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Assessment of Breeding Practice of Dairy Cattle in Central Zone of Tigray, Northern Ethiopia

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Abstract
The study was conducted in central zone, Tigray, Northern Ethiopia, aimed with assessment of breeding practices of dairy cattle. The study of the survey covered 180 households found in per-urban and rural areas of Ahferom, Adwa and Laelay michew district which included 113 in rural areas and 67 in per-urban areas of the districts. The Information was collected from secondary data, group discussion, AI technician, household level survey questionnaire, farm visit and personal observations. The data were analyzed using SPSS (16) and SAS (9.1).Trait preference of farmers for dairy cattle was analyzed using ranking index method. Dairy cattle were kept for generating income (35.6%), milk consumption (32.2%) and milk consumption and breeding (16.1%) in the study area. Purchased dairy cattle (69.9% and 68.7%) were the main foundation stock followed by own (20.35% and 17.91%) in rural and per-urban areas respectively. Mating system in the study area were AI (42.8%), AI with estrus synchronization (22.2%) and natural mating (35%). Households obtained breeding bull from neighboring (61.4%), own (21.3%) and village (17.3%). Individual performance and pedigree selection were used as selection criteria for dairy cattle. Trait preference of farmers were milk yield (1st) body weight (2nd)) and fertility (3rd) for both rural and per-urban areas. Community based breeding program is the best option to improve dairy breeding practice in the study area.
Keywords: Dairy Cattle, Breeding Practice, Rural, Per-urban

1. INTRODUCTION

Ethiopia has one of the largest livestock resources in Africa with a national herd estimated at 49 million cattle, 25 million sheep, 22 million goats and 9 million pack animals (EATA, 2013). Livestock support and sustain livelihoods for 80% of the rural community and 35 – 40 % of all livestock are located in the pastoral areas and female cattle constitute about 55.5% of the national herd (MoARD, 2007).

Dairy genotypes in the tropics Rege (1998) showed that at the same level of indigenous genes inheritance, crosses of different exotic breeds differed in their performance indicating that no one breed, crossbreed or crossbreeding strategy will have superior aggregate performance in all production environments. Farmer's knowledge and preferences about the genotypes should therefore be an integral part of breed improvement efforts because farmers adopt and adapt genotypes to their needs and circumstances (Bebe *et al*, 2000). For example, farmers might tend to upgrade to higher exotic grades and/or Friesian based on cross breeding for higher milk yields even though the overall productivity, on the account of reproduction and production, may be low. In addition, large dairy breeds are associated with high milk yields and are likely to be more popular than smaller breeds in production systems such as found in Kenya where milk is sold on volume basis (Bebe, 2003).

The breeding practice, importance of farmers' breeding objectives, preferences for different traits, criteria used for selection of dairy breed and mating system as breed improvement strategy under low-input systems have not been documented for smallholder dairying in Tigray region, particularly central zone of Tigray, which necessitates undertaking this study.

Objectives

- To outline general description of the dairy breeding activities of farmers in the study area;
- To identify trait preference of farmers for dairy cattle in the study area

2. MATERIALS AND METHODS

2.1. Description of Study Area

The study was carried out in three districts of central zone of Tigray region, Northern Ethiopia (Laelay Mychew, Adwa and Ahferom). The Central Tigray Zone is one of the five zones in Tigray National Regional State 1080 km far away from Addis Ababa. The zone approximately extends between 13°15' and 14°39' North latitude, and 38° 34' and 39°25' East longitude. The altitude of the zone mainly falls within the category of 1650 to 3000 masl. The larger part of the zone receives mean annual rainfall ranging from 400 to 800mm. The mean monthly maximum and minimum temperatures of the zone are 30°C and 10°C, respectively (NMSA, 1996). Central Tigray zone is bounded by Eritrea in the north, East Tigray zone in the East and south east, West Tigray zone in the west and Amhara National Regional State in the south. The zone with its capital in the ancient city of Aksum

encompasses ten districts. The zone has the largest human population in the region. The farming system of the study area is largely characterized by mixed crop-livestock production system. The study area possesses lowland, midland and highland.

Laelay Mychew, Ahferom and Adwa possess a wide range of an altitude of 1400-2080 masl, 1805-2258 masl and 1514-3000 masl and received mean annual rainfall of 500-600mm, 600-850mm and 560-700mm respectively. The mean annual temperature is ranged in 15-25^{o}c, 18-28^{o}c and 18-27^{o}c for Laelay Mychew, Ahferom and Adwa respectively (Gebremedhin and Weldewahd, 2013).

2.2. Sampling Methods and Data Collection

Based on their milking shed potentiality and dairy production availability, three districts from central zone and three kebeles from each district were purposively selected for questionnaire administration. Multistage sampling technique was used. First the kebeles in each district were classified as rural and per- urban. Then a total of 180 households (60 from each district) from which 113 households from rural areas and 67 from per-urban areas were randomly selected from the dairy holding households for the interview from the selected kebeles. Total sample size was used as follows (Cochran, 1963).

Total sample (N) = $\frac{Z\alpha^2 \text{ x } p\ (1\text{-}p)}{d^2}$

Where:

N=required sample size

P (expected proportion) = 0.135(if the population is homogenous)

d (desired absolute precision) = 0.05

Zα = 1.96(is the abscissa of a normal curve that cuts of an area at the tails (1-α equals to the desired confidence level, for 95%=1.96)

For the survey for required sample size of the respondent with 95% confidence level was calculated as, $N=Z\alpha^2 \times p(1-p)/d^2= [(1.96)^2 \times 0.135(1-0.135)]/ (0.05 \times 0.05)$

$3.8416 \times 0.1168/0.0025=180$ farmers

The number of households in rural and per urban were determined by proportionate sampling technique.

Questionnaire administration

Data was collected from primary sources. A semi- structured Questionnaire was prepared and pre-test before administration and some re-arrangement, reframing and correcting in accordance with respondent perception was done. A pertinent questionnaire to the respective respondents to selected smallholder households and Artificial insemination technician in the study area was administered. The questionnaire was filled by trained enumerators recruited for the purpose with close supervision by the researcher. During the interview process, every respondent included in the study was briefed about the objective of the study before starting presenting the actual questions.

The information collected included issues related to socio-economic characteristics of the farmers, breeding practice (mating system, selection criteria, trait preference, routine husbandry practices etc), factors like cattle breed possessed, service per conception, heat detection techniques, milk production, lactation length, reproductive performance, distances from the AI center and status of AI technician, feed situation, veterinary services etc were assessed from recall survey.

Focus group and key informants' discussion were also conducted to strengthen the data obtained from structured and semi-structured questionnaire. The group was formed with 10 people and composed of youngsters, women, village leaders and socially respected individuals who are known to have better knowledge on the present and past social and economic status of the area**.**

2.3. Methods of Data Analysis

All the data were fed to Ms-Excel (2007). Qualitative data survey was analyzed for descriptive statistics using frequency procedure and cross tabulation of SPSS version 16.1 was used. For quantitative data obtained from the recall survey general linear model procedure of statistical analysis system SAS 9.1(2003) was used to evaluate the effect of production system and breed in livestock number holding of farmers.

In trait preference ranking method, index was computed using weighed averages and indexes were ranked using auto ranking with MS-Excel 2007.The following formula was used to compute index as employed by (Musa et al 2006):

$\text{Index} = R_n \times C_1 + R_{n-1} \times C_2 \ldots + R_1 \times C_n / \sum(R_n \times C_1 + R_{n-1} \times C_2 + \ldots + R_1 \times C_n)$

Where, R_n = the last rank (example if the last rank is 8th, then $R_n = 8$, $R_{n-1} = 7$, $R_1 = 1$).

C_n = percent of respondents in the last rank, C_1 = percent of respondents ranked first

3. RESULT AND DISCUSSION

3.1. Household Member and Educational Level of Household Heads

The results on average household numbers of respondents are presented in table 1. The survey revealed that the total average number of household member by gender was 3.16 and 2.91 male and female, respectively. Rural farmers had more household members of male and female than per- urban farms. This is in agreement with the report of ESAP (2002) for the case of Eastern Ethiopia. The dominance of male household heads reported here is in agreement with results published by Azage (2004) for Addis Ababa, Ethiopia.

The results on educational level of respondents are presented in table 2. The result showed that proportion of illiterate household heads was estimated as (50%, 30%) and (65.5%, 51.9%) for rural and per-urban for male and female household heads, respectively. Male headed household were higher in proportion of educational level as compared to female headed household heads in both rural and per-urban areas. This study is consistent with the result of (Yitaye, 2008). It could be argued that, educated households tend to use modern method of rearing like milk production through crossbred cattle and artificial insemination.

Table 1. Average Household number of the respondents in the study area

Farming type	Male		Female		
	N	Mean±SD	N	Mean±SD	P value
Rural	113	3.23±1.48	113	3.04±1.41	0.41
Per-urban	67	2.92±1.36	67	2.88±1.52	0.86
Total	180	3.16±1.46	180	2.91±1.42	

Where, N is the number of observation, SD is standard deviation

Table 2. Frequency and percent of educational level of the respondents in the study area

Education level	**Male**				**Female**				**Total**			
	Rural		Per-urban		Rural		Per-urban		Male		Female	
	N	%	N	%	N	%	N	%	N	%	N	%
Illiterate	42	50	12	30	19	65.5	14	51.9	54	42.5	33	58.9
1-7	31	36.9	22	55	10	34.5	13	48.1	53	42.7	23	41.1
>7-12	11	13.1	6	15	0	0	0	0	17	13.7	0	0
Total	84	100	40	100	29	100	27	100	124	100	56	100

Where, N is the number of observation

3.2. Household Resource

The land holding of the respondent household is presented in Table 3. Average land holding for crop was 0.66 ha own and 0.17ha rented. About 0.03 ha, 0.05ha and 1.07 ha land was allocated for grazing and forage production that could be own, rented and communal land, respectively. This low private and rented land allocation for grazing might be attributed to the availability of communal grazing land. Average irrigated land holding was 0.14ha and 0.02 ha for own and rented respectively.

The average land holding for crop, grazing and forage and irrigated land were 0.51, 0.13 and 0.08 ha and 0.32, 0.63, 0.9 in the rural and per-urban areas respectively. The household resource in the rural area showed that nearly 47.8% land was used for crop production and the remaining 43.2% and 9.10 % of land was used for natural pasture and irrigation respectively. This result indicated that land holding for crop in rural area was higher than in per-urban, but land for grazing and forage and irrigation was higher in per-urban than rural areas. The reason might be in per-urban areas the land for farming is limited due to urbanization and availability of water and knowledge about irrigation is higher in per-urban than rural in the study area. The present study is consistent with Zemenu (2014) reported as land holding for crop in the rural areas are higher than other land pattern use in Debremarkos districts.

Table 3. Landholding of the household in rural and per-urban areas (ha)

Land allocation	Rural		Per-urban		Total	
	N	Mean±SD	N	Mean±SD	Mean±SD	P value
For crop		0.51±0.21		0.32±0.33	0.42±0.69	0.01
Own	113	0.79±0.75	67	0.520.±56	0.66± 0.69	0.01
Rented	113	0.22±0.44	67	0.12±0.27	0.17± 0.38	0.10
Grazing & forage		0.13±0.34		0.63±0.18	0.38±0.27	0.04
Own	113	0.01±0.04	67	0.04±0.13	0.03± 0.09	0.05
Rented	113	0.06±0.66	67	0.03±0.24	0.05± 0.54	0.07
Communal	113	0.32±0.87	67	1.82±0.37	1.07± 3.41	0.004
Irrigated land		0.08±0.08		0.09±0.09	0.08±0.13	0.50
Own	113	0.13±0.21	67	0.15±0.15	0.14± 0.18	0.35
Rented	113	0.02±0.09	67	0.02±0.09	0.02± 0.09	0.71

Where, N is the number of observation, SD is standard deviation

3.3. Livestock Holding

The average number of livestock holding was described in (Table 4). The proportion of local and crossbred dairy cattle showed slight difference which was 0.30 and 0.15 in dry cow and 0.25 and 0.18 in lactating cow respectively. Local dry and lactating dairy cattle of rural were slightly higher than local dry and lactating dairy cattle of per-urban areas. However, the crosses were slightly lower in rural areas than per-urban areas. The study revealed that number of local bulls and oxen (0.46, 1.4) in rural areas was higher than local bulls and oxen (0.3, 0.8) in per urban areas. The observed variation for oxen and bull holdings of both locations were probably due to the fact that the rural households give more attention to oxen as source of draught power for crop production and bulls for natural mating of their dairy animal. In the present study there was a significant difference ($p \leq 0.05$) between breeds. Local dry cow, local bull and local oxen were higher than cross dry cow, cross bull and cross oxen in the study area. The average livestock holding per household reported in the present study (4.33 TLU) was lower than those reported by Abdinasir (2000) for Arsi area which was 11.86 TLU.

Table 4. Average number of livestock per house hold by breed in rural and per-urban areas

Animal type		**Rural(mean ±SE)**	**Per-urban (mean ±SE)**	**Total**
Cattle		3.58	2.84	3.21
Calves (< 1 yr)-Local		0.08± 0.58	0.08±0.04	0.08±0.04
-Cross		0.06±0.47	0.13±0.04	0.09±0.04
Heifer	**-Local**	0.18± 0.61	0.14±0.04	0.16±0.04
	-Cross	0.12±0.60	0.14±0.04	0.13±0.04
Bull	**-Local**	0.46±0.03	0.30±0.48	0.40±0.03[a]
	-Cross	0.19±0.03	0.10±0.34	0.15±0 .03[b]
Oxen	**-Local**	1.40±0.80[a]	0.80±0.98[b]	1.1±0 .05[a]
	-Cross	0.13 ±0.43	0.03±0.17	0.08±0.05[b]
Dry cow	**-Local**	0.30±0. 54	0.25±0.50	0.28±0.03[a]
	-Cross	0.15±0.55	0.18±0.42	0.16±0.03[b]
Lactating cow-Local		0.24±0.08	0.23±0.10	0.24±0.03
-Cross		0.27±0.08	0.46±0.10	0.34±0.0.3
Total	Local	2.66	1.8	
	Cross	0.92	1.04	
Sheep		0.34±0.54	0.21±0.41	0.29±0.34
Goat		0.39±0.7[b]	0.58[a]±0.44	0.26±0.36
Equines		0.57±0.44[a]	0.23±0.13[b]	0.44±0.06
Poultry-Local		0.03±0.28	0.02±0.37	0.03±0.23
-Cross		0.01±0.29	0.01±0.37	0.01±0.23
Beehive-Traditional		0.24±0.08	0.30±0.11	0.21±0.06
-Modern		0.12±0.08	0.36±0.11	0.26± 0.06
Total		4.92	3.89	4.33

Where, N is the number of observation, SE is standard Error

Letters different in row are non significant ($p \geq 0.05$) for production system and in the column for breed.

3.4. Assessment of Breeding Practice

3.4.1. Farming system

From the survey result the farming system of farmers (table 5) in the study area was 91.1% mixed type of production, 6.7% livestock production and 2.2% crop production. Most of the farmers were practiced mixed type of production of farming system. This result indicated that households in the study area depends their livelihood both in animal production and crop production.

Farmers depend in livestock production for their livelihood in per urban was higher than rural areas (Table 6). Some farmers in per urban might not have land for crop cultivation so their life depends only in livestock rearing in the study area.

Table 5. Frequency and Percent of farming system adopted by respondents in the study area

Farming type	Rural		Per-urban		Total		X^2	P value
	N	%	N	%	N	%	2.81	0.245
Livestock production	5	4.4	7	10.45	12	6.7		
Crop production	2	1.8	2	2.98	4	2.2		
Mixed production	106	93.8	58	86.57	164	91.1		
Total	113	100	67	100	180	100		

Where, N is the number of observation

3.4.2. Purpose of keeping dairy cattle

The farmers keep cattle for multiple uses. Farmers keep dairy cattle for, milk consumption, generating income, breeding and milk consumption together. However, farmers attached greater importance to generating income (35.6%) and feeding the family (milk consumption) (32.2%) than any other stated reason (Table 6). The group discussion responded that farmers keeping Friesian and jersey breeds give slightly higher priority to milk production for cash income, whereas those keeping local cattle breeds give higher priority to milk production for feeding the family. Purpose of keeping dairy cattle in this survey is in line with the result of Bebe (2003) stated as farmers attached greater importance to generating income and feeding the family than any other stated reason.

Table 6. Frequency and percent of Purpose of keeping dairy cattle

Purpose	**Rural**		**Per-urban**		**Total**		**X^2**	**P value**
	N	%	N	%	N	%	33.63	0.001
Milk consumption	48	42.48	10	14.93	58	32.2		
Milk consumption & breeding	22	19.47	7	10.45	29	16.1		
Generating income	29	25.66	35	52.24	64	35.6		
Generating income & breeding	3	2.65	12	17.91	15	8.3		
Breeding	11	9.73	3	4.48	14	7.8		
Total	113	100	67	100	180	100		

Where, N is the number of observation

3.4.3. Husbandry management

The interviewed households indicated that crop residue was the most common feed resource of dairy in the study area. Hay, wheat bran, hatela and sasbania and lucinia was also the feed source for livestock in the area. Most of the household was tied their cattle around their home and feed their dairy with cut and carry system. There was no free grazing system in the study area. Wheat bran was used in per-urban households than rural households due to availability of cross breed dairy cattle and input supply.

The survey indicated that 21.1%, 50% and 28.9% of households responded that their dairy cattle were taken water from pond, river and pipe water respectively. Majority of the household revealed that the water obtained from the river was not clean water.

48.9 % of the household said that the average distance of watering dairy cattle estimated to be less than 1km from their home and 41.7 and 9.4 % households responded watering point was at home and 1-5km far away from their home respectively. The watering point at home indicated that dairy cattle was not let free grazing. The frequency of cleaning the house of dairy cattle in the study area was 51.1%, 35.0% and 13.9% for daily, weekly and monthly respectively.

The result revealed that 68.3% of the respondents did not have animal health problems and all respondents said that they get veterinary service. The result of the survey indicated that regarding disease prevalence, the major animal disease identified in the area was anthrax, bovine Pastorolosis, black leg, mastitis, and dystocia. All households were vaccine their animal, but they don't know for which disease was given the vaccine.

3.4.4. Sources of dairy foundation stock

The study showed that 69.4% of the household purchased their first dairy cow, 10% actually obtained from gift of their family's stock, 1.1% upgrade and 19.4% of the households get their foundation dairy stock from their own stock. Purchased dairy (69.91% and 68.66%) was the main foundation stock followed by own (20.35% and 17.91%) in both rural and per-urban areas. This result shows that smallholder dairying developed independently of direct project donations and without the long process of upgrading indigenous zebus to exotic dairy breeds. The higher proportion of purchased dairy cattle indicated that their important role in the foundation of smallholder dairying in the study area. Foundation dairy stock source in this study is in line with result of Bebe (2003) reported purchased dairy is the highest source for foundation stock (83%) in Kenyan highlands.

Table 7. Frequency and percent sources of foundation dairy stock as perceived by farmers

Foundation stock	Rural		Per-urban		Total		X^2	P value
	N	%	N	%	N	%	2.58	0.46
Purchased	79	69.91	46	68.66	125	69.4		
Gift	9	7.96	9	13.43	18	10		
Upgrading zebu	0	0	2	1.77	2	1.1		
Own farm	23	20.35	12	17.91	35	19.4		
Total	113	100	67	100	180	100		

Where, N is the number of observation

3.4.5. Mating type of dairy cattle

Farmers use a diversified reproductive technologies and mating type in the study area (Table 8). The survey revealed that 42.77 %, 22.22% and 35% of interviewed households used artificial insemination, artificial insemination with estrus synchronization and natural mating respectively. This result indicated that Artificial insemination was dominantly used in the study areas.

The rural and per-urban dairy production system have a different practice in using reproduction technologies in which 40.7% rural farmers and 46.26% per urban areas practiced only artificial insemination, while 15.04% and 34.32% of respondents practiced AI with estrus synchronization in rural and per-urban farms respectively. The survey has also revealed that, 19.40% of per urban farms and 44.24% of rural farms depended on natural and uncontrolled mating system. There was a tendency that, breeding practices have shifted from natural mating to improved mating system in the study area. Artificial insemination alone and artificial insemination with synchronization was higher in per-urban households than rural households, where as natural mating was higher in rural households than per-urban households (Table 8). This result indicated that per-urban households were more aware than rural households about the advantage of artificial insemination and estrus synchronization due to access to artificial insemination services. The accessibility to reproductive technologies and the high market demand for milk might have been contributed to the more use of AI and synchronization in per-urban areas.

Farmers practice different options to reverse failure on conception. Most of the respondent practice natural mating if AI service did not bring conception while, some of them practice AI repeatedly. There are a number of factors contributing to unsuccessful pregnancy after insemination. As indicated by group discussion and key informants the reason for failure of insemination in the study area was heat detection problem, disease problem, performance of AI technicians and distance of AI center to farmers. This is in agreement with the result of (Desalegn, 2008) in Ethiopia. The present study revealed that, 78.8% farmers were satisfied with the overall service of the AI technician and 21.2% were not satisfied. Most of farmers communicate the AI technicians for services via phones and the result indicated that 68.6% of the respondents call with phone when they want to AI technicians for insemination.

The overall perception of farmers for estrus synchronization was 54.7%, 26.5%, 14.5% and 4.3% low, medium, high and very high respectively. This result indicated that more than half of the households responded estrus synchronization was low in its conception rate in the study area. Poor body condition, shortage of feed, thawing problem, time missing for insemination, huge number of animals inseminated by the inseminator might have contributed to low conception rate. Few farmers have attributed the poor conception to the poor quality of semen, problem in semen handling, performance of the inseminator and low awareness of farmers on the technology. There was also poor awareness on the advantage of synchronization in which some farmers understand injection of hormones similar to insemination which did not bring for insemination and others bring sterile and non-cyclic animals for PGF2α treatment. Hence, there is a need to create awareness of the farmers through demonstration for a wider adaptation of the technology.

The study indicated that educational status of the households directly related to perception of farmers in estrus synchronization. Illiterate male and female households have the highest percentage (Table 10) for low perception of synchronization in the study area.

The opportunities for AI and synchronization of dairy production obtained from group discussion in the study area were presence of veterinary service, equipped AI technicians and experts, availability of cattle population, extension service and good market demand for milk production.

Table 8. Mating system of dairy cattle in the study area

Mating	Rural		Per-urban		Total		X^2	P value
	N	%	N	%	N	%	14.76	0.001
AI without synchronization	46	40.7	31	46.26	77	42.77		
AI with synchronization	17	15.04	23	34.32	40	22.22		
Natural mating	50	44.24	13	19.40	63	35.00		
Total	113	100	67	100	180	100		

Where, N is the number of observation

Table 9. Perception of farmers for estrus synchronization

Perception	Rural		Per-urban		Total		X^2	P value
	N	%	N	%	N	%	7.39	0.06
Low	32	58.18	32	51.61	64	54.7		
Medium	22	35.48	9	16.36	31	26.5		
High	7	11.29	10	18.18	17	14.5		
Very high	1	1.61	4	7.27	5	4.3		
Total	62	100	55	100	117	100		

Where, N is the number of observation

Table 10. Educational level of households in acceptance of estrus synchronization

Sex of household	Educational level	Perception of farmers in estrus synchronization				X^2	P value
Female		Low	Medium	High	Very high	4.10	0.13
	illiterate	62.50	29.20	8.30			
	1-7	40.00	26.60	33.33			
Male						8.60	0.20
	illiterate	58.82	32.35	8.82			
	1-7	58.62	13.80	17.24	10.34		
	>7	40.00	33.33	13.33	13.33		

The result of the survey indicated that 94.4 % of the households were not aware about problem of inbreeding and 5.6% of them were aware about problem of inbreeding in the study area. The households responded that weak calves, small sized animal, poor resistivity for disease and decrease productivity were the main problems of inbreeding in the study area.

Table 11. Respondents that aware about problem of inbreeding in the study area

Knowledge of inbreeding	**Rural**		**Per-urban**		**Total**		**X^2**	**P value**
	N	%	N	%	N	%	0.74	0.39
Yes	5	4.42	5	7.46	10	5.55		
No	108	95.58	62	92.54	170	94.45		
Total	113	100	67	100	180	100		

3.4.6. Source of breeding bull

The farmers have different source of bull for mating (Table 12). The households in study area obtained breeding bull from neighbors, own farm and village as responded by 61.4%, 21.3% and 17.3% of farmers, respectively. The present study is in agreement with previous studies who reported 21.6% farmers keeping bulls on their farm (Gitau *et al*., 1994).The bulls kept in own farm are shared and recycled in communities. It has been argued that, few farmers keep their own bulls and breeding stocks which are recycled within the community with small herd size, and there are possibilities of increasing inbreeding rates in the population (Bebe et al., 2000). Bull obtained from neighbors was higher (67.5%) in Per-urban households than rural households (58.62%) attributed to high availability of bulls in rural areas for their multiple uses.

All farmers in the study area castrate their bull to use them for plouging and control breeding. The farmers also perceived that if the bulls are castrated, it might respond to feeding and be fattened.

Table 12. Frequency and percentage of bull Source in the study areas

Source	Rural		Per-urban		Total		X^2	P value
	N	%	N	%	N	%	4.74	0.09
Own	23	26.44	4	10	27	21.26		
Village	13	14.94	9	22.5	22	17.32		
Neighboring	51	58.62	27	67.5	78	61.42		
Total	87	100	40	100	127	100		

Where, N is the number of observation

3.4.7. Selection criteria and trait preference of dairy cattle

According to group discussion the main selection criteria of farmers for dairy cattle in the study area were milk yield based on individual performance and pedigree selection. This result is in agreement with a previous study that was conducted in Kenyan Urban dairy production systems where milk is sold on volume basis (Ibrahim and Jayatileka, 2000). Friesian and their cross were the most preferred breeds for high milk yield, which explains their increasing predominance in the smallholder systems. However, local cattle were more favored over Friesian for disease resistance and feeding behavior but not for market value and body weight.

Trait preference as perceived by farmers was rated as milk yield, fertility and body weight from first to third rank, respectively (Table 13 and 14). Feeding behavior, temperament, color and disease resistance were also rated from fourth to seventh in that order. The trait preference of farmers were more or less similar in both rural and per-urban areas which rated milk yield (46%,49.3%), body weight(23%,29.9) and fertility rate (13.3%,8.9%) from first to third, respectively. On the other hand disease resistance was the least preferred (0%, 1.5%) in rural and per-urban farms, respectively. This result indicated that households in the study area gave more attention to market oriented dairy system. Farmers in the study area preferred a dairy cow with high milk production, less feed consumption and with good feed appetite due to shortage of feed in the study areas. High preference for milk yield is common for smallholder farmers who kept cattle primarily for milk production to feed their family and to earn additional income. The result were consistent with the report of Mwacharo and Drucker (2005) and Lanyasunya *et al*. (2006) for smallholder farmers in Kenya and Stein *et al*.(2009) who has studied indigenous cattle breeds kept by smallholder farmers in Ethiopia. However, the present findings are inconsistent with the studies of Kassie *et al*. (2009) under smallholder Horro cattle owners in the central Ethiopia where milk is only used for home consumption and selling milk is considered as social taboo. This indicates the fact that, trait preference is driven by the breeding objective, product use and purpose of keeping livestock.

Table 13. Trait preference of farmers for dairy cattle in rural area

Parameter	Rural								
	1st	2nd	3rd	4th	5th	6th	7th	Index	Rank
Milk yield	46.0	24.8	17.7	6.2	2.7	0	2.7	0.21	1
Fertility	13.3	45.1	21.2	12.4	7.1	0.9	0	0.19	2
Body weight	23.0	8.9	28.3	20.4	7.1	8.0	4.4	0.17	3
Feeding behavior	13.3	8.0	15.9	35.4	17.7	8.8	0.9	0.16	4
Temperament	3.5	6.2	11.5	21.2	37.2	18.6	1.8	0.13	5
Color	0.9	3.5	4.4	5.3	21.2	51.3	13.3	0.09	6
Disease resistance	0	4.4	0.9	0.9	6.2	10.6	77.0	0.05	7

Index=the sum of (7 times first order + 6 times second order +5 times third order + 4 times fourth order + 3 times fifth order + 2 times sixth order + 1 times seventh order) for individual variables divided by the sum of (7 times first order + 6 times second order +5 times third order + 4 times fourth order + 3 times fifth order + 2 times sixth order + 1 times seventh order) for all variables.

Table 14.Trait preference of farmers for dairy cattle in per-urban areas

Parameter	Per-urban								
	1st	2nd	3rd	4th	5th	6th	7th	Index	Rank
Milk yield	49.3	34.3	6.0	8.9	1.5	0	0	0.22	1
Fertility	8.9	26.9	35.8	19.4	3.0	3.0	0	0.18	2
Body weight	29.9	13.4	22.4	11.9	8.9	8.9	4.5	0.18	2
Feeding behavior	4.5	3.00	19.4	28.4	20.9	20.9	3.0	0.13	3
Temperament	1.5	16.4	10.5	17.9	28.4	20.9	4.5	0.13	3
Color	1.5	3.0	4.5	7.5	34.3	40.3	8.9	0.10	6
Disease resistance	1.5	3.0	3.0	6.0	3.0	6.0	77.6	0.06	7

Index=the sum of (7 times first order + 6 times second order +5 times third order + 4 times fourth order + 3 times fifth order + 2 times sixth order + 1 times seventh order) for individual variables divided by the sum of (7 times first order + 6 times second order +5 times third order + 4 times fourth order + 3 times fifth order + 2 times sixth order + 1 times seventh order) for all variables.

3.4.9. Record keeping

There were 6.2% of rural areas and 19.4% of the per-urban farms practiced keeping records about input costs and output prices. The absence of record keeping in almost all rural farms and in (80.6%) per-urban area farms is indicative of lack of awareness of farm owners on the benefits of record keeping in dairy farm operations. The type of record hold by farmers in the study area were price of purchased cattle, feed cost, medication cost, labor cost and revenues obtained from sale of bulls, male calf, milk sale, year of birth etc. Recording system in the study area is an indication of good breeding program. To increase this recording system extension agents should give training and practically show how and what to record. Farmers should practice synchronization and AI as it induces good record keeping of dates of heat, breeding, pedigrees, etc. This will aid in herd improvements and enable the owner to make better culling decisions.

4. CONCLUSION AND RECOMMENDATION

Breeding objective of dairy cattle indicated that farmers attached greater importance to milk production for generating income and feeding the family (milk consumption) than any other stated reason.

The selection criterion of famers for dairy cattle in the study area depends mainly in milk production based on individual performance and pedigree selection (by asking the owners history of their cows). Trait preference as perceived by farmers was rated as milk yield, fertility and body weight from first to third rank, respectively. Disease resistance is the least preferred trait in the study area because disease is not a devastating problem in the area and they might be got veterinary service for treatment of their cattle.

Artificial insemination is the dominant mating system in the study area. Farmers in the study area also practiced AI with synchronization for the last 3 years. The opportunities for AI and synchronization of dairy production in the study area were presence of veterinary service, equipped AI technicians and experts, availability of cattle population, extension service and good market demand for milk production.

Community based breeding program by incorporating indigenous knowledge of farmers is the best option in improving breeding practice of dairy cattle in the study area. Further work on improving smallholder farmers' awareness of the breeding and management of crossbred dairy cattle (using a participatory approach) is imperative.

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