of the study areas reported that they castrate young bulls. However, they also believe that castration of male animals at early age reduces its growth and results in small mature body size. As a result, male animals are castrated at relatively late age (4.17 years on average). The Mursi castrated their male cattle at ($P < 0.01$) higher (4.59 years) age compared to the Bodi (3.58 years). 85% of the respondents in the Bodi and all respondents in the Mursi locations revealed that castration is usually done during the rainy seasons when enough pasture is available in order to reduce the effects of post-castration stress. Most of the respondents (91.1%) indicated that castration is usually done for fattening purpose, while 5.9% of the respondents indicated that castration is performed as a form of selection; hence, help prevent the unwanted males from siring future generations, with (3.0%) a small groups of respondents citing the need to reduce aggressiveness among young males as reason for castration.

A relatively high fraction (43.6%) of breeding bulls are sourced from within own household herds (that is, home grown), while 41.6% of the respondents indicated that they use bulls from their neighbors and bulls derived from animals obtained from elsewhere as gifts or as a dowry. Although most of the respondents purport to select breeding bulls, natural and uncontrolled mating is mostly (55.4%) practiced. However, some (44.6%) individuals only allow their cows to be served by selected bulls that they consider to be genetically better based on a given set of criteria (Figure 2). Seasonal mating is not deliberately practiced, hence, calving occurs throughout the year (58.8%) but a sizable proportion of the respondents (41.2%) indicated that calving mostly occurs during the main rainy season when sufficient grazing pasture is available.

Culling of unproductive animals is commonly practiced by the two pastoral communities. 96.1% of the respondents indicated that they routinely cull (remove) unproductive animals from their herd. Although, cattle sales as an income source was not earlier cited as main purpose for cattle keeping, a significant proportion (44.4%) indicated that they cull (that is, sell animals as source of income as well as through home-slaughter for cultural ceremonies).

DISCUSSION

Understanding household characteristics of pastoral communities are vital to knowing the number of household labor allocated on their main economic activities. Family labor is the main source of labor in the study communities; it mainly involves cattle husbandry practices that are source of food and income. The family size of Bodi and Mursi pastoral communities were found to be smaller than reports from other pastoral communities from Ethiopia. According to Alemayehu (1998), the mean family size in Borana pastoralists is 13.5 persons per household; 7.4 persons

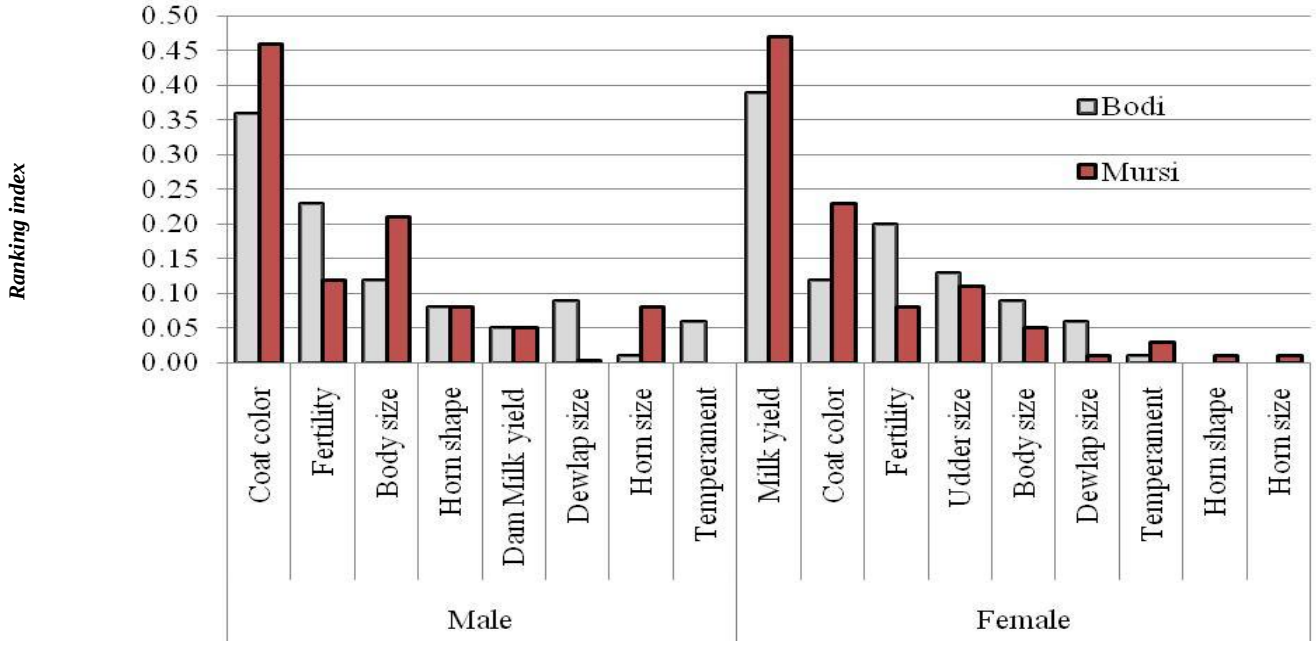

Figure 2. Ranking Indices of selection criteria for male and female cattle for breeding purpose by the pastoralists in the Bodi and Mursi locations.

in Kereyou pastoralist (Shiferaw, 2006), and 7.3 persons per household in Hamer, Benna and Tsemay pastoralists (Admasu, 2006). The lower family size in the Bodi and Mursi pastoral communities compared to other pastoralists in the country might be due to low polygamy rates among the Mursi and the Bodi.

Large number of animals owned by pastoralists in the study areas is believed to provide guaranty for enough milk and blood for family consumption, income as well as fulfilling diverse social functions. Besides, keeping large number of cattle is considered as living assets or household savings, to be relied upon to meet the various socio-cultural needs. The numbers of animals owned per household are indicative of the owners' social status.

The main social function of cattle in both Bodi and Mursi pastoral communities is for dowry payment. According to the communities' information, a person marrying a wife has to pay large number (between 38 and 40 heads) of cattle for the bride's family. This compels the pastoral communities to keep large herd sizes. As a result, the mean number of cattle per household in the studied pastoral communities was found to be higher than cattle numbers reported from different pastoral communities in Ethiopia. For examples, the Kereyu pastoralist in central rift valley possess 16.6 heads of cattle per household (Shiferaw, 2006); while Afar pastoralists owned 20.4 heads (Tesfaye, 2008). Herd sizes reported in this study are also higher than herd sizes reported by Admasu (2006) for Bena-tsemay and Hammer pastoral communities of the neighbouring South Omo Zone, where the average herd sizes are 25.7 heads per household. Similarly, the Mursi and Bodi household cattle herds are larger than the 27.4 heads reported by Nakachew (2009) for the Gambela pastoral communities.

In the present study locations, cattle keeping is very important compared to other livestock species. This is demonstrated by the observed relatively high proportion of cattle to the total livestock species kept (Table 3). This contrasts to other pastoral communities such as the Afar, Borana and Gambela, where other livestock species, especially goats, camels and sheep are important, and therefore constitutes high proportions of the pastoral total livestock units kept by each household (e.g. goats in Afar; camels in Boran etc). This is clearly illustrated by reports by Cecchi et al. (2010) in which the proportion of cattle to other livestock species in pastoral production areas of Ethiopia is much lower (38.5%). Where the availability of feed, water etc. is increasingly becoming limited, and droughts becoming more frequent and severe, pastoralists are shifting from cattle to goat or camel keeping. Fortunately, this is not the case in Mursi and Bodi pastoral areas.

The pastoral communities from the study areas have a culture of keeping large number of castrated animals in their herd, as sales for such animals are infrequent their herd, as sales for such animals are infrequent. Male cattle are usually castrated at late age. Such males are kept in the herd for long and are decorated and area source of pride to their owners. The other reason for the observed high number of castrates in household herds is

Table 1. Mean (SD) Family size of Bodi and Mursi pastoral communities in south-west Ethiopia.

Family member	Significant level	Locations		
		Overall	Bodi	Mursi
Total	ns	6.67 (3.89)	6.42 (3.68)	6.88 (4.08)
Female	ns	3.16 (2.46)	2.95 (2.03)	3.33 (2.79)
Male	ns	3.51 (2.08)	3.46 (2.28)	3.54 (1.92)
Female: Male ratio	ns	1:1.08 (0.9)	1:1.04 (0.6)	1:1.12 (1.2)

ns, Non-significant (P > 0.05); SD, standard deviation.

Table 2. Rank and Indices of main income sources of Bodi and Mursi pastoral communities from south-west Ethiopia.

Income source	Location							
	Bodi				Mursi			
	Rank 1	Rank 2	Rank 3	Index	Rank 1	Rank 2	Rank 3	Index
Cattle	41	2	0	0.62	57	2	0	0.62
Honey	1	14	8	0.19	2	25	5	0.21
Goat	0	9	6	0.12	0	14	6	0.12
Milk	0	1	0	0.01	0	0	1	0.004
Butter	0	4	3	0.05	0	2	0	0.01
Chicken	0	0	2	0.01	0	0	7	0.03

Index = Sum of (3 times rank 1 + 2 times rank 2 + 1 times rank 3) given for an individual reason divided by the sum of (3 times rank 1 + 2 times rank 2 +1 times rank 3) for overall reasons.

Table 3. Mean (SD) and percent in TLU of livestock species owned by Bodi and Mursi pastoral communities in south-west Ethiopia.

Livestock species	Significant level	Location					
		Overall		Bodi		Mursi	
		Mean (SD)	%TLU	Mean (SD)	%TLU	Mean (SD)	%TLU
Cattle	***	54.27(30.13)	96.7	41.47(20.27)	95.3	62.95(32.69)	97.7
Goat	**	6.17(7.18)	2.7	8.57(8.48)	4.1	4.19(5.21)	1.7
Sheep	ns	1.24 (3.6)	0.5	1.44 (4.9)	0.4	1.10(2.22)	0.5
Chicken	ns	2.71 (4.840	0.1	3.31 (6.0)	0.2	2.28(3.78)	0.1

SD , Standard deviation; ns , non-significant (P > 0.05); ** , significant (P < 0.01); ***, significant (P < 0.001), TLU = tropical livestock unit conversion factors were: 0.7 for cattle, 0.15 for sheep and goats, and 0.02 for chicken (Jahnke, 1982).

the fact that the number of castrated males in a household herd is an indicator of the owners' social status and brings respect to the household. Even if having castrated animals in the heard is very important, given their special social functions among the communities, the number of lactating cows per household was exceedingly high. Previous studies have reported similar finding among Ethiopia's pastoral herds. For example, the mean number of milking cows in Kereyou pastoralist herd was reported to constitute 38.9% (Shiferaw, 2006). Workneh and Rowlands (2004) also reported that milking cows constitute 47.9% of the herd in different parts of Oromia region. Similarly, Nakachew (2009) reported that 47% of the herd comprised lactating cows in the herds of pastoralist from Gambela region.

The breeding male to breeding female ratio in Mursi herds is higher than ratios reported for other pastoral communities in Ethiopia. Nakachew (2009) reported 1:11.7 breeding male to female ratio for Abigar cattle in Gambela region. On the contrary, the findings of the present study are comparable to those (the male: female ratios) reported by Shiferaw (2006) for Kereyou cattle (1:9.6) under pastoral management conditions. However, the breeding male: female ratio obtained in the present study are higher than the recommended breeding male to breeding female ratio of 1:50 under natural service in commercial ranching situations (Rege et al., 2001). Given the late age (> 4 years old) at which males are castrated, it is quite likely that many young will have sired offspring by the time they are castrated, thus substantially lowering

Table 4. Mean and standard deviation of number, age group and gender distribution of the Mursi cattle breed owned by Bodi and Mursi household herds in southwest Ethiopia.

Sex and age	Significant level	Location		
		Overall	Bodi	Mursi
Male calves	ns	4.48 (2.83)	4.141 (2.12)	4.75 (3.25)
Male (1-3 years)	ns	5.84 (4.51)	5.48(5.35)	6.09 (3.82)
Castrated	**	9.79 (5.45)	8.04(4.94)	11.08 (5.49)
Breeding bull	ns	2.65 (2.24)	2.33(1.74)	2.89 (2.53)
Total male	*	22.93 (10.9)	20.31(10.19)	24.82 (11.12)
Female calves	*	4.31 (2.73)	3.69(2.40)	4.77 (2.88)
Heifer (1-3 years)	ns	5.21 (4.65)	4.85(5.13)	5.47 (4.28)
Milking cow	***	8.42 (5.37)	6.02(3.66)	10.22 (5.77)
Pregnant cow	***	6.02 (3.81)	4.60(3.43)	7.21 (3.73)
Dry cow	**	4.08 (3.22)	3.16(2.43)	4.77 (3.57)
Total female	***	28.13 (13.6)	22.26 (10.5)	32.46 (14.08)
Breeding female♀	***	18.59 (9.29)	13.79 (6.40)	22.21 (9.54)
Male to female ratio	ns	1:1.31 (0.47)	1:1.2 (0.40)	1:1.38 (0.51)
Breeding male to breeding female ratio	*	1:9.78(8.39)	1:7.73(5.49)	1:11.28 (9.77)

♀Breeding female include sum of all milking cow, pregnant cow, and dry cow; ns, non significant; *, significant at P < 0.05; **, significant at P < 0.01; ***, significant at P < 0.001.

Table 5. Ranking indices on purposes of keeping Mursi cattle by Bodi and Mursi communities in Southwest Ethiopia.

Purposes of keeping Mursi cattle	Location							
	Bodi				Mursi			
	Rank 1	Rank 2	Rank 3	Index	Rank 1	Rank 2	Rank 3	Index
Milk production	30	8	3	0.45	41	17	1	0.51
Social status	11	4	8	0.20	0	0	1	0.003
Income from sells	0	4	12	0.08	0	1	21	0.07
Blood source as a food	0	9	3	0.09	0	37	20	0.30
Conflict resolution	0	7	3	0.07	0	1	0	0.01
Meat production for home use	0	3	5	0.05	0	2	10	0.05
Social security	0	5	3	0.05	3	0	0	0.03
Dowry	0	1	1	0.01	0	1	6	0.03

Index = Sum of (3 times rank 1 + 2 times rank 2 + 1 times rank 3) given for an individual reason divided by the sum of (3 times rank 1 + 2 times rank 2 +1 times rank 3) for overall reasons.

Table 6. Ranking indices of Bodi and Mursi communities' trait preference on Mursi cattle.

Traits	Location							
	Bodi				Mursi			
	Rank 1	Rank 2	Rank 3	Index	Rank 1	Rank 2	Rank 3	Index
Milk yield	19	2	5	0.37	43	10	5	0.44
Adaptability	4	5	7	0.17	6	6	6	0.10
Feed efficiency	2	9	2	0.15	0	0	1	0.003
Coat color	1	5	3	0.09	7	18	23	0.23
Body size	1	3	5	0.08	0	15	6	0.10
Fertility	2	0	3	0.05	3	7	6	0.08
Growth rate	0	4	2	0.06	0	2	9	0.04
Temperament	0	0	1	0.01	0	0	1	0.003

Index = Sum of (3 times rank 1 + 2 times rank 2 + 1 times rank 3) given for an individual reason divided by the sum of (3 times rank 1 + 2 times rank 2 +1 times rank 3) for overall reasons.

the intensity by which genetic selection is practiced in the two community herds.

Cattle are considered as an important asset, sources ofprestige and means of livelihood for the pastoral communities in the two locations, thus larger number of cattle are kept in any given herd irrespective of the sex, age and production group. Trait preferences by the pastoral communities under traditional management system are quite logical. They emphasize and aim at improving milk production, and higher calf crop and improved adaptation to local environmental challenges, especially the endemic diseases. This provides a good balance between productivity and adaptation. Such a balance ensures maintenance of sizeable herds, which would help guard against risks, builds living assets while allowing for reasonable income generations through off-takes and sales.

Milk and blood are highly nutritious and major daily source of food for these communities, and although sufficient milk can be produced from the large numbers of cows kept by each household, individual cow's ability to produce more milk is still important as such milk is shared with calves. It is only logical that the Mursi and Bodi pastoralists highly rank cow's milk yield among the preferred and selection criteria traits. Similarly, given the heavy disease challenges and poor veterinary health delivery systems in these areas, it is important for the cattle to be able to withstand the endemic disease challenges and generally harsh local environments.

The high emphasis the pastoralists put on adaptive attributes are therefore well placed. The ideal cow in these environments are those which grow fairly fast under, able to reproduce regularly, produces enough milk for both human and the calf' needs and survives long enough under the local conditions. The results of this study are indeed consistent with several earlier results (Takele, 2005; Shiferaw, 2006; Nakachew, 2009), which indicated that milk yield, fast growth, adaptability and breeding efficiency were the preferred traits by pastoral communities in Ethiopia. The present finding also concurs with Ouma et al. (2004) in so far as African pastoralist trait preference submersed as: milk yield, coat color, adaptability and body size as the man focus. For the Mursi pastoralist, coat color is a highly (the second most) preferred trait and was listed first in terms of selection criteria by the Bodi community as well. It is surprising that although the two communities cited adaptation to local endemic disease challenges, notably trypanosomosis, tolerance to this endemic disease was not mentioned among, or singled out as a selection criteria trait and instead was taken as given.

It can be argued that because all animals are equally exposed to the disease, those that grow faster, and produce more milk compared to the rest of the herd-mates must be tolerant to the disease challenge (that is, trypanosomosis), thus indirectly trypanosomosis tolerance is indeed selected for. Likewise, although it was not elaborated as to what coat colours were preferred, it has been documented (Makokha et al., 2006) that the darker coat colours attract tsetse flies-the vector for trypanomosis, much more than light coloured cattle. Therefore, the number of fly bites and by extension, the transmission and infection rates (parasitic load) are likely to be higher among darker coat- coloured animals. Selection against dark coat coloured animals would then reduce the level of trypanosmosis infection in the herds. It is little wonder that coat colour was ranked first among selection criteria traits for both bulls and cows (Table 6).

In addition, coat color plays a significant role in environmental adaptations. Some coat colour shades reduce the effects of solar radiation and reduce heat stress (Finch and Western, 1977; Olson et al., 2003). In tsetse and trypanososis challenged areas, like the present study district, pastoralists prefer cattle that tolerate trypanosomosis better, growth faster, produce more milk, have better reproductive ability, are of lighter coat colors. Black cattle are discerned (Ouma et al., 2005). Animals with low feed requirements are also preferred (Makokha et al., 2006). Besides, high growth rate, resistance to diseases, better fertility, large body size, docility or good temperament, are additional preferred traits (Tano et al., 2002). The Mursi and Bodi pastoralists share all the preferences, and logically so, with other Africa pastoral communities.

Conclusions

From the results of this study and discussions thereafter, the following conclusions can be made:

1. Mursi cattle are multipurpose animals that play economic and social functions to their pastoral owners. This is demonstrated by larger herd size kept by the communities, as the high contributions to the total livestock units owned by the pastoral household.

2. The cattle are kept for milk production, which is met by the large cow herds, but due to the breeds' large frame and body size, reasonably fast growth and high fertility rates, these cattle's meat production potential is high.

3. Poor traditional husbandry and breeding practices, coupled with lack of access to modern animal health and market services prevent full exploitation of their breed's genetic potential.

4. Although the breeding objectives and combination of selection criteria traits are reasonable and generally point to the right directions, selection intensities from the male side remains low due to the relatively large number entire males used for breeding, the late age at castration of unwanted young males, sub-optimal herd structures, the overall desired total merits and productivity improvements are unlikely to be optimized under current traditional practices, hence could benefit from a combination of the existing rich indigenous knowledge systems and better improvement

design and appropriate improvement implementation strategy.

5. Given the high levels of tsetse fly infestation and trypanosomis challenge, as well as general lack of prophylactic treatments of the Mursi cattle, it is apparent that these cattle have reasonably tolerance to trypanosomosis. Additional well designed studies to provide evidence for this is therefore warranted and recommended.

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