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STATUS OF ARTIFICIAL INSEMINATION AND REPRODUCTIVE PERFORMANCE OF DAIRY CATTLE IN AMBO DISTRICT,WEST SHOA ZONE OROMIA NATIONAL REGIONAL STATE ETHIOPIA

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ABSTRACT
The study was conducted to assess the status of Artificial Insemination (AI), and reproductive performances of dairy cows in smallholder Urban and rural dairy farms in Ambo District, west Shoa zone Oromia National Regional state. A total of 125 respondents who had used AI, services were randomly selected and interviewed using semi-structured questionnaire. Secondary data were collected from record book of the AI centers. Farmer's group discussion and key informants interview. The data were analyzed using the Statistical Package for the Social Sciences version (SPSS) 20 to analysis variation of the reproductive performance traits among the study sites and scale of production. Result of the study revealed that 62% and 33.3% from urban and rural dairy production system uses AI for breeding respectively. The majority of the respondents from the rural area (56 %) reported that they use only natural mating method using local bulls. However it was also observed that only (26 %) of the urban dairy producers use natural method of breeding. The rest proportion has reported to use both method of mating. The study showed that the majority of the respondents (63.4%) were not satisfied with the existing AI service. The major identified constraints of AI service in the study area were low conception rate, Artificial insemination technician problem, heat detection, shortage of semen and liquid nitrogen, unavailability AI service, and lack of awareness creation to the farmers on AI service. Though retrospective data show that an increase in AI service, numbers of calves born are decreasing in relation to numbers of inseminated cows. However when diagnosis of pregnancy were carried out at day 90 days of post AI service of cow by rectal palpation 39.1% were conceived and 32.9% of pregnant cow were delivered calves. The overall means for AFS, AFC, CI and DO of local and crossbred cow/Heifer were estimated to be 43.07+0.86 months 52.41+0.56 months.19.86±0.28months,118.01±2.25 days for local breed cow and 25.18±0.75 months, 34.63 ±0.72, 14.59±0.36months, 116.78 ± 1.61days for cross bred cow. To improve dairy cattle productivity A.I. should be used by considering, proper estrus detection method, proper time of insemination and appropriate animal selection. Thus, it is concluded that there is an urgent need for well-coordinated efforts of all concerned bodies to boost the production and productivity and thereby enhance the livelihood of the dairy farmers in the area. The skill and knowledge based training must be given for farmers and implementers for enhancement of AI to augment perception and adoption of the technology.

***Key words**: Artificial insemination; reproductive performance*
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INTRODUCTION

Livestock production is one of the fastest growing agricultural subsectors in developing countries; where it accounts for more than a third of agricultural GDP. It is projected soon to overtake crop production as the most important agricultural subsector in terms of added value (FAO, 2006).

Ethiopia is one of the sub-Saharan Africa countries with a large potential for livestock production. The country's cattle population is first among African countries and fifth in the world (FAOSTAT, 2018). The total cattle population of the country is estimated to be about 60.39 million. Out of this total cattle population, the female cattle constitute about 54.68 %. The indigenous cattle breeds account 98.24%, hybrid 1.54% and exotic breed accounts 0.22%. Out of the female animal 11.03% were used for dairy cows and 20.52% are milking cows (CSA, 2018).

Livestock production in Ethiopia is mainly on smallholder farming system with an animal having multipurpose use and accounts for approximately 47.69% of the total agricultural gross domestic product (GDP) and 23.8% of national foreign currency earnings (IGAD, 2013). Per capita consumption of milk is approximately 19 kg per year (FAO, 2018).

The indigenous breeds also characterized by lower productivity of 403 liters compared to 2123 liters of milk per lactation for cross breeds a shorter lactation duration of 204 days compared to 325 days and late maturation experiencing a late first calving at 54 months compared to 37 months for crossbred cattle (Chebo and Alemayehu, 2012).

This attribute mainly because of the fact that cattle breeding are mostly uncontrolled in Ethiopia which making genetic improvement difficult. To reverse the situation genetic improvement has been recommended in order to improve the low productivity of the indigenous Zebu cattle, by selection of the most promising breeds and crossbreeding of these indigenous breeds with high producing exotic cattle (Mekonnen *et al*., 2010).

Artificial Insemination is recognized as the best biotechnological technique for increasing reproductive capacity and has received widespread application in farm animals. It is one of the technologies that can solve these constraints if the necessary conditions are put in place to spur poor rural farmers to adopt the technology. This technology (AI) has been used for improvement of livestock production in developed countries. However, in developing countries, its use has been reported in several literatures to be less widespread and the results obtained are far from being satisfactory (Azage *et al*., 2010).

For a dairy cow to produce the most offspring during her life in a herd, she should calve first at two years of age and again every 12 months until she is culled. This pattern will also optimize the milk production per day of her life.

One of the most effective ways to improve both the reproductive performance as well as genetic performance is utilizing of superior sires through artificial insemination (AI) combined with estrus synchronization.

In this regard Oromia Government also focuses on dairy cattle improvement program through a synchronization and mass insemination method in west Shoa zone, Ambo district. However, production, reproductive performances of dairy cattle and status of AI in this district is unknown and not documented.

Statement of the problem

Oromia with 23.33 million cattle population ranked first in Ethiopia. West Shoa Zone has 1.69 million cattle. The zone is believed to have high potential for dairy, and there is an increasing demand for milk and milk products in the area. To boost the production of indigenous cattle, as it is true in most of the highland of the country, improving milk production through provision of artificial insemination and distribution of crossbred heifers has been under taken for decades in this area.
However, these all efforts didn't base on a systematic studies and scientific reasons for sustainable development. Due to this fact there has been continuous complains from dairy farmers in the area for inefficient service deliveries system. Even though the production and productivity is generally regarded as poor and there is critical shortage of milk in the area no designed studies took place to understand the performance of the dairy sector in the district. The statuses of dairy production and reproductive performance Artificial insemination program are not known and have not been systematically studied and documented. Therefore the current study is initiated to identify the status of Artificial insemination and reproductive performance and evaluate dairy input service deliveries in Ambo district.

Objectives of the study
General objective
The main purpose of the research is to assess the status of A.I, and reproductive performance of dairy cattle in Ambo district.

Specific objectives
To assess the status of AI of dairy cattle in study area.
To evaluate the reproductive performance of dairy cows via the common determinant traits

To identify constraints of AI service and reproductive performance of breeding cows in research area.

MATERIALS AND METHOD

RESEARCH METHODOLOGY

Research methodology refers to the steps, procedures and strategies for gathering and analyzing the data (Polit& Beck 2004:723). In this section, in order to address the above questions and objectives of the study, a mixed methods design is useful to capture the best of both quantitative and qualitative approaches. In these situations the advantages of collecting both closed-ended quantitative data and open-ended qualitative data were used to understand a research problem.

Description of the study area

The study was conducted in Ambo district located in Western Shewa Zone of Oromia Regional State .The district is located at about 114 km West of Addis Ababa. The capital Town of the district, Ambo, is located at 08º 35.589'North and 40º 19.114'East. As data from Ethiopia meteorology agency reveal the district is generally divided in to three agro ecologies: the lowland (Gammojii), 14.7% the midland (BaddaDaree) 50% and the highland (Baddaa) 35.3 % the annual rainfall of the District is rages from 800 mm 1000 mm with annual temperature ranges from 15 to 29 degree Celsius. The area is characterized by crop-livestock mixed farming system where livestock in general and dairy production in particular contributes significantly to livelihoods of the smallholder farmers. The 2007 national census reported total populations for this district of 108,406, of whom 54,186 were men and 54,220 were women; 865 or 0.8% of its population were urban dwellers. The study area is endowed with significant number of domestic animals; cattle (763,172), shoats (302530), Equines (76574), Poultry (100240) and Bee hive (10027) (AWLFDO, 2010).

Sampling Procedures

Study Design

A cross-sectional method of study supported by questionnaire survey were used in selecting smallholder dairy cattle owners who had used AI and estrus synchronization and mass artificial insemination services at least once over the last 5 years'. The dairy farmers were randomly selected and interviewed using semi-structured questionnaire. The question posed to the dairy farmers includes, among others, breeding history (AI, natural mating,), age at first service, age at first calving, calving interval, and other related questions.

Retrospective study

The study design used was comprised retrospective study. Retrospective study was used to collect data from the service records book of AI service. Artificial insemination recordings were obtained from AI certificates and from inseminations recording books.

Sampling techniques and household selection

The district was purposively selected based on dairy production potentials, accessibility to the main road and distance from the main Capital. Number of kebeles and households were selected based on proportional random sampling techniques from the district. The sample respondent households have been selected randomly based on proportional to the number of households owning dairy cows. Accordingly, five kebeles namely 01 and 02 from Ambo town (Urban) and Bilo, Amaro and Bayo Kurbi from rural area were selected from the district. A total of 125 households were selected from five kebeles. From each selected kebeles smallholder dairy cattle owners who had used artificial insemination services (AI) at least once over the last 5 years' time were randomly selected.

The sample size was determined based on sampling size determination formula developed by Yemane (1967) indicated below.

Determine the required sample size at 92 confidences level.

$$n = \frac{N}{1+N\,(e)\,2}$$

n =Sample size for the research use

N=Total number of HHs participating in using Artificial insemination service

e = margin of errors at 8 %

Then; $= \frac{650}{1+650 \times 0.08^2} = 125$

Method of Data Collection and Sources of Data

Method of data collection

Both primary and secondary data were collected following qualitative and quantitative research methodologies involving surveys, focus group discussions and key informant interviews.

The qualitative methods including: individual interview, in-depth interview, focus group discussion and observation were used as methods of primary data collection. In addition, secondary sources such as journals, country progress reports, books, magazines, assessments and relevant documents were used.

Primary data was gathered through two approaches namely structured questionnaire and group discussions. The questionnaire was translated to local language (Afan Oromo) to make easily understandable and pre-tested before administration and some re-arrangement, reframing and correction was made in accordance with respondent perception.

The questionnaires were administered to households by enumerators recruited and trained for the purpose, with close supervision by the researcher. Based on the questionnaire, perception of the dairy cattle owners about AI and reproductive performance and preferences of farmers were collected.

Source of data

The source of data for this study comprised both primary and secondary sources of information. Using various data collection instruments, primary data were collected. To supplement the primary data, available and relevant secondary sources were reviewed and embodied in the analysis to enrich the study.

Focus group discussion and Key Informant Interview

Focus group discussions (FGD) was formed with 10 to 14 persons 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. The focus group discussions were focused on perception of the dairy cattle owners about AI and reproductive performance and preferences of farmers were collected. Before the start of the discussion, participants of each group were briefed about the objective of the study and invited to participate in the discussion.

Key Informant Interview (KII) (4 to 6 persons) which encompasses A.I technician, dairy expert, development agents, Animal nutrition and health were interviewed on dairy production status, reproductive performance, opportunity and constraints in the study area.

Method of Data Analysis

All the data from the interviews were collected by hand-written notes. Each rough note of the interview was converted to organized notes. The analysis was made using SPSS version 20 computer package. The results were summarized using frequency tables, percentages, graph, mean and standard error.

RESULTS AND DISCUSSION

Socio-economic Characteristics of the respondents

Gender and age

The socio-economic characteristics of the households in Urban and Rural of the study areas in terms of gender and age are presented in Table 3. Among the total respondents, about 82.6 % were male headed and the rest 17.4 % were female headed households.

The proportions of female households were higher in rural (18.7 %) than in urban (16%) district. This result is relatively lower than the report of Zewdie (2010) about 86.7 % male, 13.3 % female in central highlands and with Fekede et al. (2013) 84.4% male, 16.6% Female. On the other hand, the present study was greater than the result of Tamiru (2015) in Elfata district as he reported 76.4% male and 23.6% female headed households in West Shoa Oromia national Regional State.

There was different in average ages of the respondents in the urban and about 92.8 % of the respondents were within the productive age category (18-60) years. Dairy production activities were done by different gender

groups. Herd keeping of the cattle mostly was for the children and daughters and other activities such as milking, processing, cleaning and selling of dairy products performed by females.

Dairy cattle buying have being done by male households. Dairy production is then correlated with age and gender in the district. This has meaningful implications in terms of improvement envisaged in the area, to give focus on different extension activities on different gender groups.

Table 1: Gender and Age of the Respondents

Variables	House Hold Characterization in the Study Area		
Gender (%)	Urban	Rural	Over all
Male	84	81.3	82.65
Female	16	18.7	17.35
Total	100	100	100
Age Category			
18-30 years	12	19.8	15.9
31 -45 years	58	27.6	42.8
46-60 years	24	43.4	33.7
Over 60 years	6	9.2	7.6
Total	100	100	100

Educational Status of the Respondents

The educational status of the respondents presented in Table: 4 ranged from totally uneducated (illiterate) to those with diploma and above graduates. Of the total respondents about 9% were Uneducated (illiterate), 14.4% able to read and write, 12.6% have attended grade 1-4, 30.7 % have attend grade 5-8 13.3% have attended high school ,19.6% diploma and above graduates.

These results revealed that there were considerable differences in the levels of formal education attended by the respondents in the two study area of the District. The overall mean literacy rate (76.6%) in the study areas was greater than the results 65% reported by Tsedeke (2007) in Jimma Zone, Gomma District of Oromia Regional State. In this study, the level of education of dairy farmers farmer play significant role in better household income, adoption of new technologies like estrus synchronization, production of improved forage, to keep health of their cattle. Research conducted by Lemma *et al.* (2012) also explored that, farmers who have better level of education adopted improved dairy husbandry practices faster than those with low educational level.

Table 2: Educational status of the respondents

Variables	Percentage of Respondent in Rural and Urban of the District		
	Urban	Rural	Over all mean
Uneducated (Illiterate)	6	12	9
Able to read and write	14	14.7	14.35
1-4	12	13.4	12.65
5-8	24	37.3	30.65
9-12	14	13.3	13.65
Diploma and Above	30	9.3	19.65
Total	100	100	100

Breeding Managements of Dairy Cattle

Mating Systems and Source of Bull

Genetic improvement of cattle is an important element in production of milk that determines the potential of dairy cattle. Mating in the context of animal breeding means pairing of female and male animals for the purpose of reproduction on a farm using natural or artificial (AI) methods (Willam Simianer, 2011). In Ethiopia, the most commonly mating methods practiced are natural and artificial methods. The natural methods use bull mating while the artificial ones employ artificial insemination (AI) system. According to this study dairy farmers follow different mating systems and have different source of bull for mating of their cattle, the results relating to the type of mating system and source of bull of the respondents were presented in Table 6.

The majority (62%) of the respondents in Urban are using artificial insemination method as compared to natural mating (26%) and the rests (12%) were used both for mating their cow. However, 56% of the respondents in rural were used natural mating method followed by 33.3% used artificial insemination for mating their cow and the rest (10.7%) used both AI and natural mating. The different between urban and rural in using Artificial insemination were different. This result indicated that urban households were more aware than rural households about the advantage of artificial insemination due to access to artificial insemination services. About 76.6% of the respondent in Urban and 29.3% Rural preferred Artificial insemination while 70.7% Rural and 23.4% urban dwellers preferred natural mating method for their cow mating.

This study result for the rural dwellers was similar with studies being conducted by Desta (2002) that reveals, farmers in Ethiopia prefer natural mating as the conception results from the AI services is not successful. In similar ways, research result conducted by Solomon et al., (2014) at Metekel Zone also indicated majority of the farmers depend on natural mating in absence of artificial insemination facilities. The study indicated majority (79.1%, 76.7%) respondents in urban and rural areas were used bull owned by neighbor for breeding purpose respectively. The present study was in agreement with the study of Debir, (2016) who reported the majority of the farmers in Sidama zone do not have breeding bull and they depend on their neighbors for breeding purpose.

Table 3: Mating system and source of bull in the study area

Parameter		Urban	Rural	Overall
1.	Mating system			
	AI	62	33.3	47.65
	Natural Mating	26	56	41
	Both Natural and AI	12	10.7	11.35
2.	Source of Bull			
	Own bull	20.9	23.3	23.25
	Bull owned by neighbor	79.1	76.7	77.92
Total		**100**	**100**	**100**
3.	Breeding Methods Preference			
	AI service	76.6	29.3	52.95
	Natural mating	23.4	70.7	47.05
4.	**Heat Detection**			
	Family head	74.4	49.9	62.2
	All family members	25.6	30.6	28.1
	Herders		19.5	9.7
Total		**100**	**100**	**100**

Provision of mass artificial insemination services in the study area

AI service is provided by the government, the total percentages of AI are presented in Table 7. The exchange of information between the Artificial insemination technician and the AI center is poor as well: few records are kept but not collected and analyzed. The overall mean of Artificial insemination is 47.65 %. The majority (59.2%) of the respondent in the study area communicated to AITs through phone when they detect sign of heat from their cows/heifers. It is about 40.8% of dairy cattle owners took to AI centers when they detect sign of heat on their cows/heifers. This leads to the heat period of the cows and heifers passed before the AI service have been given or inappropriate time of insemination that cause failure to conception. This study result is lower than the study conducted by Bainesagn (2015) as 60.5% of farmers in south Shoa zone of Oromia region detect heat by their own and took their cows to AI station.

The majority (83.3%) of the respondent in the study area indicated that AI had not available all the time and don't get the service without interruption due to shortage of AITS and inputs it is only 16.7% of them that get the service regularly. As indicated in the Table 7, the majority 67 % and 58.5% of respondents in urban and rural of the study area reported as they had passed the breeding date of their cow due to the absence of AI service and wait for the next 21 days of breeding period. In both study areas, about (62.6%) mentioned dairy cattle owners postpone time of insemination for the next cycle and (37.4%) of them use natural mating. These were the possible solutions of AI users when the service discontinuous due to absence of AIT and input shortages during time of onset of heat .However this increases calving interval within breeding cows.

Table 4: provision of AI service in the study area

	Urban	Rural	overall
Means of communication			
Mobile phone call	44.2	74.3	59.2
Travel to AI Center	55.8	25.7	40.8
Total	100	100	
Status of the provision of AI			
Regular provision of AI			
Yes	20.5	12.9	16.7
No	79.5	87.1	83.3
Alternative methods			
In the Absence of AI technician and shortage of input			
Pass the date without breeding the cow (%)	67	58.5	62.6
Use Natural mating (%)	33	41.5	37.4

Level of satisfactions and constraints of Existing AI service

As the result showed farmers' satisfaction with the current AI service is low. Majority (63.4%) of the respondents in both Urban and Rural areas were not satisfied with the existing AI service due to different problem. The present study was similar with report of Kelay (2002) who found that about 50% of Addis Ababa dairy producers were not satisfied with the AI service delivery system/reasons.

The result showed that About 20.5% of the respondents reported conception problem, 17.4% of them raised inefficiency of AIT , 11.7% of them non-availability of semen and liquid nitrogen on time, 30.2% of them low and/or no awareness creation to farmers on AI service, and 17.3% of them Heat detection problem were the major constraints in successes of AI.

Table 5: Level of satisfaction and constraints of AI service

Parameter	Rural	urban	overall
Level of satisfaction			
Satisfied	32.1	41.2	36.7
Not satisfied	67.9	58.8	63.3
constraints of AI service			
Semen and liquid nitrogen does not come on time	15.2	8.3	11.7
AIT problem	12.4	22.2	17.4
Conception problem	24.2	16.7	20.5
Heat detection problem	15.2	19.4	17.4
Insufficient support of concerned body	6		3.0
Low/no Awareness creation to farmers on AI service	27	33.4	30.2
Total	100	100	100

Farmer practice on time of Insemination

The results indicated that when Heat signs were detected in the morning, (16.7%) of farmers reported as they were arranged AI service in the afternoon of the next day, but when heat signs were detected in the afternoon 57.9 % (majority) of the Farmers arranged AI service in the afternoon of the same day.
About (36.6%) and (7.9%) of respondent in study area reported as they were inseminated their cows / heifers at the right time of insemination but the rest of the respondent inseminate their cows at the wrong time mainly having been too late after onset of estrus . This may be possibly due to lack of awareness among farmers on the appropriate time effective for AI. The miss-timing of AI as observed in the study is basically have a disagreement of poor extension services rendered to the beneficiaries of such program, the observations are in agreement with the results of Tadesse et al., (2014) The findings on research conducted by Sinishaw (2005) stated that animal should be inseminated within 24 hours of the onset of heat because late and early insemination may influence the CR of both the heifers and cows.

Table 6: Farmers practice of timing of AI in the study area

Time of insemination	Heat detection In the morning	Heat detection In the afternoon
Afternoon of that day	36.6	57.9
Morning of that day	6.7	-
Morning of the next day	3.3	7.9
Afternoon of the next day	16.7	-
Based on the Availability of AI technician	36.7	34.2
Total	100	100

Major Constraints of AI Service Delivery System
AI service delivery system in urban and rural of the study area was conducted in two ways: stationed and mobile service delivery systems.

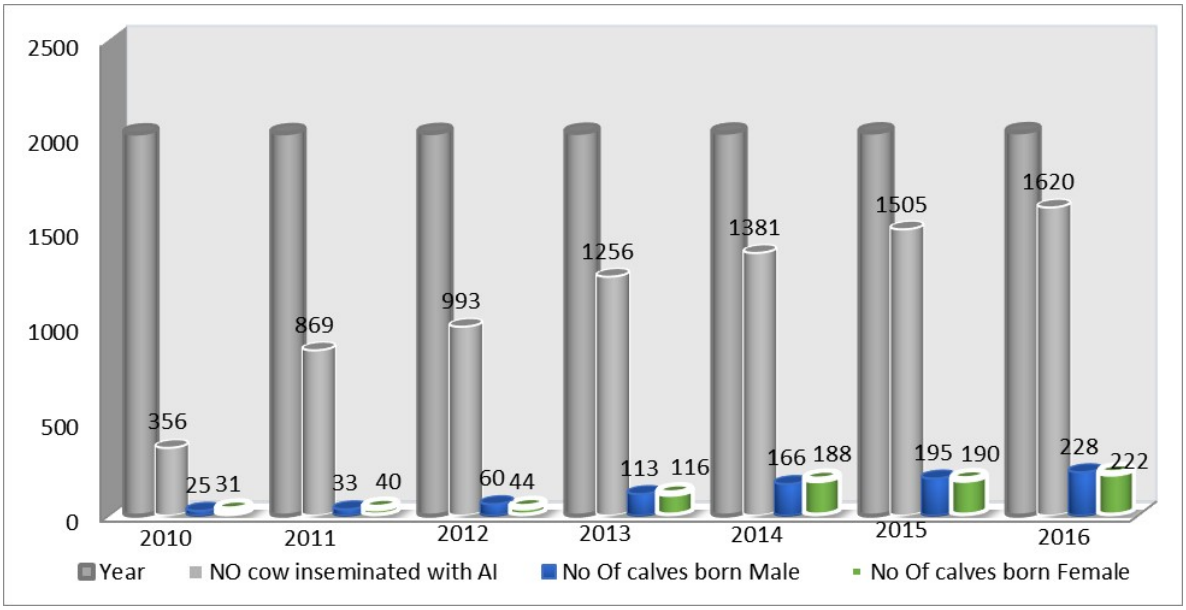
According to the respondents in the focus group discussion, the reason for the limited use of AI service in the rural area are due to lack of awareness in genetic improvement, timely access to AI service, long distance of the AI station, number of services required till conception resulting poor conception in the herd. There are only two AITs for the all kebeles of the study area where the service is conducted and there is quick turnover of ATs. This limits the service delivery sustainability. The survey results revealed that they sometimes have received on-job skill training and incentives but they complained of those material inputs like liquid nitrogen is not readily available. Moreover they reported that as they do not get necessary supports by the respective district. Similarly, two of them said that AI service delivery is not consistent in their respective areas because of shortage of semen and liquid Nitrogen which have an adverse effect on semen quality and reproductive performance of dairy cows. All of the AITs provide both stationed and mobile service delivery by using motor bike and two of them cover a maximum of 20 Km in rural which is convenient for the service they deliver. The average numbers of cows being covered by AITs ranged from 1-5 per day but the service is not regular.

Study Result of Retrospective Data
Retrospective data obtained from artificial insemination service recording book from year 2010-2016 indicated that there is an increasing trend in the numbers of inseminated cows from year to year. Even through the numbers of cows inseminated were increasing from year to year the numbers of calves born are decreasing in

relation to number of inseminated cows. All inseminated cows did not conceive and the level of satisfaction of the farmer is low due to conception failure and low number calves born.

According to the respondents in the focus group discussion of key informants the unfitness number of cow inseminated with calves born inappropriate time of insemination, management problem of the farmers, heat detection problem of the farmers and also lack of awareness creation to farmers, and loose collaboration between concerned bodies, which contributed for the overall poor efficiency of the services in the study area.

Source; AWLRD



Sex of Calves

The percentage of male and female calves born in this study was 50.76% and 49.23%, respectively. This finding is almost similar with the study result of Ismudiono (2000) calf born sex ratio showed 50:50 between male and female. The current study for male and female calves was disagree with the value (60% and 40%) reported by Tewodroset al. (2015) for male and female in FogeraWoreda of North-Western Ethiopia.

Reproductive performance of dairy cattle

Age at first Service

Age at first services is the age at which heifers attain body condition and sexual maturity for accepting services for the first time and it is also considered as age at puberty.

On average, age at first service (AFS) for local and crossbred heifers in the study areas were 43.07+0.68 and 25.18 ± 1.23 months, respectively,

The current finding for local is slightly lower than AFS of 44.1±5.9 months reported by Debir (2016) in Sidama Zone, Southern Ethiopia and 44.8 months for Fogera cattle (Gidey, 2001).

The cross bred Heifer in rural of study area had slightly higher average First service (25.57± 0.43) than that of urban kebeles (24.80± 1.08).The mean estimated AFS observed in this study was lower than findings of Gebeyew *et al*. (2016) where the AFS local breed dairy cow was 46.16 ± 0.5 and the mean estimated AFS of cross heifer was 27.03 ± 2.11 in Dawa Chefa District, Amhara Region, Ethiopia.

Age at first service in rural was almost similar with that of urban kebele for cross bred. But it was far apart higher for local heifers in urban and cross in rural. This difference might be associated with management in terms of feed, health care and housing and different breed. Management factor especially nutritional status

determines pre pubertal growth rates and reproductive development (Masama et al, .2003). Delay in attainment of sexual maturity may mean a serious economic losses, due to an additional, none lactating, unproductive period of the several months.

Age at First Calving

The average age at first calving of local and cross breed heifers in urban and rural kebeles of the districts are presented in Table 13.

The overall mean of age at first calving for local and crossbred heifers were 52.41+0.56 and 34.63+0.72 months, respectively. The average AFC for local cows were 52.26+ 0.58 and 52.56+ 0.54 months, in urban and rural area while for cross breed dairy cows 34.54+1.29 and 34.73+0.16 in urban and rural respectively.

The present study indicates that the mean AFC disagreed with the 48.9 ±8.20 months reported by Demissu *et al.* (2013) for local cow from Guduru district of Oromia regional state in Western Ethiopia. The current result is also longer than the study reported by Nibret, 2012 for crossbred dairy cows under small holder conditions in and around Gondar which is 32.4 months and Niraji et al (2017) who reported 26.5±2.5 months in and around DebreZeit.

The high age at first calving observed here may be related to environmental conditions and husbandry practices which may affect on the cattle growth. These may retard growth rate, delay puberty, reduced fertility and conception, thus, the high age at first calving of the imported breed. Hence, there should be concerted efforts to improve the feeding and nutrient profile of feeds offered to the animals, housing, disease prevention and management especially during harsh climatic conditions in order to improve on age at first calving.

Calving interval

The mean calving intervals of local and cross breed cows in urban and rural districts are presented in Table 9. The calving interval is the period between two consecutive parturitions, and ideally should be 12 to 13 months. The overall average mean of calving interval for local and cross breed was 19.86±0.28 and 14.59±0.36 months. The present result for cross breed cow was higher than what was reported by Hunduma, (20120) 12.42 months for crossbred dairy cows under smallholder condition in Ethiopia, by Nibret, 2012. 13.4 ±5.1 months for crossbred dairy cows under smallholder conditions in and around Gondar, North Western Ethiopia and by Dessalegn et al.,(2016) 13.0± 2 at Bishoftu. On the other hand, the present result is lower than 21.36±3.84 months of CI reported in previous studies by Belay *et al* .,(2012) for cross bred cows of jimma town

Long calving interval in the study areas associated with environmental factors, poor nutrition, poor housing, lack of sufficient bull and AI services and poor health and reproductive management. The calving interval needs to be shortened for improved reproductive and productive performances. Thus, the results of the present study regarding calving interval calls for appropriate intervention.

Day open

Days open (also called calving-to-conception interval) is the period between calving and conception in cows. The overall average mean day's open of local and cross breed cows in Urban and Rural kebelesof the districts were presented in Table 9. The overall average mean of days open for local and cross breed was (118.01+2.25and 116.76+1.61 days) respectively.

The current finding of DO for local cows is lower than 340.3 days for Boran cows at Tatesa cattle breeding center reported by (Yifat et al. (2012).

From the result of the study it was observed that the average days open for cross bred in the study areas were, lower than the study conducted by Tadesse et al. (2010) 148±1.72 days at Holetta and finding of Belay et al., (2012) which is 155.7 days at Jimma town Oromia Regional state. On the other hand, longer than the result of (Nibret, 2012) who reported 87 days for cross bred cows at Gondar North Western Ethiopia? Feed shortage, silent estrus and lack of proper heat detection might be the contributory factors for long DO reported in this study. Productive parameter is influenced by Feed shortage, silent estrus and lack of proper heat detection might have contributed considerably to the long days open (Belay et al., 2012).

Table 7: Reproductive performances of dairy cattle in the study areas.

Breed	Reproductive	Urban	Rural	Overall Mean
	Reproductive	Mean+ SE	Mean+ SE	Mean+ SE
Local	AFS (months)	42.92+ 0.64	43.22+0.73	43.07+0.68
	AFC (Months)	52.26+ 0.58	52.56+ 0.54	52.41+0.56
	CI (months)	19.50+ 0.28	20.22+ 0.28	19.86+0.28
	DO (days)	117.52+ 2.73	118.5+ 1.77	118.01+2.25
Cross	AFS (months)	24.80+ 1.08	25.57+0.43	25.18+0.75
	AFC (Months)	34.54+ 1.29	34.73+ 0.16	34.63+0.72
	CI (months)	14.29+ 0.32	14.90+ 0.41	14.59+0.36
	DO (days)	116.38 + 1.05	117.18+2.17	116.78+1.61

AFS = Age at First Service, AFC = Age at First Calving, CI = Calving Interval, DO =day open, SE = Standard Error of mean.

CONCLUSION

The study was conducted to assess the status of artificial insemination, and reproductive performance of dairy cattle related constraints as well as farmers' perception toward Artificial insemination of dairy cows in ambo districts of west Shoa zone.

Even though, there have been AI service to improve the productivity of local breeds using exotic blood level from abroad, the accommodation and utilization of this technology has not yet met the intended goal for the improvement of production and reproduction of livestock sector in the study areas

Results of the study indicate that majority of the respondents in Urban were used artificial insemination method as compared to natural mating and the rests are used both for mating their cow. However, the rural farmer were used natural mating method followed by artificial insemination for mating their cow The exchange of information between the technician and the center is poor as well: few records are kept but not collected nor analyzed which leads to passed the heat period of the cows and heifers before the AI service have been given or inappropriate time of insemination that cause failure to conception.

Majority of the respondent in the study area communicated to AITs through phone when they detect sign of heat from their cows/heifers while the other of dairy cattle owners took to AI centers when they look sign of heat on their cows/heifers. This leads to the heat period of the cows and heifers passed before the AI service have been given or inappropriate time of insemination that cause failure to conception.

The majority of the respondents in the study area were not satisfied with the existing AI service because of that low conception rate AIT problem, Semen and liquid does not come on time, non-availability of AI service, and Awareness creation to farmers on AI service, and Heat detection problem were the constraints that hinder the successes of AI.

Generally, the results of the study showed that, status of AI, reproductive performance, and farmers' perceptions toward the technology were low and great attention must be needed to advance the technology in order to make the farmers more profitable. Lack of designed breed improvement scheme, insufficient AI service, inadequate feed in quality and quantity and inadequate extension services were some of the identified determinants for the improvement of dairy sector in the area.

Finally, reproductive performance of dairy cows in the current study was found to be lesser than the optimum values desirable for profitable milk production, indicating urgent attention must be needed to overcome the

problem. Thus, it is concluded that there is an urgent need for well-coordinated efforts of all concerned bodies to boost the production and productivity and thereby enhance the livelihood of the dairy farmers in the area.

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