



## Assessment of Husbandry Practices, Production and Reproductive Performance of Indigenous Cattle in Hadiya Zone, Southern Ethiopia.

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### Abstract

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The study was conducted in Soro and Misha districts of Hadiya zone Southern Ethiopia, to describe the husbandry practices, to assess production and reproductive performance of indigenous cattle breeds. Data collections were carried out by using observation, semi-structured questionnaire, and focused group discussion and also from secondary data sources. A total of 240 households (120 from each district) were selected by using systematic sampling method for questionnaire interview. The collected data were analyzed by Statistical Package for Social Sciences (SPSS version 20), and the values were compared at the significance level  $P < 0.05$ . The study reported that the main purpose of keeping indigenous cattle in both districts were milk production, saving as live bank, draught power, income generation, for meat, manure and ceremonies. The selection criteria used by farmers for selecting male and female cattle were by using mainly associated with production and reproduction parameters. The main feed resources of cattle in dry season were crop residues, communal grazing, maize strover, Enset, Atela and wheat bran. Natural uncontrolled mating system was the main breeding system in the study areas. The average daily milk yield and length of calving interval showed significant variation ( $p < 0.05$ ) between the two studied locations. The major cattle production constraints in the study area were feed shortage, shrinkage of grazing land, lack of capital, shortage of improved breeds, and low productivity of indigenous cattle, lack of improved forages and disease and parasites. The reported major prevalent cattle disease identified were bovine pasteurillosis, foot and mouth disease, diarrhea, sudden death and blackleg. The current study result indicated that cattle production and reproductive performance in the current environmental condition are comparable with other indigenous breed. Therefore, it could be concluded that, management improvement and designing appropriate breed improvement programmes such as participation of the community are critical to improve the breed..

#### **Key Words**

Breeding,  
Husbandry,  
Cattle,  
Production System  
Selection Criteria

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### 1. Introduction

Ethiopia is home for many livestock species and sustainable for livestock production. The country is predominantly agrarian with most of the people residing in rural areas; these residents are directly or indirectly dependent on agriculture for their day to day activities.

The livestock sector contributes about 12 - 16% of the total and 47% of the agricultural Gross Domestic Product (GDP) excluding the value of draft power, manure and other such activities and provides livelihood for 65% of the population [1,2]. Unlike those in the developed countries where the livestock are reared for specific purpose, livestock in developing countries including Ethiopia serve multiple purposes [3,4]. In most of the rural households, livestock production is at subsistence level, where livestock are

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selected for adaptive traits with productivity of individual animals being quite low and the overall productivity comes through their sheer numbers [5,6].

According to CSA (2016/17), cattle population in the country is about 59.5 million heads most of which about 98.2% are of native breed's ecotypes. Only about 1.62% and 0.18% of them are crossbreds and exotic types, respectively. Out of these total cattle population heifers/cows constitute about 59.5%. The numbers of cattle reared in Southern Nations Nationalities and Peoples Region (SNNPR) are estimated to be 11.49 million heads which Hadiya zone houses 929,689 heads of cattle [7].

In spite of the large livestock population of the country their contribution is dismally low, leading to a mismatch between demand and supply of the livestock products [8]. One of the major impediments of livestock sector are the quality and quantity of fodder available to them besides other genetic and non-genetic factors which can influence the overall productivity[9]. Thus, prior to initiation of any specific intervention, it is imperative to understand the prevailing production systems of cattle, which can provide an understanding of the types of fodder, feed and diseases prevalent in the area.

The selection objectives and the criteria used to evaluate the progress of breeding by the traditional breeders need to be assessed so as to understand the progress of the breed in question and also can pave the way for its future development [10]. The study was conducted at Hadiya zone of SNNPR.

Traditionally the cattle are of dual purpose type where cows are expected to produce replacement bulls and some extra milk that can be used for home consumption while the bulls are used for agricultural activities and manure from the cattle is also an important component as farm input [11]. However, information on production system, breeding practices and identification of important selection traits and features of the cattle reared in the study area were yet not assessed. Thus the objective of the current study was to assess the production systems, husbandry practices and selection criteria of indigenous.

## 2. Materials and Methods

### 2.1. Description of the Study Area

The study was conducted in Hadiya zone, located in the Southern Ethiopia. Its capital city is Hossana, which is located 232 km south of Addis Ababa and 160km west of Hawassa town. The zone has a predominantly up-and-down topography and pleasant climate which makes it highly suitable for human habitation as well as agricultural production. The elevation of the zone lies between 1500 to 3000 meters above sea level.

The study location is situated between 70 45"N latitude and 380 45"E longitudes. According to the Hadiya zone annual report (2017), the mean annual rainfall ranging between 469.98 and 156.66mm, the mean maximum and minimum temperature is 22.540c and 10.350c respectively. Based on agro-climatic zones, the Hadiya Zone can be divided into three broad climatic zones, namely midland areas of 1500-3000 m.a.s.l., which accounts nearly two third (64.7%) of the zone, high land >2,300 m.a.s.l., which accounts for 23.7% of the total land, and lowland which accounts for 11.6% of the total land of the zone (HZLFB).

### 2.2. Sampling Strategy and Sample size

Multi stage sampling procedure was employed to select the study districts and respondents for interview. From ten districts and one urban town of Hadiya zone, two districts were purposely selected based on their cattle population and accessibility. From each selected district; three Rural Kebele were selected purposively with the help of the respective district's agricultural experts and development agents based cattle population. Forty households possessing a minimum of three adult cattle were randomly identified from each Rural Kebele. A total of 240 households (forty from each selected rural kebele) were randomly sampled for the questionnaire interview, based on their experience in livestock rearing. Focused group discussion was held among agricultural development extensions and a minimum of five selected model farmers and local elders from each selected Rural Kebele.

### 2.3. Methods of Data Collection

The data were collected using semi structured questioner which was translated into the local language and pretested before being administered. Cattle husbandry and breeding management including mating system, traits preferred by the farmer's and selective breeding practices and also information on production and reproductive performance such as age at puberty, calving interval, the mean life time calf crop of cow, number of service per conception, milk production performance and lactation length of the cow of cattle were assessed using questioner survey and focused group discussion.

### 2.4. Methods of Data Analysis

The data collected through questionnaire were described by descriptive statistics by using Statistical Package for Social Science (SPSS) version 20. The fixed factor was the studied locations (Soro and Misha districts). The data were analyzed used simple descriptive statistics (mean, percentage, and ranking).

Index of response of sampled population was calculated as  $[(n) \times \text{number of response ranked first} \pm (n-1) \times \text{number response ranked second} \pm (n-2) \times \text{number response ranked third} \pm \dots \pm (1) \times \text{number}]$

response ranked  $n$ ], given to individual response for the variables divided by the sum of  $[(n \times \text{number of households ranked first} \pm (n-1) \times \text{number of households ranked second} \pm (n-2) \times \text{number of households ranked third} \pm \dots \pm 1 \times \text{number households ranked } n)$  for overall responses of individuals to a given variable response. 'n' is equals to the level of rank from which a variable response of individuals ranked for [12].

### 3. Results and Discussion

#### 3.1. Socio-economic Characteristics of the Households

The Table-1 below shows that, out of a total interviewed households ( $N = 240$ ), most of the households were male headed; however, fewer female headed households were recorded in both districts. The findings also indicated that most of the respondents in both districts had basic primary education followed by illiterates, with very few respondents who had high school level education. In terms of livestock production, literacy enables the respondents to appreciate scientific techniques for the management of livestock including efficient utilization of natural resources and adoption of improved technologies [13].

The study further indicated that across both districts crop production played an important role for improving the livelihood of the households, followed by an integration of both crop and livestock, the observations are in close accordance with previous literature report [14,15]. This may be ascribed to the fact that dependency on livestock alone may lead to high risk especially due to disease, theft, drought and shrinkage of grazing land [12]. Interdependency of livestock and crop production serves as a synchrony between the efficient utilization of crop residues and manure alike [14]. The synergistic approach of rearing livestock and cultivation of crop also ensures that farmers have access to cash which they can obtain by selling off some animals in case of emergency and social commitments [16]. The study further indicates that most of the respondents were married which indicates a stable family life and hence are able to devote much of their time for constructive livestock farming activities.

#### 3.2. Land Holding Size and Use of Land of the Sampled Households

The mean land holding size in the study areas was about 1.57ha. The average land holding did not vary across the study areas; the landholdings in the areas are similar to those reports [17]. However, the

landholdings are less than those reported [13]. This might be due to population density, expansion of urbanization and land size allocated for crop production. The study also indicates that the meager land is effectively used for various purposes with a greater share provided for the crop farming activities which are in close accordance with the findings [17].

The average family sizes observed in the current study was about 6.63 heads. The results of the current study are similar to those reported [18], however, larger family sizes were reported [13] from selected districts of Benshangul Gumuz, Western Ethiopia. The average age of the respondents was 43.59 years and it is in close accordance with those of [14] from highlands of Blue Nile basin. The findings also indicate that average age of the respondents did not vary across the locations and they were physically active besides were having active working age, adequate experience in matters pertaining to crop production and livestock husbandry which are crucial for cattle genetic improvement and sustainable developments [18].

The study further indicates that land allocated to grazing and forage is very small in the both study districts. Moreover, the difference between the districts with regard to the agronomic activities may be ascribed to better road connectivity and availability of improved seeds and fertilizers; moreover the land has a better fertility when compared to Soro. The livestock demography in the study area as summarized in Table 3 indicates that, the overall mean cattle possession in the study area was 1.49 heads. The study indicates that the numbers of native cattle predominates in both the locations. This might be due to the reason that, the attitude of the AI (Artificial Insemination) and the efficiency of utilization of the AI service [19]. The findings are in close accordance with report that the native cattle outnumber the crossbred in rural areas of the country [20].

The study further indicates that the numbers of cows were more than other categories of bovines, which is in close accordance with report [15]. This may be because most of the bulls or bull calves were sold off, while oxen are retained for agricultural and allied purposes, while cows are reared as mothers for the replacements of oxen and bulls [14, 15]. Thus, the numbers of cows retained for breeding have to be more in numbers. The study further indicates that the goats are better adapted to the low land agro-ecologies while the sheep are better adapted to the midland and highland agro-ecologies [12].

Table 1. Summary of Education level, sex and marital status and source of income

Variable	Districts		Overall (%) (N=240)
	Soro (%) (N=120)	Misha (%) (N=120)	
<b>Education level</b>			
Illiterate	28.3	26.7	27.5
Read and write	17.5	24.2	20.8
1 to 4 grades	38.5	40.8	39.6
5 to 8 grades	12.5	6.7	9.6
9 to 10 grades	3.4	1.7	2.5
<b>Sex</b>			
Male	97.5	94.2	95.85
Female	2.5	5.8	4.15
<b>Source of income</b>			
Crop production	52.4	49.2	51.7
Livestock & their products	11.8	9.2	9.6
Both livestock and crop	33.3	40.0	36.7
Salary, wages & daily labor	2.5	1.7	2.1
<b>Marital status</b>			
Married	92.5	82.5	87.5
Divorced	5.0	9.2	7.1
Widowed	2.5	8.3	5.4

Table 2. Summary of the average age of the respondents and the average land holdings (hectare) and utilization.

Land Holding	Soro (N = 120)	Misha (N = 120)	Overall (N = 240)
	Mean± SE	Mean± SE	Mean ± SE
Total land	1.54±0.036	1.61±0.031	1.57±0.02
Crop production	1.13±0.03*	1.22±0.029	1.17±0.021
Fruit and vegetables	0.31±0.017	0.33±0.012	0.32±0.010
Forage production	0.02±0.005	0.02±0.004	0.02±0.003
Grazing land	0.04±0.006	0.4±0.006	0.4±0.004
Family size	6.91±1.5*	6.36±1.7	6.63±1.67
Age (years)	43.17±7.654	44.01±6.368	43.59±7.038

Table 3. Livestock possession of the households in the study area.

Species	Soro (N = 120)	Misha (N = 120)	Overall (N =240)	P_value
	Mean ± SE	Mean ± SE	Mean ± SE	
Ox Local	1.55±0.50*	1.43±0.5	1.49±0.5	0.61
Ox Crossbred	0.02±0.13	0.06±0.24	0.4±0.19	0.90
Cow Local	1.82±0.53	1.61±0.51	1.71±0.53	0.002
Cow Crossbred	0.08±0.29	0.35±0.56*	0.21±0.47	0.00
Heifer Local	0.43±0.51	0.39±0.51	0.41±0.51	0.528
Heifer Crossbred	0.08±0.28	0.023±0.42*	0.015±0.36	0.002
Bull Local	0.13±0.34	0.19±0.42	0.16±0.38	0.062
Bull Crossbred	0.02±0.13	0.02±0.13	0.02±0.13	0.315
Steer Local	0.40±0.51	0.28±0.45	0.34±0.48	0.062
Steer Crossbred	0.01±0.09	0.03±0.16	0.02±0.13	0.024
Calf Local	0.57±0.56	0.47±0.50	0.52±0.53	0.147
Calf Crossbred	0.09±0.29	0.19±0.39	0.14±0.35	0.026
Sheep	1.43±1.65	1.61±1.8	1.52±1.73	0.434
Goat	1.83±1.95*	0.57±1.2	1.20±1.76	0.00
Chicken	3.08±3.0	2.93±3.0	3.01±3.02	0.701

Donkey	0.74±0.6	0.68±0.5	0.71±0.55	0.346
Horse	0.18±0.43	0.34±0.47	0.26±0.47	0.005
Mule	0.09±0.29	0.07±0.25	0.08±0.27	0.475

SE= Standard Error, \* = significant at  $P < 0.05$

Table 4. Percent (%) of respondent's purpose of keeping cattle with the respective indices.

Main_purpose of keeping	Districts									
	Soro					Misha				
Cattle	R1	R2	R3	R4	Index	R1	R2	R3	R4	Index
Meat	3.3	2.5	10.8	14.2	0.097	5.8	0.8	5.8	20.8	0.10
Milk production	60.0	30.8	10.8	3.3	0.25	42.5	29.2	27.5	0.8	0.24
Saving	5.0	8.3	21.7	21.7	0.16	15.8	25.8	30.8	10.8	0.20
Ceremonies	-	0.8	15.0	6.7	0.07	0.8	-	0.8	7.5	0.03
Traction (Male)	30.8	55.0	13.3	0.8	0.15	34.2	40.0	20.0	5.8	0.20
For income	-	-	12.5	20.8	0.11	-	-	8.3	20.8	0.10
Manure	0.8	1.7	12.5	15.8	0.010	-	2.5	4.2	15	0.06
For social value (Sign of Wealth)	-	0.8	3.3	15	0.06	0.8	1.7	2.5	18. 3	0.07
Skin and hide	-	-	-	1.7	0.01	-	-	-	-	0.00

### 3.3. Socio-economic Purpose of Indigenous Cattle

The major reasons for rearing cattle were more or less consistent in both the two districts (Table 4). The primordial reasons for rearing female cattle were for milk production purposes and it is in line with literature reports [13]. The reason for the same may be two fold, primarily because the cows with optimal lactal yield can wean strong calves which can be then used for traction purpose. Besides, the milk then be used by the householders themselves for drinking and used for culinary purposes (ergo, ayib and kibe) [21]. The extra milk is also an important component for ensuring nutritional security for the pregnant, nursing mothers, old and infirm and also for the neonates [12]. The cattle are also used for the purpose of accumulating wealth and have often been described as bank on hooves[12]. This is all the more true in locations which are away from the modern banking systems and hence are used as a mode of wealth accumulation and savings. According to the farmers, the use of oxen for traction purpose is all the more important among the agrarian communities where ploughing is one of the major activities that are performed by oxen [18]. As the traction and draft power are required for only a few days in a year more and more farmers are ceasing keeping oxen all the year round and usually sell them once the agriculture season is over [14]. Furthermore, cattle are also reared as a source of income, where the extra milk is processed to cooking butter (kibe) and cottage cheese (ayib) which have a long shelf life and thus can be transported to nearby markets thereby generating income for the family [17,22].

### 3.4. Cattle Breeding and Trait Preferences of Farmers

Preference traits of breeding bulls, milking cow and heifers, oxen and steers as reported by the respondents from both the districts in the study areas are presented in Table 5. The findings show that breeding bulls are selected based on their appearance (bright eyes, steady gait and body size), which makes the bulls looks beautiful; the findings are in close accordance with report [23]. The study also indicates that breeding bulls are selected based on their coat color, while the lighter coated cattle are preferred in the lowlands as they are able to thrive well in the lowlands [22]. This may be ascribed to their adaptation in hot climatic conditions. The result also show that breeding bulls reared in the mid-altitudes were dark coated, however black coated cattle were not preferred which may be ascribed to socio-cultural preferences [22]. The result also shows that breeding bulls with long prepuce were preferred by the respondents and such bulls are thought to have good fertilizing capacity besides the trait is generally considered to be correlated with masculinity [22]. The current study results further indicate that the respondents prefer to select bulls with large scrotum and that both the testicles have well descended, these observation are in accordance with report [23]. With regard to well descended testicles, it was reported that cryptorchidism is correlated with poor fertility and are heritable; therefore such bulls should not be used for mating. It has also been reported that crytor-chid or monor-chid bulls have poor fertility, hence selecting against the trait is a welcome gesture [24]. Furthermore it was also indicated that scrotum size is correlated with body weight. Big and straight hump is

also considered as a trait worthy of selection as hump of the bulls usually stores additional fat from the body and bulls with higher endurance and can graze for longer hours [18,23]. It has also been reported in the study cattle owners tend to associate large and straight hump of bulls with good breeding potential [12]. The study also shows that the respondents prefer to select larger and taller bulls; such bulls have a high drafting power and also are correlated with masculinity [13]. Moreover, such bulls also fetch higher price when they are culled at the end of their productive life.

The result also indicated that the bulls with wide front quarter are selected by the farmers, the observation is correlated and such bulls have a capacity to work for longer hours as the lung capacity for such animals are usually high [23]. These also indicate that such animals can graze for longer hours and for longer distances [18]. Studies have indicated that zebu cattle have loose skin and larger dewlap when compared to the taurine counterparts [18]. Loose skin has an advantage in tropical areas as it helps in increasing the surface areas of the body and thereby helps in dissipating the heat generated metabolically [18]. It has also been reported that the looser the skin the more are the sweat glands per unit surface area and hence are able to thrive well in tropical climate [24]. It has also been reported tropically adopted cattle have well developed inter-dermal muscles which allows them to fend away the external parasites [23]. Some of the respondents preferred to select bulls on their tail length, indicating that bulls with longer tails are able to wade off the flies and other external parasites which can keep the animals comfortable. The finding is in close accordance with report [17].

The results pertaining to the selection of the heifers/cows indicates that they are selected based on the udder conformation, which is in close accordance with the finding from communities of southern Ethiopia [18]. The results further indicate that the cows are selected based on their long thin neck, which is consonance with report [23]. Findings of a study indicated that, long and thin necks of the cows are correlated with feminine character of the bovines [12]. The study further indicates that cattle with long body length and height have higher body capacity and hence optimum uterine capacity that ensures larger calves that can grow to larger mature sizes to fetch better market prices [25]. The large barrel also has indicates that the rumen capacity is large hence cattle with large rumen capacity can consume greater amount of fodder, which again can be correlated with milk yield [17]. It was also reported that the respondents selected cows having long and squarely placed teats, udder with teats apart indicates well developed quarters of the udder and milk well, thus, udders have high individual capacity [23]. The presence of long teats in one hand

ensures that the chances or mastitis decrease [21,22]. Longer teats are beneficial for reducing the incidences of mastitis and for proper milking [21,22]. Cattle farmers also indicated that there is no correlation between teat length and milk production, however, longer teats facilitate milking [26].

Thin and medium tail are which again is correlated with feminity of the bovines [23], while long tail is preferred as it helps the cows to drive away the flies and similar ecto-parasites [17]. However very long tail has its own disadvantages as there are chances that such tails get crushed and injured when the animals lay down [27]. It has also been reported that the wide rear quarters have several benefits and are correlated with feminity [28]. In one hand it provides adequate space for the development of udder [29 and also that cows with wide quarter (correlated with wide pelvis) have lower incidences of dystocia [21,22]. The selections of cows with feminine appearances have been reported in the literature [23], these includes thin, glossy skin, bright eyes and also good milking temperament and mothering abilities.

The selection of oxen based on their appearance includes traits which are correlated with those of the castrates have also been reported [21, 22]. Large frame size is preferred as such animals are expected to have high amount of muscling and therefore the beef production is also expected to have to be high [5,25]. Such animals are usually slow and lethargic and hence require moderate exercise otherwise they tend to fatten out. High muscle is preferred over high fat animals as such animals have poor draft-ability and get tired soon especially if made to work in the sunny days. Oxen with large, erect and strong hump can take the pressure of yoke easily and hence can be good for traction [27]. Oxen with good working temperament are usually a boon for the farming community as such animals can endure long and tenuous working hours [23]. The oxen with light colored skin can work for long hours under the sun without getting affected by sun stroke [21, 22]. It has also been observed that lighter and pied coated animals suffer less from the infrared radiation (solar) in compared to their solidly darker coated counterparts [25]. Presence of horn in oxen is considered as aesthetic [24, 30], besides such animals are able to defend themselves against predators better than the polled counterparts.

### **3.5. Breed and Coat Color Preference of Cattle in the Study Area**

The results pertaining to the preference of genotypes of cattle in the study areas (Table 6), show that most of the respondents from Soro district preferred to rear the native cattle while, the differences across the genotypes (native Vs crossbred) were not observed among the respondents at Misha district. This may be

ascribed to the fact that the adaptability issue was given a high importance among the respondent's from Soro. The importance of adaptability as a selection criteria as observed in this study are in close accordance with the findings [25]. This may also be ascribed to the availability of feed and fodder in the area besides the allied services which are associated with rearing of crossbred cattle.

The study further indicates that as the resources at Soro are limited the respondents prefer to rear the cattle under low input low output system and under such condition the native genotypes are better than their crossbred counterparts [25]. The study further indicates that the cattle in both the locations are reared for milk purpose which too is in close accordance with the findings [12]. Studies have indicated that the respondents in the rural areas prefer to rear native cattle for high butterfat content, it is also reported that many respondents preferred consuming milk and dairy products from the native cattle as it is considered tasty and for the culinary preferences [25]. The native cattle may also be preferred over the crossbred because of purchasing and management costs like feeds and medicaments are low for local cattle types [25].

The preferences of the coat color of cattle varied across the study areas which may also be ascribed to the adaptability of the cattle [21, 22]. Studies by [28] have indicated that cattle with lighter coat color do well in the warmer locations while the reverse was true for the cattle raised in the cooler locations. Therefore, as the climate of Soro district is warmer the respondents preferred lighter coated cattle. The relationship between coat color and the adaptability may be ascribed to the fact that at warmer locations the infrared radiation is high while at the cooler locations higher amount of ultra-violet radiation can lead to problems in the lighter coated animals and therefore the darker coated counterparts do well under such climates [21, 22]. The preferences of patchy coated cattle in both the locations may be ascribed to the fact that such animals have better camouflaging and hence are able to escape predatory attacks, while the lighter and darker coated animals can be easily spotted.

### **3.6. Mating System Used by Farmers to Breed their Cattle.**

Mating system practiced in the study areas are summarized in Table 7. The findings show that non-controlled mating is prevalent in both locations which are in close accordance with report [21, 22]. The prevalence of uncontrolled mating has advantage and disadvantage, while the farmers need not bother about the estrus cycle of the cows while uncontrolled breeding can also lead to higher incidences of inbreeding and also help spread of many venereal diseases both within and between herds [31]. Some of

the respondents also reported of controlled mating (natural) in their herds.

This in one hand can ensure that there is genetic progress and that the incidences of the spread of venereal diseases are minimized this can give rise to high incidences of inbreeding in the herd as the numbers of bulls owned are generally limited [27]. Higher incidences of inbreeding across herds of cattle have been reported in studies by [28] from Babilie district, East Hararge zone, Oromia regional state. Inbreeding in one hand leads to genetic purity while on the other hand it also leads to higher incidences of reproductive failures besides expression of semi-lethal and lethal genes if they exist in the population. The reasons for uncontrolled mating as reported by the respondents too concur with the observations where communal grazing often results in such uncontrolled mating [27].

### **3.7. Culling and Castration Practices of Households**

The reasons of culling cattle in the study areas are presented in Table 8. Culling is an essential farm practice which enables the respondents to select the best cattle across the herds [30]. The reasons of culling were several and the primordial reasons being bad temperament of the bulls followed by laziness poor performance in traction. These two factors have also been reported as a major reason for culling of bulls in earlier studies [18]. It has been reported that bulls with bad temperament can cause grievous injuries to both the handlers and also other animals within the herd and taming of such bulls are quite difficult [16]. Moreover, bulls are generally raised for traction and therefore lazy bulls are curse for the farmers as such bulls can delay the time required for ploughing and other allied activities [18]. The other reason for culling include infertility of the cows and as such cows can lead to delay in conception hence such cows/heifers are better to be identified and culled [12].

The current studies further indicate that old and infirm bulls are usually the next to be culled out from the herd, such bulls have poor draft ability so is their fertility decreases as the animals age progresses [16]. Culling of bulls due to lack of feed and fodder have been reported in an earlier study in the Nile river basin of Amhara region, where it was reported that the farmers usually cull their bulls after the end of the agriculture season [14]. This was because on an average a bull is effectively used for only fraction of the year and therefore it's of no point to keep animals throughout the year [14]. This has been because the meager resources available to the farmer's disposal can be allotted to cows and other productive animals.

The practice of castration and the reasons thereof as reported by the respondents in the study areas have been presented in Table 9. The study shows that

culling is practiced by majority of the farmers in the study areas, which is in close accordance with the findings [18] from Bako Tibe and Gubo Sayo districts of Oromia region. While, castration is an important farm operation it is carried out with various aims viz. to prevent unwanted breeding, to bring about docility of the bulls and also to improve fattening performances. The current study shows that most of the bulls are castrated after being mature, which is in close accordance with the findings [12,30]. Castration of bull calves need to be carried out at a younger age, while it helps to prevent unwanted mating, but also is less painful for them [30].

It has also been reported that most of the castration are carried out using traditional methods which is not only unscientific but also quite painful [25]. Open methods of castration can also lead to spread of infections and may also lead to death of the animals castrated. The reasons for castration as provided by the respondents are several including fattening and this is in close accordance with the observations [30]. In addition to fattening, castrating bulls also helps to improve their docility which is also in close accordance with the observations reported in the literature [16,27]. Both the reasons may be correlated with the disturbances of testosterone hormones, high levels of which often lead to bad temperament and traits associated goes to with masculinity the animal and traction[18].

### **3.8. Livestock Managements**

#### **3.8.1. Animal housing management**

Proper housing is one of the prerequisites of livestock husbandry which plays an important role in reducing stress due to exposure to tremendous temperature and moisture which in turn affect their performance [17]. It is not only protects animals from the vagaries of nature, but also from thefts and predators alike [12]. However, respondents need to be aware of how to construct houses using locally available materials but also how to ensure proper ventilation and also having adequate slope for ensuring drainages. Constructions of houses have to be carried out in a way that separate enclosures are available to different species owned and also for different classes and ages within the species [28]. The current study indicates that most of the respondents housed their cattle within the family enclosures which in one hand can help protect the animals from thefts but on the other hand is also responsible for spread of many zoonotic diseases. Keeping animals in family houses with their owners also result in improper ventilation as many times the cooking for the family is also carried on indoors. Therefore, cattle producers need to be appraised about the importance of separate housing and also the methods to construct the same using locally available materials. The findings also show that majority of the

cattle are housed in the night and also in the warmer parts of the day to keep them comfortable besides the animals are also housed indoors during rain and at times when the family members are not around [5, 25]. Cleaning of the houses are an important part of the daily husbandry practices, while in one hand it ensures that the filth accumulated are removed, it also ensures hygiene both for the owners and the livestock alike. The frequency of cleaning barn as indicated by the majority of respondents (78.3%) was carried out daily and it is in close accordance with the findings of Enanit (2017).

#### **3.8.2. Feeds, feed supplements and methods of overcoming seasonal feed shortage**

The findings from the study areas indicate that in the dry season the primary feed resources included crop residues, household leftovers, enset leaves, communal grazing land followed by maize stovers. These observations are in close accordance with the findings from selected districts of Sidama zone [17]. Crop residues usually have poor feeding values and are in most of the cases unable to provide even the basic requirements for body maintenance of cattle [14]. This is because of high lignification and poor palatability. Animals are also provided with household food leftovers which the amount varies on a daily basis and also their feeding values may also vary significantly across the days [17]. The leaves of enset are a good source of forage to the cattle by cut and carry system in the dry season, however the feeding value of which too varies across the accessions and the age of the plant itself [17]. Maize stover is also high lignified and in most of the cases unable to meet the basic maintenance requirements of the animals [9].

The study pertaining to the provision of feed resources in the wet season indicate that weeds, pasture land, inset and its parts, sugarcane leaves and also household leftovers are the main feed stuffs that are provided for cattle. These are in close accordance with the findings [13] from Benshangul gumuz regional state of Western Ethiopia. Providing weeds to cattle has dual benefits as it ensures that the land is free from obnoxious weeds ensuring a healthy crop. However, the respondents need to be appraised about identification of poisonous weeds which can lead to abortions and also death of cattle. However, the availability of weeds is not a constant affair as weeding may be carried out 2-3 times during the cropping season, the availability of pasture land is also limiting and therefore there are chances that the cattle may remain underfed during the season. This is all the more true to the fact that during the rainy season crop residues are mostly unavailable and therefore the only way of feeding cattle is by providing enset leaves or other parts of the plant [17].

Table 5. Selection criteria of breeding bulls, oxen, calf, cow and heifers.

Traits	Districts		Overall (N=240)
	Soro (N=120)	Misha (N=120)	
<b>Bull</b>	%	%	%
Appearance & body conformation	100	100	100
Large scrotum equal testicles	47.5	96.67	72.08
Short and thick neck	47.5	54.167	35.83
Long prepuce	90	93.33	91.67
Straight shaped big humped	80.83	82.5	80
Length and height	85.83	79.167	82.5
Active and good temperament	71.167	82.5	77.08
Long tail	10.0	6.67	8.34
Wide front quarter	80.83	80.83	80.83
Large Dewlap	46.67	36.67	41.67
Coat color	100	100	100
<b>Milking cow and heifer</b>			
Small head and concave face	71.67	72.5	72.08
Thin and long neck	90.83	89.167	90
Long body length and height	100	100	100
Well-structured udder size	100	100	100
Long and squarely placed teats	40.83	43.33	42.08
Thin and medium length tail	20.83	21.67	20.83
Large body size	89.167	85.83	87.5
Wide rear quarter	92.5	94.167	93.33
Light colored with attractive appearance	95	93.33	94.167
Good temperament	43.33	47.5	45.42
<b>An oxen</b>			
Appearance	61.67	58.33	60
Height and body length	100	100	100
Castrated	49.167	46.67	47.92
Large body size not very fat	89.167	95	92.08
Medium to large hump	100	100	100
Active and light colored	57.5	64.167	60.83
Good temperament	75	76.67	75.83
Horned	45.83	59.16	52.5

The feed shortages as indicated by the respondents were mostly during the dry season the observations are in close accordance with results [18]. However, many of the respondents also indicated that the shortages were also observed in the wet season, the reasons for the shortages have been summarized ahead and thus in order to overcome the same most of the respondents conserve feed and fodder, which are in close accordance with the findings [17]. However, the quality of the conserved fodder is questionable at times and therefore; even if the fodder is available its palatability and nutritive values need to be improved substantially. Therefore, feeds which are deficient in one or both of the ingredients cannot fulfill the minimum dietary requirements and hence provision of such feed is expected to adversely influence the reproduction and production capability of the cattle [9]. The present study also indicates that most of the respondents practice herding of their cattle. However, herding has some serious drawbacks viz, it does not

allow the old, young, nursing and pregnant cattle to compete with the bulls for the feed [12]. In this way the stronger animals usually drive away the weaker ones and hence there is a gross nutritional deficiency among the herd. It has also been reported that herding can lead to overgrazing in lush areas unless regulated; thereby leading to soil erosion at places [9].

Tethering is usually practiced during the wet season when there are chances that animals may venture to enter the agricultural fields [16]. Care has to be taken so that the places are changed on a regular basis and this in one way will prevent overgrazing in the area besides and it also allows the animals to optimize the usages of the vegetation in the locality. Care is also to be taken to ensure that there is no entanglement of the ropes with bushes and other animals otherwise it may also lead to injury and even death of the animals. Feed supplements and source of minerals for cattle in the study areas are presented in Table 14. The findings indicate that besides grazing on natural grasses some

of the respondents provide their cattle with concentrates locally known as furishka, which is basically wheat brand [5]. However, wheat bran alone

is not enough to maintain the production of the crossbreds and therefore need additional supplements especially during the dry season.

Table 6. The preference of the coat color, breed type and the reason for their preference

Variables	Soro (%)	Misha (%)	Overall (%)	X <sup>2</sup>
Breed preference				1.366
Local	59.2	51.7	55.4	
Exotic	40.8	48.3	44.6	
Reason for selection of breed				15.635*
High milk production	30.8	38.3	34.6	
Adopted to local environment	40.8	45.8	43.3	
Small amount of investment	14.2	0.8	7.5	
Short calving interval	10.0	10.0	10.0	
Disease resistant	4.2	5.0	4.6	
Coat color preference				16.462*
Dark red	15.8	13.3	14.6	
Light red	38.3	17.5	27.9	
White and red patchy	22.5	27.5	25.0	
Black and white patchy	15.8	29.2	22.5	
Brown	7.5	12.5	10.0	

Table 7. Type of mating system and the reason of using uncontrolled mating system.

Mating system	Soro (%)	Misha (%)	Overall (%)
Natural uncontrolled	60.0	52.5	56.2
Natural controlled	35.0	36.7	35.8
Artificial insemination	5.0	10.8	7.9
If not controlled, the reason?			
Animals graze together	67.08	52.28	59.68
Lack/ insufficiency of breeding bulls	17.89	17.49	17.69
Lack of awareness	11.99	22.24	17.11
Lack of pedigree to know estrus time	3.04	7.98	5.51

Table 8. Major reasons for culling cattle from the herd in the study areas

Reason for culling	Soro (%) (N=120)	Misha (%) (N=120)	Overall (%) (N=120)	X <sup>2</sup>
Diseased	24.2	50	37.1	23.256
Old aged	75.8	57	66.4	
Infertility	82.5	75.8	79.15	
Poor physical appearance	35	29	32.0	
Lack of feed	65	72.5	68.75	
Bad temperament	100	100	100	
Poor and unwilling to traction	100	100	100	

The Holstein Friesian crossbreds usually require high maintenance ration and therefore require good quality feed especially oilcake [5]. Many of the respondents also provide locally available brewery products viz. atella which too are in close accordance with report [17]. The quality of atella varies from location to location and depends on the types of grains used. However, the numbers of respondents who used atella for their cattle vary across the study locations and their numbers are generally few [17, 23].

The study further indicates that many of the respondents provide their cattle with mineral supplements which too are in close accordance with

result [25]. Minerals play important roles in many metabolic functions and can be classified into both macro and micro types. The respondents identified the need of minerals by the cattle by observing the symptoms of pica [39]. According to the respondents, cattle try to eat inanimate objects and that the feces of the cattle have offensive smell if they are not supplied by minerals. Owners provide their cattle with locally available mineral salt known as “bole, locally known as Boora.

Cattle consume the minerals based on their own free will which too are in close accordance with those of [23]. However, the composition of the soil varies from

location to location and so does the composition of minerals. Studies have indicated that, the composition of minerals can have profound influence on the reproduction and production parameters [9]. The levels of minerals needed by the cattle vary across genotypes and also sex within genotypes and also vary across the ages [9]. However, the cattle owners need to be appraised about the proper composition needed for the wellbeing of cattle, thus the composition and the amount provided to each cattle need to be properly monitored.

### **3.8.2.1. Water sources, watering frequencies and distance to watering point in different season**

The provisions of water made available to the cattle are presented in Table 11. The study shows that primarily water is provided to the cattle from perennial rivers followed by ponds; such observations are in close consonance with the observations from Awi, East and West Gojjam zones of Amhara region [27]. While presences of perennial source of water ensure that cattle rarely suffer from water deprivation, however the presence of water alone does not ensure its quality [15].

Water is needed for all the basic physiological functions and also is a prerequisite for keeping the animals comfortable in the warmer regions [17]. However, poor quality water is a very important cause of spread of diseases and contaminants alike [14]. While water from the rivers is flowing year round, it can harbor diseases causing agents from contaminated carcasses disposed upstream. The respondents need to also ensure that the watering points of the animals are clean from filth and other excreta so as to prevent any cross contamination. The other source of water is ponds which are also in close accordance with the findings [12] from Arsi Highland of Oromia region. Ponds are seasonal in nature and many times the water recedes during the warmer season of the year. During such time water is often muddy and are unfit for drinking, ponds may also serve as drainage point of the agriculture and anthropogenic contaminants, hence usages of ponds as a source of water has to be done with care and that the watering points have to be properly maintained so as to minimize the contamination. The current study also indicates that the majority of respondents (about 74.6%) provide water to their cattle once a day, which at times may be inadequate especially during the warmer season [17] from selected districts of Sidama Zone, Southern Ethiopia.

Ideally water has to be provided adlib and deprivation of water to the animals especially those which are

nursing, pregnant and also used for draft purposes have to be provided several times a day. Thus, farmers need to be trained about the safety and methods of conserving water especially rainwater harvesting so that the water can be made available to the herds adlib. Cattle are allowed to drink water mainly by taking them to the watering point.

Distance to watering points in different seasons and the methods of overcoming water shortage in the study areas are indicated Table 12. About 76.2% of the respondents reported that they travel less than one kilometer to reach watering points. The study indicates that as the rivers flow from the vicinity of the study areas water deprivation is not a very big problem and the observations are in close accordance with the findings [15] from Bench Maji zone of the South West Ethiopia. The observations are contrary to the reports from Humera Ranch, Western Tigray [5]. Cattle producers also need to be appraised that at times of scarcity they either dug holes for obtaining water or conserved water in the ponds for watering their livestock, such observations are indeed a welcome gesture and are in close accordance with the findings [16].

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While water from the rivers is flowing year round, it can harbor diseases causing agents from contaminated carcasses disposed upstream. The respondents need to also ensure that the watering points of the animals are clean from filth and other excreta so as to prevent any cross contamination. The other source of water is ponds which are also in close accordance with the findings [12] from Arsi Highland of Oromia region.

Table 9. Age of castration and the reason for castration.

Reason	Soro (N=120)	Misha (N=120)	Overall (N=240)	X <sup>2</sup>
Do you castrate?	%	%	%	1.017
Yes	99.2	97.5	98.3	
No	0.8	2.5	1.7	
If yes, at what age?				2.759
At puberty	3.3	8.3	5.8	
At maturity	96.7	91.7	94.2	
Reason of castration				97.937
Control breeding	6.06	2.49	4.27	
Improve fattening	28.83	17.43	23.13	
Bad temperament	19.57	35.26	27.42	
Better price	24.18	6.26	15.40	
Better draft power	21.36	38.20	29.78	

X<sup>2</sup>=Chi-square, N = total households number

Table 10. Type of housing, the time of housing cattle and the frequency of barn cleaning

Variables	Districts		
	Soro (%) (N=120)	Misha (%) (N=120)	Overall (%) (N=240)
Animal housing system			
Isolated pen	24.4	30.6	27.5
Together with family	75.6	69.4	72.5
Housing time			
At night only	31.9	31.4	31.7
Part of the day and night	68.1	68.6	68.3
Barn cleaning frequency			
Daily	79.8	76.9	78.3
Weekly	8.4	8.4	8.3
Twice per week	11.8	14.9	13.3

Table 11. Water sources, watering frequencies and methods of watering cattle

Variables	Districts		
	Soro (%) N=120	Misha (%) N=120	Overall (%) N=240
Watering source			
Permanent rivers	73.1	57.9	65.4
Ponds	14.3	25.6	20.0
Bore holes	10.9	12.4	11.7
Piped water source	1.7	4.1	2.9
Watering frequency			
Twice per day	16.8	9.9	13.3
Once per day	75.6	73.6	74.6
Once per two days	7.6	16.5	12.1
How cattle are watered			
Cattle go to the water	76.5	72.7	74.6
Fetches and provided	23.5	27.3	25.4

Table 12. Distance to watering points in different season, the methods of overcoming water shortage in the study area.

Variables	Districts		
	Soro (%) N=120	Misha (%) N=120	Overall (%) N=240
<b>Distance to watering point</b>			
<b>Dry season</b>			
Watered at home	0.0	9.9	5.0
<1km	80.7	71.9	76.2
1 to 5 km	19.3	18.2	18.8
<b>Wet season</b>			
Watered at home	22.7	26.4	24.6
< 1km	73.9	71.1	72.5
1 to 5 km	3.4	2.5	2.9
<b>Water shortage?</b>			
Yes	39.5	60.3	50.0
No	60.8	39.2	50.0
<b>Methods of overcoming</b>			
By searching from available place	39.06	43.91	41.49
By storing rain water in the ponds	17.45	38.32	27.89
Digging wells & extracting water	43.49	17.76	30.63

Table 13. Available feed resources for cattle production in dry and wet season.

Feed sources	Districts		
	Soro (%) N= 120	Misha (%) N= 120	Total (%) N= 240
<b>In Dry season</b>			
Communal grazing land	9.15	6.55	7.85
Crop residues	20.34	21.24	20.79
Wheat bran	6.78	8.50	7.64
Hay	3.73	5.31	4.52
Household leftover	20	21.24	20.62
Enset	18.47	19.65	19.06
Sugarcane leaves	3.05	2.48	2.76
Maize strover	14.41	11.50	12.95
Atela	4.07	3.54	3.80
<b>Wet season</b>			
Communal grazing land	7.27	5.93	6.6
Weed inside crops	23.58	24.54	24.06
Own natural pasture	23.58	24.54	24.06
Wheat bran	7.27	5.27	6.27
Established pasture	4.13	5.03	4.58
Household leftover	14.54	14.53	14.53
Enset and its parts	11.39	11.62	11.505
Sugarcane leaves	8.25	8.83	8.84

Table 14. Feed supplements and source of minerals for cattle in the study area.

Feed supplements	Districts		
	Soro (%) N= 120	Misha (%)N= 120	Overall (%) N=240
Concentrates	90.32	83.93	87.13
Atela	9.68	16.07	12.87
<b>Source of mineral supplements</b>			
Salt	20.0	29.2	24.58
Bole	80.0	70.8	75.42

Table 15. Summary of seasonal shortage feed and methods of overcoming feed scarcity.

Variables	Districts		
	Soro (%) N=120	Misha (%) N=120	Overall (%) N=240
<b>Seasons</b>			
Dry season(January to April)	79.2	74.2	76.7
Wet season (May to August)	20.8	25.8	23.3
<b>Methods of overcoming feed shortage</b>			
Conserving feeds	40.0	46.7	43.3
Using Enset leaf parts and sugarcane	23.3	23.3	23.3
Using purchased feeds	3.3	5.0	4.2
Using cut and carry system	15.8	10.8	13.3
Using Atela	17.6	14.2	15.9
<b>Type of grazing methods</b>			
Herding	54.1	56.7	55.4
Zero grazing	11.7	15.0	13.3
Tethering	34.2	28.3	31.2

Table 16. Responsibilities of family members for routine husbandry practice of indigenous cattle.

Activity	Soro (%) N= 120				Misha (%) N= 120				Overall (%) N= 240			
	H	W	S	D	H	W	S	D	H	W	S	D
Herding	25.1	0	68.3	6.6	8.4	0	83.9	7.7	16.7	0	76.1	7.2
House cleaning	0	41.1	2.1	56.8	0	32.7	0	67.3	0	36.9	1.1	62.1
Take care of sick animals	96.8	3.2	0	0	100	0	0	0	98.4	1.6	0	0
Feed supplying	31.5	35.3	19.9	13.3	27.9	38.1	18.4	15.6	29.7	36.7	19.2	14.5
Animals marketing	93.8	3.1	3.1	0	100	0	0	0	96.9	1.6	1.5	0
Cow Milking	0	97.7	0	3.3	0	99.2	0	0.8	0	98.5	0	2.1
Selling milk products	0	98.2	0	1.7	0	99.2	0	0.8	0	98.7	0	1.3

H= Husband; W= Wife; S= Son; D= Daughters

Table 17. Methods used to improve milk production, pregnancy diagnosis and identifying drought tolerant animals.

Variables	Soro (%) N=120	Misha (%) N=120	Overall (%) N=240
<b>Methods to improve milk production</b>			
Using improved feeds	65.0	61.7	63.3
Maintain hygiene of the animal	15.0	17.5	16.2
Proper selection of animals	8.3	3.3	5.8
Increase the number of milking cattle	2.5	10.8	6.7
Give special treatment from the calf stage	9.2	6.7	7.9
<b>Methods of identifying drought tolerant cattle</b>			
Coat color	73.3	80.8	77.1
By asking its origin	26.7	19.2	22.9
<b>Methods of pregnancy diagnosis</b>			
Body size change	2.5	3.3	2.9
If not back to estrus	35.0	20.0	27.5
Milk color change after several months	45.0	59.2	52.1
Udder size change	9.2	7.5	8.3
By Veterinarians	8.3	10.0	9.2

Table 18. Management aspects, the percentage of respondents practiced crossbreeding and the reason for not using crossbreeding.

Variables	Soro (%) N=120	Misha (%) N=120	Overall (%) N= 240	X <sup>2</sup>
Management and production aspect				0.801
Crop and livestock mixed production	92.5	89.2	90.8	
Semi-intensive production system	7.5	10.8	9.2	
Do you have crossbreds?				4.630*
Yes	5.8	14.2	10.0	
No	94.2	85.8	90.0	
If No, the reason				8.962*
Place too far	57.6	59.5	58.55	
Difficult to get inseminator	24.2	20.7	22.45	
Payment to inseminator is too high	14.9	16.5	15.7	
Mostly efficiency is low	3.3	3.3	3.3	
In which season more cows show estrus?				7.210*
Sep, October, November	94.17	100	97.08	
May, June, July, August	5.83	0.0	2.92	
Which season of year you prefer for calving				0.121
September, October and November	9.2	4.2	6.7	
June, July and August, September	90.8	95.5	93.3	

Table 19. Time of starting milking cows after calving and the perception to feeding of colostrum to calves.

Variables	Soro (%) N= 120	Misha (%) N= 120	Overall (%) N= 240
Time of Starting milking after Calving			
Immediately (half milk for calf)	66.7	45.0	55.8
After three days	31.8	50.0	40.8
After a week	1.7	5.0	3.3
Reason			
To feed the calf the first milk	35.0	55.0	45.0
If full of first milk is fed it harms	65.0	45.0	55.0
Perception about colostrums feeding			
Increase growth rate	32.5	15.8	24.2
Increase disease resistance	15.8	25.0	20.4
Useful but harms if fed excess	40.8	10.0	25.4
Increase both growth rate & disease resistance	10.8	49.2	30.0

Table 20. Household's perception about the trend of cattle population and the reason in the study area.

	Soro (%) N= 120	Misha (%) N= 120	Overall (%) N= 240	X <sup>2</sup>
Cattle population trend				1.973
Increasing	0.8	1.7	1.2	
Decreasing	93.3	95.8	94.6	
Stable	5.8	2.5	4.2	
The reasons				50.298*
Encroached by crossbreeds	3.8	30.8	17.3	
Land shortage	27.8	28.5	28.15	
Feed shortage	29.6	20.8	25.2	
Disease and lack of capital	10.3	5.6	7.95	
The need to rear small No of high producing	28.3	14.3	21.3	

Table 21. Productive and reproductive performances (Mean±SE) of cattle in the study areas

Parameters	Districts			P_value
	Soro	Misha	Overall	
	Mean ± SE	Mean ± SE	Mean ± SE	
Daily milk yield (Liters)	1.57±0.432	1.7±0.42*	1.6±0.45	0.026
Average lactation length (Month)	9.3±0.11	9.3±0.039	9.29±0.02	0.186
Age at First mating (Years)	3.54±0.04	3.83±0.04	3.56±0.03	0.432
Age at first calving (Years)	4.48±0.04	4.54±0.04	4.49±0.03	0.547
Length of calving interval (Years)	1.78±0.03	1.867±0.03*	1.825±0.02	0.036
No of service per conception (n)	1.32±0.05	1.25±0.043	1.29±0.03	0.274
Life time calves crop of cow (n)	7.75±0.116	7.67±0.115	7.7±0.08	0.647
Weaning age of calves (Month)	7.785±1.48	7.54±0.101	7.71±0.09	0.064

Table 22. The frequently occurring diseases among cattle reared in the study area.

Diseases	Soro (%) N= 120	Misha (%) N= 120	Overall (%) N= 240
Black leg	8.10	9.77	8.93
Diarrhea ( <i>Adora locally</i> )	15.5	12.83	14.16
Anthrax	6.16	7.18	6.67
Foot Mouth Disease (FMD)	15.35	15.57	15.46
Bovine Pasteurellosis	16.74	18.32	17.53
Lumpy skin disease	8.96	6.56	7.76
Pneumonia	7.13	12.07	9.6
Bloating	3.50	3.83	3.67
Sudden death	13.12	8.54	10.83
External and internal parasites	5.44	5.33	5.39
<b>Measures to treat sick animals</b>			
Taking to veterinary service	73.3	75.0	74.2
Traditional treatment	22.5	17.5	20.0
Buying medicine and introducing	4.2	7.5	5.8

Ponds are seasonal in nature and many times the water recedes during the warmer season of the year. During such time water is often muddy and are unfit for drinking, ponds may also serve as drainage point of the agriculture and anthropogenic contaminants, hence usages of ponds as a source of water has to be done with care and that the watering points have to be properly maintained so as to minimize the

The current study also indicates that the majority of respondents (about 74.6%) provide water to their cattle once a day, which at times may be inadequate especially during the warmer season [17] from selected districts of Sidama Zone, Southern Ethiopia. Ideally water has to be provided adlib and deprivation of water to the animals especially those which are nursing, pregnant and also used for draft purposes have to be provided several times a day. Thus, farmers need to be trained about the safety and methods of conserving water especially rainwater harvesting so that the water can be made available to the herds adlib. Cattle are allowed to drink water mainly by taking them to the watering point. Distance to watering points in different seasons and the methods of overcoming water shortage in the study areas are indicated Table

12. About 76.2% of the respondents reported that they travel less than one kilometer to reach watering points. The study indicates that as the rivers flow from the vicinity of the study areas water deprivation is not a very big problem and the observations are in close accordance with the findings [15] from Bench Maji zone of the South West Ethiopia. The observations are contrary to the reports from Humera Ranch, Western Tigray [5]. Cattle producers also need to be appraised that at times of scarcity they either dug holes for obtaining water or conserved water in the ponds for watering their livestock, such observations are indeed a welcome gesture and are in close accordance with the findings [16]. However, cattle producers need to be very careful to prevent any contamination of the conserved water especially by keeping it covered from birds and other mammals alike.

### 3.8.2.2. Labour division among family members for cattle management.

The results pertaining to the division of labour pertaining to the husbandry practices among the family members are presented in Table 16. The findings show that herding is usually carried out by sons; this was observed irrespective of the study areas. The current

observations are in close accordance with those of [28] from Babilie district, East Hararge Zone, Oromia regional states. However, studies have indicated that hired labours are used in herding cattle in Mycadra kebele [5]. This may be ascribed to the fact that more and more children are now being admitted to schools, which is a good step. The present study also indicates that cleaning of homestead and the cattle barn is carried out by the women and female children which too are in close accordance with the findings [28].

Cleaning of homestead by the female family members is a tradition which is observed in many of the developing countries. The study further indicates that care of sick animals is usually a prerogative of the household head, which too is in close accordance with the findings [13,28]. This may be because the family head usually have good contacts with other members of the community and also that travel to the veterinary clinics usually takes long time and that cannot be carried out at the expense of family duties by the female members [28]. The procurement of feed is carried out by the adults (husband and wife) as collecting fodder requires a lot of effort which cannot be carried out by children [16].

The current study further indicates that the purchase and selling of livestock are carried out by the male members of the family as it may require travelling long distances and also negotiating with strangers and traders alike, the observations are in close accordance with the findings [28] from East Hararge zone of Oromia regional states, Ethiopia. The act of milking and processing of dairy products are traditionally carried out by the female family members in developing countries which is in close accordance with the observations reported [12].

### 3.9. Indigenous Knowledge of Farmers

The results pertaining to the traditional knowledge used by the respondents in improving the productivity of their cattle are presented in Table 17. The findings show that most of the respondents understood the importance of proper nutrition and feed that cattle require special attention, which is also in close accordance with result [25]. It is well known that the heritability of most of the production traits are moderate and that of the reproduction related traits are low. Therefore in order to improve the reproduction and production parameters the only way is to provide proper management and hygiene to all classes of livestock, these observations are in close accordance with the observations [14]. Some of the respondents also preached that proper selection of cattle based on the performance of their dam and also ancestors can be one of the options, the current observations are in close accordance with result [25]. Selection based on the performance of the ancestors is based on the fact that

they have received the good genes from them [27]. However the biggest hindrance in the selection using pedigree method is lack of proper records and the recall method cannot be considered as a reliable method for production related traits [27]. Phenotypic selection is also not reliable for reproduction related traits as the heritability are quite low and hence can be deceptive [20]. Moreover, phenotypic selection is sex specific and hence cannot be used in the selection of the economically traits. The other option to enhance the milk yield of cattle have been stated to be increased in the numbers of cattle by the householders, this is not a viable option as there is shrinkage in communal pastures and also that the present fodder is poor in both the quality and the quantity is also deficient at times [12]. Moreover, rearing of large numbers of animals in less space often lead to soil erosion in the area and this can also be detrimental to the overall future carrying capacity of the land [9].

The present results also indicate that many of the respondents prefer to provide adequate allowances to their calves so that the pre-weaning growth is improved. Calves with higher pre-weaning growth often are healthy and they have lower incidences of mortality as such calves have optimum growth and mature early [32]. The studies pertaining to the identification of cattle which can tolerate drought are identified by their coat color. Lighter coated cattle can tolerate drought better, because they are less affected by the infra-red radiation at lower altitudes when compared to their darker coated counterparts [21, 22]. With regard to conception, respondents reported that most common method of identification include non-return of estrus after mating or artificial insemination, the observations too are in close accordance with those [33]. Non return of estrus as a sign for conception may at times be misleading as in many cases a cow may not show signs of estrus in case there are incidences of cystic ovaries or non-regression of corpus-luteum [20].

The results further indicate that the color or milk changes after several months, this may be ascribed to the fact that after a particular length of milk production the cows enters a declining lactal phase which results in concentration of nutrients and thus the color of the milk may look yellowish at times, however in this case too it cannot be considered as a confirmation of the pregnancy status in a cow. However, the last two options, changes in the udder confirmation and also rectal palpation (by a veterinarian) were given less priority which may be because the udder confirmation changes at a very late stage of gestation i.e. a few days prior to calving [33]. However, in absence of veterinarian or allied staff identifying the pregnant cows may be difficult through rectal palpation method.

### **3.10. Management, production aspect and households Perception about cattle population trend of cattle in the Study Area.**

The current study revealed that most of the respondents practice crop-livestock-mixed production system and these observations are in close accordance with results [18] reported that most of the small holder farmers in the country reared livestock alongside crop farming activities. The study further indicated that most of the farmers interviewed did not own crossbred cattle which may be ascribed to lack of artificial insemination facilities in the study area [17]. The primordial reasons for the lack of crossbreds in the study areas have been ascribed to long distance to the artificial insemination center besides fewer numbers of inseminators in the region. The current observations are in close accordance with results [14] from Highland of Blue-Nile Basin. Therefore, when many of the respondents reach the insemination center the inseminator may not be around and therefore, the time spent in travelling is lost, this desists them from relying on artificial insemination for mating of their cattle.

The study further indicates that most of the cattle show signs of estrus after the end of the wet season and the observations are in close accordance with those of [14]. The reason for the same may be attributed to the availability of ample and quality feed and provide better roughages and crop aftermath during the end of wet season and harvesting season besides, the weather during that phase is also favorable for the cattle due to low incidences of stress [14]. Calving season reported in the present study also correlates with the season of estrus, which may be ascribed to the fact that the season of calving also correlates with the amount of feed and fodder available to the cows and most of the respondents revealed that survival of calves was better in both rainy and harvesting season [14].

The findings pertaining to the perception of the respondents towards the trend of cattle population and the reasons thereof are presented in Table 20. As the findings indicated the shortage of land is the prime factor that causes declining indigenous cattle population in the study area.

Decreasing of land led to shortage of grazing land due to cultivation of grazing land for crop production as the result of increasing human population which in turn leads to the scarcity of feed. The present study is complementary with the finding [28] who reported land shortage mainly due to expansion of crop production which leads to scarcity of grazing land. Some of the cattle holders indicated the reason for decrease in indigenous cattle was due to encroachment by crossbred cattle. However, small proportion of the

respondents indicated disease occurrence as one of the factors for the declining trend of the cattle population in the study area.

### **3.11. Time of Staring Milking after calving and Perception to Feeding Colostrum to Calves**

The results pertaining to the initiation of postpartum milking of cows and the perception of feeding of colostrum are presented in Table 19. The findings shows that, most of the respondents use colostrum after the calves have had their share, mainly three days after parturition; these observations are in close accordance with results [5]. Consumption of colostrum adlib can lead to diarrhea due to its mucilage, therefore the amount of colostrum consumed by the calves need to be regulated [20]. However, many of the respondents indicated that they start milking of cows after three days of calving, this is because colostrum provides immunoglobulin absorption of which is severely curtailed after 24 hours of birth [32]. Thus, the respondents need to be trained about the importance of colostrum besides the proper time of its feeding. The perception of farmers pertaining to consumption of colostrum indicates that while it enhances the tolerance excess provision of which leads to diarrhea thereby doing more harm than good for the cattle as calves suffering from diarrhea usually succumb to electrolyte losses and therefore may also succumb to death [20]. Improvement of immunoglobulin also helps in reduction of diseases therefore enhancing the growth of the calves [32].

### **3.12. Production and Reproduction Performance of Indigenous Cattle**

The results of production and reproduction parameters of the cattle reared in the two locations are presented in Table 21. In the current study, the average daily milk was 1.6 liter and there was significant variation between the study areas. The variation in the daily milk yield observed in the present study was in line with those reported [14] for native cattle reared in Fogera, Diga and Jeldu districts from highlands of Blue Nile basin of Ethiopia. This can be ascribed to the genetic makeup of the cattle and also on the parity and also the stage of lactation. The variation may be further ascribed to the availability of the nutrients and also the management received by the cattle in the study areas [25]. The average lactation length (LL) reported in the two study areas are lower than what was reported [34,38] from Lake Tana watershed, North Western Amhara region, Ethiopia. However, LL reported in the current study is lower than the standard 305 days. Fewer days of lactation indicates that the lactation milk yield is lower among the cows, which has an adverse economic impact for the owners of such cattle [35]. The age at first mating of cows did not vary between the locations considered, while the values are

quite high, which may be ascribed to delay in maturity of the heifers [15]. The age at first mating (AFM) is also influenced by the weight of the heifers, as heifers with low body weight usually have a delayed maturity. As the trait has an economic impact, heifers with delayed AFM alongside the AFC have fewer numbers of calves, thereby influencing the overall lifetime productivity thereby adversely affecting the economy of cattle producers [13]. The study also indicates that there is a delay in non-return of the estrus, which prolongs the calving interval, the long calving interval as recorded in the current study are in close accordance with the findings reported in the literature [16,31]. Genetically zebu cattle have a longer CI when compared to the taurine counterparts [35]. However, as the trait has low heritability improvement in the trait can only be carried out through proper feeding management [15]. Prolonged CI can also be ascribed to poor nutrition and certain diseases [2]. Hence, improvement in both of them can help in minimizing the CI thereby improving the economics associated with the same. The numbers of services per conception as observed in the present study was in close accordance with the findings [2]. The results as presented indicates that the effects of non-genetic factors on the trait is significant as most of the cows come in estrus after the long rainy season during which the quality and the quantity of fodder is adequate [14]. The findings pertaining to the lifetime calf crop as presented in the study areas is in consonance with the findings [13]. The numbers of calves born are also indicative of the economy of cattle rearing and life time milk production [13]. The weaning age of calves are also in close accordance with the findings [13] for zebu calves in selected areas of Benshangul-Gumuz, Western Ethiopia. The age of weaning of the zebu cattle is longer than those of the taurine cattle as the birth weight of the calves are usually lower than those of the taurine calves of the same sex [35]. Thus, as both the traits are correlated calves born lighter usually have higher age at weaning [14]. Moreover, as there exist a significant maternal attachment between the dams and calves of the zebu cattle therefore the lactation length of the dam ceases soon after weaning occurs.

### **3.13. Animal Health Care and Frequently Occurring Diseases**

The major diseases that appear in the study area are indicated in Table 22. The frequently occurring diseases as reported by the respondents were black leg, anthrax, bovine pasteurilosis, foot and mouth disease, diarrhea, sudden death, pneumonia and lumpy skin disease. These observations are in close accordance with results [5]. Furthermore, bloating, prevalence of both external and internal parasites has also been reported and this is in line with those results [12].

Blackleg, FMD and LSD are vaccination preventable diseases, hence regular vaccination need to be carried out as per the schedule provided by the competent authorities.

Foot and mouth disease has low mortality among the adults however often leads to serious economic loss and the tiger heart condition among the calves lead to sudden death [36]. The disease also leads to abortions among the cows, cessation of lactation and therefore the economic losses due to FMD are quite high. Blackleg, FMD and LSD are vaccination preventable diseases, hence regular vaccination need to be carried out as per the schedule provided by the competent authorities [36]. Sudden death without any sign was also the major problem in the study area, this may at times be fallout of poisoning which can be from the consumption of poisonous plants in the areas, and the observations are in close accordance with those of [14]. Studies have indicated that over consumption of fresh clover plants (*Trifolium* species) can often cause bloating and cyanide (from sorghum) lead to poisoning especially among the young bovines which can lead to sudden death of the animals [31]. Bloating is mainly occurs in wet season when animals were fed by leguminous fodder from the clover family [12,31]. The respondents hence need to be careful that the poisonous plants and too much of lush green fodder may be avoided, the farmers need to be appraised about the poisonous plants growing locally besides. Besides, the respondents need to be told about the simple household treatments (drenching the cattle with mineral/ cooking oil). As regards to the prevalence of ecto-parasites the losses due to them can also be significant. The respondents need to be appraised about the methods to control them by either using ethno-veterinary medicines (usages of concoction made from castor leaves) or using acaricides [5,23,26] However, in both cases the respondents need to be appraised about proper disposal of the spent water as in both the cases it may lead to serious toxicity among the animals if consumed.

The study has further indicated that most of the respondents use the assistance of modern veterinary medicines, which is also in close accordance with result [17] from selected districts of Sidama zone, Southern Ethiopia. This may be because the ethno-veterinary practitioners are dwindling over time and so are the medicinal plants. Moreover, treatment using traditional methods is limited to few diseases only and there are hardly any information regarding the usages of these plants for newly emerging diseases [26]. The efficacies of the plants are at times questionable and the time taken for the treatment to show its desired effect is also at many times delayed [5]. However, many times the respondents prefer treating sick animals by purchasing medicines from the local clinics

(without the advice of any competent authorities), which too is in close accordance with the observations reported in the literature [17,27]. Therefore, the local veterinary pharmacies need to be cautioned not to sell the medicines without proper prescriptions.

### 3.14. Constraints of Cattle Production

The major constraints pertaining to cattle production in the study areas are presented in Table 23. The study shows that shortages of feed followed by shrinkage of grazing areas are the two major causes identified by the respondents; these observations are in close accordance with the findings [12] from Arsi Highlands of Oromia region from Bench-Maji zone, South west Ethiopia [15]. The study further indicates that many of the respondents have identified lack of capital to invest on livestock breeding as one of the major constraints, which too is in close accordance with the findings [23]. Lack of capital leads to non-procurement of essential inputs (feed, fodder, medicines) much needed for the livestock production. Thus, formation of self-help groups and also taking assistance of local micro-finance institutions may be helpful to solve these problems; the observations are in close accordance with the findings [37]. Shortage of improved breeds and low productivity of indigenous cattle are constraints reported by the respondents.

### 4. Conclusion and Recommendation

Even though, cattle give multiple purposes for mixed crop livestock production system by providing traction, food and income generation, the production performance of indigenous cattle was low. In order to improve productive and reproductive performance of indigenous cattle, critical attention should be given regarding good management, health care and feed supplementation. Since feed shortage was the main constraint for cattle production in the study area, education and livestock extension intervention services are important to create better understanding about use of available feeds and use of non-conventional feeds for supplementation to mitigate feed problem, adoption of improved technologies and to sustain development. The study further indicated that land allocated to grazing and forage production is very small and therefore, the respondents need to be trained about effective utilization of crop residues and aftermaths. The low genetic potential of local cattle breeds is improved through selection and crossbreeding with improved genotypes. The awareness and appropriate facilities should be given to cattle owners' better understanding on selection criteria related to production, introduction of crossbred cattle, crossbreeding and close monitoring the entire breeding process should be indispensable. The major constraints hindering the cattle productivity in the study area are feed shortage, diseases, water shortage,

and shrinkage of grazing land. Special attention should be needed to address the major constraints related with management and husbandry practices of cattle breed to improve cattle productivity. Further detailed monitoring study is imperative to fully investigate and document the productive and reproductive performance of cattle to further substantiate the results of the current study.

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