Breeding Practices and Farmers Trait Preferences on Indigenous Dairy Cattle Production in East Gojjam Zone, Ethiopia

Andarge Zewdu[1], Kefyalew Alemayehu [2] and Zewdu Wondifraw[3,*]

[1] Enebsie Sar Midir District Rural and Agricultural Development Office, East Gojjam Zone, Ethiopia, andarge34@gmail.com
[2] Department of animal science, College of Agriculture and Environmental Sciences, Bahir Dar University, Bahir Dar, Ethiopia,
[3]Department of Animal Science, College of Agriculture and Natural Resources, Debre Markos University, Debre Markos, Ethiopia, kefyale@gmail.com.

**Corresponding author's email: zewduwondifraw [AT] dmu.edu.et*

ABSTRACT---- ***This study was carried out to evaluate the indigenous cattle breeding activities and farmers' trait preferences on indigenous dairy cows in Hulet Eju Enese, Enebsie Sar Midir and Aneded districts within East Gojjam Zone under smallholder farmers management system. For the study, a cross-sectional survey and structured questionnaire as well as focus group discussions were used to collect data from 225 households. The data were analyzed using the Statistical Package for the Social Sciences (SPSS Version 20) to study the magnitude and direction of variation. Uncontrolled natural mating was a common mating system accounting 82%, 87.3%, 73.3% in Hulet Eju Enese, Enebsie Sar Midir and Aneded districts, respectively. The first breeding objective of the farmers in Enebsie Sar Midir district was obtaining better milk yield 45.4%, however attaining strong draft oxen 42.7% was more preferred in both Hulet Eju Enese and Aneded districts. Trait preference ranking indices showed that communities prefer cattle for its higher milk yield with the indices of 0.16, 0.37, 0.22, faster growth rate 0.11, 0.09, 0.11, adaptability to local environment (shortage of feed resources and prevalence of disease) 0.10, 0.07, 0.08, breeding ability 0.14, 0.13, 0.09 and providing traction power 0.22, 0.19, 0.35 in Hulet Eju Enese, Enebsie Sar Midir and Aneded districts, respectively. Farmers' cattle trait preferences slightly differ across districts. Overall, milk yield and draught power were the most important production objectives. Among the selection criteria of farmers for indigenous dairy cows, udder and teat size, and pelvic width were commonly considered as primary important and in addition traction power, breeding ability and tolerant to seasonal feed shortage and disease for male selection. Productivity of cattle is limited by several constraints that include natural uncontrolled and unorganized breeding practice, high prevalence of diseases, poor reproductive performance, limited feed availability and poor marketing system and lack of recording system in the study area.***

Keywords--- breeding practice, selection criteria, indigenous cattle

---

1. INTRODUCTION

Ethiopia is enriched with indigenous cattle genetic resources diversity (IBC, 2004; DAGRIS, 2007) and is known for its diversified livestock production systems. This is due to considerable agro ecological variation, cultural and ethnic diversity, and a long-lasting agricultural practice. The country is the home for 32 recognized indigenous cattle breeds (DAGRIS, 2007) and has a wealth of undocumented indigenous knowledge on cattle genetic resource management. Of the total cattle population found in the country, 99.4% are indigenous types and the remaining are the hybrids and the exotic breeds that accounted for about 0.5% and 0.1%, respectively owned and managed by smallholder farmers and pastoralists (IBC, 2004; Workneh *et al*., 2004; Rowlands *et al.,* 2006).

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 average lactation period per cow at country level is estimated to be about eight months and the average milk yield/cow/day is about 1.284 liters. The average lactation milk yield of the indigenous cows ranges from 494 to 850 kg under optimum management practice and cows usually do not produce their first calves earlier than 35-53 months of age and calving interval is about two years (Alewya, 2014; Misganu, 2016). Low genetic capacity of the indigenous cattle, feed shortage, disease prevalence, low level of management, lack of proper breeding management such as lack of

accurate heat detection and timely insemination might have contributed considerably to long days open, late age at first calving, long calving interval, short lactation length and low milk production influence on productive and reproductive performance of cattle (Masama *et al.,* 2003).

In dairy cattle breeding, most of the dairy farmers in the highland, midland and the lowland areas of Ethiopia used natural mating by using indigenous breeding bull (Tesfa, 2009). Along with natural mating, some farmers used AI in highland and midland areas. Trait preferences of livestock keepers usually vary across communities, production systems, and agro ecological zones (Scarpa *et al*. 2003; Roessler *et al*. 2008). This might result in re-ranking of preferences for a particular trait in different production environments. This is indeed true because most economically important traits in livestock are influenced by variation in the production systems.

To put in place appropriate remedial interventions that would lead to enhanced productivity of the dairy subsector, understanding the prevailing overall farmers breeding practices and understanding the farmer's trait preferences on indigenous dairy cattle is very vital. This necessitates the need for generating site specific database under specific production scenarios. In this regard, little research has been done so far to identity the overall farmers breeding practices and trait preferences on the selection of indigenous dairy cattle in East Gojjam Zone. In this research, it is endeavoured to fill this existing information gap. Hence, the objective of this study was to investigate the farmers breeding practices and trait preferences on indigenous dairy cattle production and to suggest possible solutions for the identified limitations at their production environment.

2. MATERIAL AND METHODS

2.1. Description of the Study Area

This study was conducted within East Gojjam zone of the Amhara National Regional State, at three representative districts namely Enebsie Sar Midir, Aneded and Hulet Eju Enesie.

Enebsie Sar Midir district: is located 180km far from Bahir Dar and 365 Km from Addis Ababa. The area is located at 10^0 52' N latitude and 38^0 16' E longitudes at an altitude of 1300-3664 masl with annual rain fall of 900-1200 mm which is an erratic type of rainfall. The annual average temperature ranges from 10^0C to 22^0C. Agro-ecologically the district covers 53% lowland, 33% midland and 14% high land. The livestock population of the district accounts as 63761 cattle, 23343 sheep, 46070 goat,15004 equine 37359 chicken and 7370 bee colony (CSA, 2007).

Aneded district: is located 285km far from Bahir Dar and 280 Km from Addis Ababa. The area is located at 11^0 N latitude and 38^0 E longitudes at an altitude of 1663-2570 masl with annual rain fall of 1200-1660mm which is an erratic type of rainfall. The annual average temperature ranges from 10^0C to 22^0C. Agro-ecologically the district covers highland 3.3%, Midland 81.1% and lowland 15.6%. The livestock population of the district accounts as cattle 97600, sheep 49918, goat 7445, equine 18564, poultry 35840 and bee colony 5846 (CSA, 2007).

Hule Eju Enesie district: is located 120km far from Bahir Dar and 376 Km from Addis Ababa. The area is located at 11^0 05' N latitude and 37^0 53' E longitudes at an altitude of 1290-4036 masl with annual rain fall of 1100-1600mm which is an erratic type of rainfall. The annual average temperature ranges from 10^0C to 27^0C. Agro-ecologically the district covers highland 18%, Midland 52% and lowland 18%. The total livestock population of the district accounts as cattle 88112, sheep 488649, goat 19579, equine 17183, poultry 113634 and bee colony 5846 (CSA, 2007).

2.2. Site Selection and Sampling Procedure

Before deciding on the survey areas, discussions were held with the district experts of the rural and agricultural development office and the farmers' representatives about the objective of the study and also to know the current production systems and area dominated by indigenous cattle breed in the district. In the first stage, districts known for their cattle populations were identified and followed identification of potential peasant association and villages. Potentials for cattle production and road accessibility were used as criteria in selecting the sites. Thus, three districts were purposively selected based on cattle population potential and road accessibility. From each districts three peasant associations (PAs) were selected purposively based on the same criteria. A total of 225 households (cattle owners) (25 from each PA and 75 from each district) were strategically selected based on possession of cattle for interview.

2.3. Data Collection

A total of seventy-five (75) households in each district were selected purposefully to administer a questionnaire. The questionnaire was designed to explore general information about major conformational traits used by farmers to assess milk production potential of their heifers and cows. The appearances of conformation traits of what are regarded by the

farmers as 'good dairy cow' were also examined for each breed. Breeding practice, trait preference and rank of conformation traits in selection criteria were assessed by semi structured questions. In addition, group discussion was also used to fill any emerging information gap. Totally nine open group discussions were carried out at selected sites and both district and PAs extension workers were involved in the discussions. The discussions focused on establishing whether and how farmers select and breed cows for milk production, and what criteria they apply. Furthermore past and current practices of farmers in selection were also assessed.
Both qualitative and quantitative Data were collected by means of questionnaire survey, participatory appraisal, and observation. The questionnaire was closed ended for its major part, focusing on demographic characteristics of households, livestock herd size and composition, husbandry practices, animal health aspects, breeding practices, herd dynamics, phenotypic description of the respective districts cattle that has been designed based on the information checklists.

There were a total of nine participatory appraisal discussion groups (one per peasant association) and each group with 10-15 members consisting of male and female farmers who are purposively selected based on their good knowledge of their PAs cattle resources. Development agents were involved in the identification of farmers for the group discussion.
Both primary and secondary data were used in this study. The primary data was collected from sampled respondents through semi-structured questionnaire. Single-visit multiple factor survey method (ILCA, 1992) has employed to collect the data on various aspects of cattle husbandry practices and herd structure. Moreover, community meeting was arranged to create awareness about the monitoring activity so that farmers' willingness was secured before commencement of the actual field work and animals were selected for their linear body measurements and physical observation of cattle was also used to generate information at household and community level. Secondary data was obtained from each district's Agriculture and Rural Development Office.

After the questionnaire is pre-tasted, nine rural peasant associations (PAs) three from each district of highest cattle population was selected by purposive sampling method based on data of cattle population and transport accessibility. Three PAs in each district and Twenty Five households per PAs were selected by simple random sampling method based on engagement on cattle husbandry practice. A total of 225 households were interviewed through semi-structured questionnaire.

2.4. Questionnaire administration and group discussion

A semi- structured questionnaire was prepared and pre-test before administration and some re-arrangement, reframing and correcting in accordance with respondent perception and meeting the objective of the study has been done. The questionnaire was administered to the randomly selected household heads by a team of enumerators assigned and trained for the purpose with close supervision by the researcher. Information on the socio-economic characteristics of the farmers, behavioural traits, trait preference, selection criteria, disease prevalence and resistance, routine breeding practices, breeding objectives and feed situation was captured after the end of the survey.

2.5. Data Management and Analysis

Questionnaire data which were gathered during the study was checked for any error, coded and entered in to computer for further analysis. Data collected through questionnaire were described by statistical analysis system (SAS version 9.2) for descriptive statistics and statistical packaging computer software (SPSS version 20) was used for frequency distribution. Statistical significance for quantitative data was done using F test. Indices were calculated to provide ranking of the reasons of keeping cattle, trait preferences, selection criteria and major constraints of cattle production according to the following formula: Index = Σ of [3 for rank 1 + 2 for rank 2 + 1 for rank 3] given for particular qualitative variables divided by Σ of [3 for rank 1 + 2 for rank 2 + 1 for rank 3] for all purpose of keeping cattle in the area. Similar indices were calculated for trait preference, selection criteria and health management and production constraint. The following formula was used to compute index as employed by Musa *et al*. (2006):
Index = $R_n \times C_1 + R_{n-1} \times C_2 ... + R_1 \times C_n / \square$ ($Rn \times C_1 + R_{n-1} \times C_2 + ... + R_1 \times C_n$)
Where, R_n = the last rank (example if the last rank is 8^{th}, then $R_n = 8$, $R_{n-1} = 7$, $R_1 = 1$).
C_n = the % of respondents in the last rank, C_1 = the % of respondents ranked first.

3. RESULT AND DISCUSSION

3.1. Breeding Practice

The use of bulls for natural service remains widespread in Ethiopia. According to Ayantu *et al*.(2012) and Derje (2015) more farmers practiced natural, unplanned and uncontrolled mating system and keeping of sire was not practiced by smallholder farmers rather they use for both breeding and drought power. Communal grazing land is the main source of breeding bull in most part of Ethiopia (Shiferaw, 2006, Ayantu *et al*, 2012).

Sample respondents this study were reported as they utilized natural mating as a breeding practices accounting as 93.3%, 97.3% and 89.3% whereas AI were practiced rarely as 6.7%, 2.7%, and 10.7% in Hulet Eju Enese, Enebsie Sar Midir and Aneded districts, respectively. Similar to this report, Ayantu *et al.* (2012) and Azage *et al.* (2013) revealed that uncontrolled mating predominates under the extensive livestock husbandry system especially in the rural areas. Bulls can be used for two main types of natural mating, either free mating in the range or controlled mating. In the free mating system, heat detection is carried out by the bull and cows in heat are usually mated several times during each heat period. In controlled mating systems, heat detection is carried out by the farmer and each cow is mated once or twice during each heat period.

Almost all of the respondents (100%) from all sites reported as they used castration as a common breeding management practice for male animals (Table 1). The farmers from Enebsie Sar Midir district reported as they have different reasons for castration activity. The first major reason (48%) was to make bulls tame for different farming activities; the second reason (28%) is to avoid the difficulty with breeding bulls running around for mating and the third reason (24%) is to remove unwanted bulls from mating (Table 1). This result is similar in previous report by Zewdu Wuletaw *et al*. (2006), in north western Ethiopia.

In Hulet Eju Enese district 52% of the respondents practice natural controlled mating, which mean bulls were selected and allowed to mate cows; around 41.3% of them reported the use of free mating, which mean there was no selection of breeding bulls. This result is similar to the trend reported by Azage Tegegne *et al*. (2009) on the highland zebu cattle in Metema district. The remaining 6.7% of the sampled households in Hulet Eju Enese district reported as they used AI technology through AI technicians (Table 1). However, in Enebsie Sar Midir 57.3% of the respondents practice natural controlled mating; around 40% of them reported the use of natural uncontrolled mating and 2.7% of the breeding practice takes place by AI. In Aneded district 53.3%, 36% and 10.7% of the respondents reported as they used natural controlled mating, natural free mating and AI services, respectively (Table 1).

It was also noted from the individual farmer interviews and the focus group discussions that obtaining the desired type of breeding bulls has become increasingly difficult in the study areas. The farmers reported as they have three options to get breeding bulls (their own herd, purchasing from market and neighbours) at different proportions between the districts. This result is similar with the earlier report by Zewdu Wuletaw *et al*. (2006), who found out that the majority of farmers in north western Ethiopia obtain their replacement breeding animals from their own farm and from their relatives and neighbours. Own bull means a bull obtained or produced within their own herd. Neighbour's bull is obtained in their surrounding and available in communal grazing lands. In Aneded district sample respondents reported primarily they used their own bull (58.7%). In Hulet Eju Enese and Enebsie Sar Midir districts sample respondents reported as they primarily rely on bulls from neighbours as well as their own home-bred bulls (54.7% and 45.3%; 40% and 38.7%), respectively.

Table 1. Source of replacement bull and mating practices in three districts

Management practice	Districts		
	Hulet Eju Enese N=75	Enebsie Sar Midir N=75	Aneded N=75
Castration practice			
Yes	100	100	100
No	-	-	-
Reason for castration			
Tame bulls for draft activity	41.3	48	46.7
Avoid running around mating	32	28	33.3
Remove unwanted bull from mating	26.7	24	20
Mating type			
Natural controlled	41.3	40	36
Natural uncontrolled	52	57.3	53.3
AI	6.7	2.7	10.7
Source of replacement bull			
From own herd	40	38.7	58.7
From neighbours /relatives	54.7	45.3	30.7
Bought/Market	5.3	16	10.6

N= number of respondents

Breeding objectives

Smallholder farmers do have a broad perspective to dairy production and pursue several breeding objectives such as increase of milk production, adaptability of animals to local feed conditions as well as diseases and cattle as capital assets (Kahi *et al*., 2000). Moreover, farmers in various cattle production systems have different trait preferences and breeding

strategies that need an investigation before designing any sustainable breeding plan (Mwambene *et al*., 2012). The objectives are likely to be affected by the cost of production and the revenue from product sales related to a genetic change in the target trait. Cattle in the northern Amhara region have multipurpose functions. These include traction, milk production, income generation, manure, reproduction and meat production (Zewdu Wuletaw *et al*., 2006). The current study also agrees with the above expressed breeding objectives of the society by emphasizing on milk production for Enebsie Sar Midir district (Table 2). This is similar to the results of the previous study by Zewdu Wuletaw(2004), milk was one of the most important functions of the local cattle and the primary reasons for keeping indigenous cattle. More milk production also means better-fed calves that will have better pre- and post-weaning survival rates. These calves will also grow better and hence reach puberty earlier thus reducing age at first calving (Zewdu Wuletaw *et al*., 2006). Similarly, Piotr *et al*. (2004) also reported that recently the cattle breeding objective are focused on the increase of milk yield, under the assumption that profit would increase with increased yield per cow. Production circumstances have given rise to interest indirectly reducing cost of production, and breeding objectives are moving from increasing yield to increasing economic efficiency. The first important breeding objective reported by the sampled farmers was traction for Hulet Eju Enese and Aneded districts (Table 2).

In addition to increasing milk production, obtaining of good breeding bull and draught oxen, good mothering ability and shortening of calving intervals were taken into account at the same time. The farmers in all study sites believed that good breeding bull brings gross improvement through natural control mating system. Keeping desirable bulls can contribute to improve herd performance over time. Since the farming system of the area is mixed crop-livestock, bulls are needed in different farming activities. They believe that shortening of calving interval is achieved by selecting for ancestors that have short calving interval and applying the tools of genetic improvement with the proper management system.

Table 2. Reasons for the selection of breeding cattle in the study areas

Traits in breeding objectives	Districts		
	Enebsie Sar Midir N=75	Hulet Eju Enese N=75	Aneded N=75
Better milk yield	45.4	27.3	26.3
Shorter calving interval	15.3	17.1	18.1
Getting good breeding bull	8.1	7.5	6.4
Draught power	26.7	42.7	44.7
Good mothering ability	4.5	5.4	4.5

N= number of respondents

3.2. Trait Preferences

Genetic improvement for productive traits in livestock, particularly in cattle, has been very slow and insignificant in the country. One of the main reasons for this is lack of well-organized and usable recorded information on the performance of both the indigenous and crossbreeds with exotic genotype to undertake structured selection and breeding programs (Azage Tegegne *et al.,* 2000).

Summary of the reported trait preference of the respondents in Hulet Eju Enese, Enebsie Sar Midir and Aneded districts were presented in Table 3a, b and c, respectively. The major preferred traits as reported by the sample respondents were milk yield, traction power, breeding ability, growth rate, adaptation, body size and Temperament of the cow. This finding is similar to the previous report of indigenous cattle genetic resources of Zewdu Wuletaw *et al*., (2006) in north-western Ethiopia.

Table 3a. Summary of reported cattle trait preference in Hulet Eju Enese district

Variables	Order of trait preference				
	1st	2nd	3rd	Index	Order
Traction power	61.61	23.21	15.18	0.22	1
Milk yield	51.20	31.70	17.07	0.16	2
Breeding ability	38.03	45.07	16.90	0.14	3
Temperament	56.00	26.67	17.33	0.14	3
Body size	71.64	20.89	7.46	0.13	4
Growth rate	15.25	67.79	16.95	0.11	5
Adaptation	28.3	41.5	30.19	0.10	6

Index=the sum of (3 times first order + 2 times second order +1times third order) for individual variables divided by the sum of (3 times first order + 2 times second order +1times third order) for all variables.

Table 3b. Summary of reported cattle trait preference in Enebsie Sar Midir district

Variables	Order of trait preference				
	1st	2nd	3rd	Index	Order
Milk yield	84.82	11.52	3.66	0.37	1
Traction power	15.63	68.75	15.63	0.19	2
Breeding ability	36.92	40.00	23.08	0.13	3
Growth rate	12.24	48.98	38.77	0.09	4
Temperament	37.50	25.00	37.50	0.08	5
Adaptation	44.12	35.29	20.59	0.07	6
Body size	25.71	45.71	28.57	0.06	7

Index=the sum of (3 times first order + 2 times second order +1times third order) for individual variables divided by the sum of (3 times first order + 2 times second order +1times third order) for all variables.

Table 3c. Summary of reported cattle trait preference in Aneded district

Variables	Order of trait preference				
	1st	2nd	3rd	Index	Order
Traction power	81.22	14.36	4.42	0.35	1
Milk yield	21.24	67.26	11.5	0.22	2
Growth rate	30.51	33.89	18.64	0.11	3
Breeding ability	41.18	39.22	19.61	0.09	4
Adaptation	34.88	37.21	27.91	0.08	5
Body size	51.43	5.71	42.86	0.07	6
Temperament	10.34	34.48	55.17	0.06	7

Index=the sum of (3 times first order + 2 times second order +1times third order) for individual variables divided by the sum of (3 times first order + 2 times second order +1times third order) for all variables.

3.3. Selection practices

As it is true for many other tropical developing countries, the cattle genotypes of Ethiopia have evolved largely as a result of natural selection for the traits such as survivability, ruggedness, heat tolerance and tolerance for diseases and seasonal shortage of feed (Abeygunawardena and Dematewewa 2004).

Development of the dairy sector in Ethiopia as in any other developing countries can further be augment with the selection within the local cattle besides crossbreeding (Yilma, 2011). In some part of Ethiopia, farmers exercise selection for indigenous milking cows depending on the appearance of some conformation traits and milk production history of the ancestors (Takele Taye, 2005). Cattle keepers in Ethiopia prefer to select their herd based on marketable traits such as milk yield, growth rate and reproductive performances of the heifers/cows, steers/bulls. However, traits such as coat color and adaptability are traditionally taken into account when selecting the dairy cattle (Ayantu *et al.*, 2012). Accordingly, in all the study districts selection for both male and female animals was practiced by most of the respondents. Selection takes place not only at the time of mating but also starts from the early ages of the calf. In all study areas the first purpose was selecting a bull that is suitable for ploughing, as the communities practice mixed crop livestock farming. Secondly, bulls are selected for breeding purpose depending on good physical appearance, known desirable pedigree history in milk yield, good reproductive performance and tolerance for seasonal feed scarcity and disease challenges.

All of the respondents reported that selection of female animals takes place by considering expected milk production potential. To achieve this, farmers apply their own selection criteria. These include body conformation and the performance history of their ancestors. All of the respondents and the focus group discussion participants indicated that conformation traits are used to select for good milking cows.

Six conformation traits were identified and ranked by the respondents. As the percentage index indicates the ranking order vary in each study site. In Hulet Eju Enese district primarily pelvic width was ranked high. Then udder size, wither height, teat size, dewlap size and body length was ranked (Table 4a). In Enebsie Sar Midir district the same traits were identified but rankings were different from those in Hulet Eju Enese (Table 4b). Udder size was ranked first for selecting breeding and lactating cows followed by pelvic width. This was followed by wither height, teat size, dewlap size, and body length. The rankings of conformation traits in Aneded district is summarized in Table 4c. Pelvic width was ranked first, followed by udder size, teat size, dewlap size, wither height and body length.

Table 4a. Ranks of conformation traits used for selecting cows in Hulet Eju Enese district

Variables	Rank of conformation traits for selection purpose							
	1st	2nd	3rd	4th	5th	6th	Index	Order
Udder size	25.3	24.0	16.0	16.0	12.0	6.7	17.79	2
Pelvic width	21.3	16.0	30.7	22.7	5.3	4.0	20.13	1
Teat size	8.0	25.3	13.3	18.7	16.0	18.7	16.29	4
Wither height	14.7	17.3	17.3	14.7	26.7	9.3	17.08	3
Body length	13.3	6.7	10.7	16.0	9.3	44.0	12.99	6
Dewlap size	17.3	10.7	13,3	12.0	29.3	17.3	15.71	5

Index=the sum of (6 times first order + 5 times second order +4times third order 3 times fourth order 2 times fifth order 1 times sixth order) for individual variables divided by the sum of (6 times first order + 5 times second order +4 times third order 3times fourth order 2times fifth order 1times sixth order) for all variables.

Table 4b. Ranks of conformation traits used for selecting cows in Enebsie Sar Midir district

Variables	Rank of conformation traits for selection purpose							
	1st	2nd	3rd	4th	**5th**	**6th**	Index	Order
Udder size	22.7	28.0	26.7	17.3	4.0	1.3	21.17	1
Pelvic width	17.3	29.3	21.3	14.7	10.7	6.7	19.45	2
Teat size	17.3	13.3	9.3	17.3	26.7	16.0	15.70	4
Wither height	9.3	18.7	17.3	14.7	29.3	10.7	15.83	3
Body length	16.0	5.3	10.7	21.3	10.7	36.0	13.67	6
Dewlap size	17.3	5.3	13.3	14.7	20.0	29.3	14.18	5

Index=the sum of (6 times first order + 5 times second order +4times third order 3 times fourth order 2 times fifth order 1 times sixth order) for individual variables divided by the sum of (6 times first order + 5 times second order +4 times third order 3times fourth order 2times fifth order 1times sixth order) for all variables.

Table 4c. Ranks of conformation traits used for selecting cows in Aneded district

Variables	Rank of conformation traits for selection purpose							
	1st	2nd	3rd	4th	5th	6th	Index	Order
Udder size	13.3	24.0	16.0	22.7	16.0	8.0	17.7	2
Pelvic width	8.0	24.0	26.7	24.0	10.7	6.7	17.83	1
Teat size	12.0	18.7	26.7	12.0	17.3	13.3	16.94	3
Wither height	21.3	8.0	14.7	13.3	21.3	21.3	15.74	5
Body length	20.0	14.7	8.0	13.3	12.0	32.0	15.29	6
Dewlap size	25.3	10.7	9.3	13.3	22.7	18.7	16.49	4

Index=the sum of (6 times first order + 5 times second order +4times third order 3 times fourth order 2 times fifth order 1 times sixth order) for individual variables divided by the sum of (6 times first order + 5 times second order +4 times third order 3times fourth order 2times fifth order 1times sixth order) for all variables.

Generally, the breeding objectives in each study site were obtaining better milk yield, getting good bulls both for breeding and traction service and good mothering ability of the cows. The stated breeding objectives were reported to be better achieved in all districts. In general selection for milking cows was reported to be based on conformation traits of the cows and heifers, and some background history of their ancestors. The most useful traits in this regard were; udder size and pelvic width, wither height, body length and teat size.

4. CONCLUSION

Cattle comprise the majority of the livestock population in Ethiopia and are reared across all the agro-ecologies. However, productivity of cattle is limited by several constraints that include natural uncontrolled and unorganized breeding practice, high prevalence of diseases, poor reproductive performance, limited feed availability and poor marketing system and lack of recording system. To address these constraints indigenous knowledge of farmers and designing appropriate mating systems with full participation of farmers is the best option in improving breeding practice of dairy cattle in Ethiopia. Breeding strategies need to involve farmers, considering the existing breeding practices, management systems and their trait preferences. Selection of livestock production system is key factor for obtaining animals for breeding and has a strong influence on reproductive performance of the herd. Exploring indigenous knowledge of managing the herd, setting of breeding objectives and finally designing appropriate mating systems with full participation of farmers is of paramount importance in improving dairy cattle. This showed that farmers' traditional breeding goal is broad and this can be achieved by using animals that are averagely good in multiple traits. In conclusion,

farmers should be train on various aspects of improving cattle productivity (nutritional, health and breeding management) in communal areas and developing their entrepreneurial skills. It is recommended to consider preferential traits of farmers for the improvement and sustainability of the dairy cattle.

5. RECOMMENDATION

- Controlled and AI service should be improved through strong extension services so that to avoid free natural mating.
- Awareness creation for farmers in selection of breeding bull and cows, accessing improved feed could improve the productivity of their cattle.
- Practicing well organized record keeping should take in to account.

6. ACKNOWLEDGEMENT

We would like to express our sincere appreciation to all staff of Hulet Eju Enese, Enebsie Sar Midir and Aneded districts and East Gojjam Zone Livestock and Fisheries Resource Department for providing the necessary baseline data for this study. Similarly, we would like to appreciate and acknowledge the farmers who participated in the survey and focus group discussions, Development Agents working in the study areas for their critical support in data collection.

7. REFERENCES

- Abeygunawardena H and Dematewewa C M B. 2004. Pre-pubertal and postpartum anestrus in tropical Zebu cattle. Animal Reproduction Science 82–83 (2004) pp 373–387.
- Alewya Heyredin 2014. Comparative Study of Reproductive and Productive Performance of Holstein Friesian Dairy Cows at Holetta Bull Dam Station and Genesis Farms, a Thesis Submitted to the College of Veterinary Medicine and Agriculture of Addis Ababa University, Bishoftu, Ethiopia.
- Ayantu M, Haile A, Dessie T and Mekasha Y 2012. On farm characterization of Horro cattle breed production systems in western Oromia, Ethiopia. Livestock Research for Development 24 (100). Retrieve June 25, 2015 from http.//www.lrrd.org/lrrd24/6/meko24100.htm.
- Azage T, Berhanu G, Hoekstra D 2010. Livestock input supply and service provision in Ethiopia: Challenges and opportunities for market oriented development. IPMS (Improving Productivity and Market Success) of Ethiopian Farmers Project Working Paper 20. ILRI (International Livestock Research Institute), Nairobi, Kenya p. 48.
- Azage T, Tesfaye M, Tesfaye D, Worku T, Eshete D 2009. Transhumance cattle production system in North Gondar, Amhara Region, Ethiopia: Is it sustainable? IPMS (Improving Productivity and Market Success) of Ethiopian Farmers Project. Working Paper No. 14. ILRI (International Livestock Research Institute), Nairobi, Kenya p. 73.
- Azage Tegegne, Tsehay Reda, Alemu Gebrewold and Hizkias Ketema, 2000. Milk Recording and Herd Registration in Ethiopia In: Pastoralism and Agropastoralism: Which way forward? Proceedings for the 8th annual conference of the Ethiopian Society of Animal Production. (ESAP) held in Addis Ababa, 24-26 August 2000, Addis Ababa. P 90.
- CSA, (Central Statistics Authority), 2007. Statistics Report on Farm Management Practices, Livestock and Farm implements. Part II, Addis Ababa, Ethiopia.
- DAGRIS (The Domestic Animal Genetic Resources System), 2007. In http://dagris.ilri.cgiar.org/distlist.asp?SC=1&GC=&BN=&RC=&SRC=&CC=70.
- Dereje Bekele. 2015. On Farm Phenotypic Characterization of Indigenous Cattle and Their Production Systems in Bako Tibe and Gobu Sayo Districts of Oromia Region, Ethiopia.M.Sc Thesis. Haramaya University, Haramaya.
- IBC (Institute of Biodiversity Conservation), 2004. The State of Ethiopia's Farm Animal Genetic Resources: Country Report, A contribution to the first report on the State of the World's Animal Genetic Resources, May 2004, Addis Ababa, Ethiopia.
- Kahi AK, Nitter G, Thorpe W, Gall CF 2000. Crossbreeding for dairy production in the lowland tropics of Kenya-Prediction of performance of alternative crossbreeding strategies. Livestock Production Science 63, 55-63.
- Masama E, NT Kusina, S Sibanda and C Majoni 2003. Reproductive and lactational performance of cattle in a smallholder dairy system in Zimbabwe. Tropical Animal Health and Production, 35: 117-129.
- Misganu Amanuel 2016. Review on Production and Reproductive Performance of Cross Breed Dairy Cattle in Ethiopia. A Seminar Submitted to Jima University College of Agriculture and Veterinary Medicine, Department of Animal Science, Seminar (Anbg516).

- Mwambene PL, Katule AM, Chenyambuga SW, Mwakilembe PAA 2012. Fipa cattle in the south western highlands of Tanzania: desired attributes, breeding practices and productive performance. Animal Genetic Resources 51: 45-56.
- Piotr G, Krzysztof M, Zygmunt H and Ewa D. 2004. Heritability's of and genetic and phenotypic correlationsbetween condition score and production and conformation traits in Black-and-White cows. p89.
- Roessler R, Drucker A G, Scarpa R, Markemann A, Lemke U, Thuy LT and Valle Zárate A. 2008. Using choice experiments to assess smallholder farmers' preferences for pigbreeding traits in different production systems in North–West Vietnam. Ecological Economics 66(1):184-192.
- Rowlands J, Nieves C, Hanotte O, Workneh A (2006). Cattle breed distributions across districts as determined from cluster analysis of phenotypic data collected in the Oromiya region, Ethiopia. In 8th World Congress on Genetics Applied to Livestock Production, August 13-18, 2006, Belo Horizonte, MG, Brasil
- Scarpa R, Drucker A G, Anderson S, Ferraes-Ehuan N, Gómez V, Risopatrón C R and Rubio-Leonel O 2003. Valuing genetic resources in peasant economies: the case of 'hairless' Creole pigs in Yucatan. Ecological Economics, 45: 427-443.
- Shiferaw Garoma, 2006. In-situ Phenotypic Characterization of kereyu cattle type in Fentale district of oromia Region, Ethiopia. M.Sc. Thesis, school of Graduate Studies Haramaya University, Ethiopia.
- SPSS (Statistical Procedures for Social Sciences) 2001. SPSS User's guide version 20.0. SPSS Institute Inc., Cary NC.
- Takele Taye, 2005. On-farm phenotypic characterization of Sheko breed of cattle and their habitat in Bench Maji Zone, Ethiopia. MSc Thesis, Alemaya University, Ethiopia. Pp105
- Tesfa Gebremicheal, 2009. Reproductive performance of indigenous dairy cattle in south Wollo. MSc Thesis, Mekelle University, Ethiopia. 65p.
- Workneh A, Ephrem G, Markos T, Yetnayet M, Rege JEO 2004. Current State of Knowledge on Characterization of Farm Animal Genetic Resources in Ethiopia. In: Proceedings of the 11th Annual conference of the Ethiopian Society of Animal Production (ESAP) held in Addis Ababa, Ethiopia, August 28-30, 2003. pp. 1-21.
- Yilma Z, Emannuelle GB and Ameha S 2011. A Review of the Ethiopian Dairy Sector. Ed. Rudolf Fombad,Food and Agriculture Organization of the United Nations, Sub Regional Office for Eastern Africa (FAO/SFE), Addis Ababa, Ethiopia, 81P.
- Zewdu Wuletaw, 2004. Indigenous cattle genetic resources, their husbandry practices and breeding objectives in North-western Ethiopia. MSc Thesis, Alemaya University, Ethiopia. Pp1
- Zewdu Wuletaw, Workneh Ayalew and Sölkner J 2006. Breeding Scheme Based on Analysis of Community Breeding Objectives for Cattle in North-western Ethiopia Ethiopian Journal of Animal Production 6(2): 53-66p.