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Assessment on Problems Associated with Artificial Insemination Service in Dairy Cattle in Two Selected Districts of West Hararghe Zone

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Abstract
Artificial insemination is recognized as the best biotechnological technique for increasing reproductive capacity and has received widespread application in farm animals. A cross sectional study was conducted from November 2016 to March 2017 with the objective of assessing the problems associated with artificial insemination service in dairy cattle in two selected districts of West Hararghe zone and coming to applicable recommendations. In this study, a structured questionnaire was used and (400) smallholder dairy farmers, (8) Artificial Insemination Technicians and (17) animal health and production professional were included. Retrospective data was also included in the study to evaluate the situation of AI service in the study site. According to the study result, 152(38%) of the smallholder dairy farmers have got AI service regularly without interruption while 248(62%) of them do not due to discontinuation of service on weekends and holidays (39.4%), unavailability of AITs (25.65%), lack of inputs (20%) and long distance (14.87%) with statistical significance between districts ($P<0.05$) for shortage of Artificial Insemination Technician. Conception failure (43.9%), unavailability of artificial insemination technicians (29.8%), Death or Dystocia (15.6%) and insufficient animal health centers (57.5%) are among the major constraints of AI delivery system raised by dairy farmers. About (61.25%) of the dairy cattle owners were not satisfied by the AI service delivery while (38.75%) were satisfied with the overall AI service with statistically significant difference among the districts ($P<0.05$). The AITs and animal health and production professionals also mentioned absence of collaboration between stakeholders, absence of inputs, lack of responsible body and lack of on job trainings and incentive as constraints of the AI service in the area. Generally, the questionnaire survey indicated that artificial insemination service faces several constraints and requires urgent corrective measures by all stakeholders to change the situation and attain the intended result of improving the production and productivity of dairy cattle in the study area in particular and in the country in general.
Keywords: Artificial insemination, Dairy Farmer, Problems, District, Oda Bultum, Doba
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INTRODUCTION

Cattle production together with the production of other livestock sectors has been known to be an important component of the agricultural sector. Livestock contributes much more by providing meat, milk, cheese, butter, export commodities (live animals, hides and skins), draught power, manure, near-cash capital stock (EASE, 2003). Ethiopian cattle population is ranked first in Africa as cited by Hassen *et al.* (2007).The total cattle population in the country is estimated about 43.12 million of which 55.41% are females (Demeke, 2010). Despite the country's high livestock holding, great potential and sustained development efforts to get the subsector moving forward, productivity has remained low and still subsistence oriented in Ethiopia. A number of interrelated, complex and dynamic economic, technical, policy and institutional challenges have hampered the subsector (Yoseph *et al*., 2003; Hundie *et al*., 2013).

Artificial insemination has become one of the most important techniques ever devised for the genetic improvement of farm animals. It has been widely used for breeding dairy cattle as the most valuable management practices available to the cattle producer and has made bulls of high genetic merit available to all (Webb, 2003).

It is known that no enough selection and improvement for productivity has been performed on the indigenous cattle in Ethiopia (MoA, 1996). The indigenous cattle breeds of Ethiopia have the capacity to cope with the harsh environmental conditions of the country. They often have special adaptive traits for disease resistance, heat tolerance and ability to use poor quality feed (Azage *et al*., 2010). Therefore, in order to improve the low productivity of local cattle, selection of the most promising breeds and cross breeding of this indigenous breed with highly productive exotic cattle has been considered a practical solution (tadesse, 2008).

Although artificial insemination has been in operation in Ethiopia for over 35 years, the efficiency and impact of the operation has not been well-documented. Reproductive problems related to crossbreed dairy cows under farmers' conditions are immense and it is widely believed that the AI service in the country has not been successful to improve reproductive performance of dairy industry (Ashebir *et al*., 2016). The success rate of artificial insemination in Ethiopia is still low owing to a number of technical, financial, infrastructural and

managerial and heat detection problems (2014). The problem is more aggravated by lack of recording scheme, wrong selection procedures, and poor management of AI bulls associated with poor motivations and skills of inseminators (Gebremedhin, 2005). Therefore the objective of this research was:

- To assess and identify problems associated with artificial insemination service in selected districts of West Hararghe zone. And to recommend and give feedback to decision makers to appropriate and outermost action on the service in the study sites.

3. MATERIALS AND METHODOLOGY

3.1. Study Area

The study area namely, Oda Bultum Woreda is located in eastern high lands of Oromiya regional state in west Hararghe Zonal Administration. It is situated 364 km East of Addis Ababa and 38 km from Zonal city Chiro. The study area is located at an altitude between1200m-2400m with an average altitude of 1780m. The temperature of the area varies between 22°C -28°C with average 25°C and the annual average rain fall is around 1200mm. The area has a subtropical (Weynadega), tropical (kola) and temperate (dega) type of climate division and accounting for 31%, 65% and 4% respectively. The livestock population of the Woreda is estimated at 96,491 cattle, 12,020 sheep, 42,132 goats, 16,710 donkeys, 163 mules, 54,416 poultry, 7,012 camels and 10,942 bee hive colonies (OBWAO, 2010). Doba district is located in West Hararghe zone of Oromia regional State, Ethiopia. Doba district is located 382 km east of Addis Ababa. The daily temperature of the area ranges from 22 to 27° C. The mean annual rainfall of the area ranges from 760 and 900 mm. The average altitude of the area ranges from 1400 to 2500 m above sea level. There are about 80,796 head of cattle, 84,507 goats, 23,723 sheep, 10,899 equines, 1,894 camels and 75,305 poultry in the districts. All of these livestock species are reared by smallholder farmers under extensive production system. The district is divided into 40 administrative PAs (Doba district Agricultural and Rural development office, personal communication).

3.2. Study Population

In this study, smallholder dairy farmers, all artificial insemination technicians (AITs), and all animal health and production professionals in the two selected districts were represented in the study population.

3.3. Study Design and Methodology

A cross-sectional type of study supported by questionnaire survey was carried out by systematic random sampling method from November 2016 to March 2017 in two selected woreda of west hararghe zone to evaluate Problems associated with Artificial Insemination in the study site. In questionnaire survey, questionnaire survey format was used and 400 smallholder dairy farmers, all artificial insemination technicians and all animal health and production professionals were interviewed accordingly. During the interview process, every respondent included in the study was briefed about the objective of the study before presenting the actual questions. Then the questions were presented to the respondents. Then after, the adjusted questionnaire was administered to the sampled households to collect information on attributes, such as challenges of AI service, the status of AI service, level of awareness of households and other stockholders about AI, perception of households about AI service and reasons for not using AI service, number of cattle inseminated, number of cow and heifers conceived, feed, health and housing management.

In the retrospective study, data was collected from records of AI service covering the period from 2013/14 to April, 2016/17. The data was obtained from inseminator's recording book. Thus, the number of cattle inseminated number of participatory farmers, number of pregnant caws and number of female and male calves born was recorded to evaluate the success rate and conception failure encountered at the study sites.

3.4. Sampling Procedure

The sample size will be determined based on the expected prevalence of 50% and absolute desired precision of 5% at confidence level of 95% according to the formula provided by Thrusfield (2005). This is calculated by using the following formula:

Total no of cows (n) = $\frac{196^2 \times P_{exp}(1-P_{exp})}{d^2}$

Where:
n=required sample size
P (expected prevalence) = 0.5
d (desired absolute precision) = 0.05
Zα = 1.96.

Based on this formula, the total numbers of respondents to be included in the questionnaire survey will be 384. However in order to increase precision the total number of respondents were risen to 400.Thus, 400 systematically selected dairy cattle owners, 17 animal health professionals (all) and 8 artificial insemination

technicians (all) were included in the survey.

3.5. Sample Size Determination

In the sampling procedure, the two districts were purposively selected because it was believed that these areas are the ones where an AI service is exercised most. Smallholder dairy farmers were selected using systematic random sampling and all artificial insemination technician as well as all animal health professionals were included. A total of 400 smallholder dairy farmers were randomly selected from the study districts.

3.6. Data Management and Statistical Analysis

All data was entered in to MS-Excel after completing data collection work from the two study districts. Then the analysis work was done using SPSS (statistical package for social studies) software version 22. The data was then summarized using descriptive statistics such as mean and percentage and chi-square in order to assess the magnitude of the difference of comparable variables.

4. RESULT

4.1. Results of Farmers Questionnaire Survey

Smallholder dairy farmers in the two districts rear local and crossbreed cattle. Distributions of local and crossbred cows in the two locations were found almost same. However, the number of local cattle exceed from the crossbred cattle. Results of smallholder dairy farmers questionnaire survey revealed that among 400 of dairy farmers 83(41.5%) in Oda bultum and 69(34.5%) in Doba districts have got the AI service regularly and without interruption while 117(58.5%) in Oda bultum and 131 (65.5%) in Doba couldn't get the AI service regularly due discontinuation of service on weekends and holidays (39.4%), shortage of AITs (25.65%), shortage of input (20%) and long distance (14.87%). There was statistically significant difference among districts in shortage of AITs ($P<0.05$).

Table.1. showing Status of AI service in study site in relation to constraints

problems	**Districts**			**X^2**	**P.value**
	Doba	O/Bultum	Total		
discontinuation on WH	55(20.4%)	51(19%)	106(39.4%)		
unavailability of AITs	44(16.35%	25(9.3%)	69(25.65%)	6.661	0.036
Input shortage	23(8.55%)	31(11.5%)	54(20%)		
Long distance	21(7.8%)	19(7%)	40(14.9%)		
Total	14353.2%)	126(46.8%)	269(100%)		

4.1.1. Results by which farmers communicate with AI technician

51.5% and 58.5% of respondents in Oda bultum and Doba districts respectively get the service at the AI station while 48.5% in Oda bultum and 41.5% in Doba districts get Artificial Insemination service at their farm through phone call to AI technicians.

Even though the on farm AI service is higher in Oda bultum district as compared to Doba district, there was no statistical significant difference between the two study areas ($P=0.159$).

4.1.2. Awareness of AI beneficiary on estrus detection in the study sites

The dairy farmers detect estrus of their dairy cows by observing mounting of the cow on other animals (31.0%), vulva discharge (16.2%), bellowing (18.0%), swelling and redness of the vulva (9.8%),restlessness and nervousness (11.5%), Inappetance (13.5%). There was no statistically significant difference among the study areas in identifying signs of estrus used to report cows to be inseminated for AI service ($p>0.05$).

Table.2. Result of signs of estrus used to report cows for AI service.

Districts	**Signs of heat used to detect cows to inseminate**						**Total**
	mounting other cow	Restlessness	Bellowing	Redness& swelling of vulva	Vulvar discharge	Inappitance	
Doba	59(14.8%)	26(6.5%)	33(8.2%)	17(4.2%)	34(8.5%)	31(7.8%)	200
O/bultum	65(16.2%)	20(5.0%)	39(9.8%)	22(5.5%)	31(7.8%)	23(5.8%)	200
Total	124(31%)	46(11.5%)	72(18%)	39(9.8%)	65(16.2%)	54(13.5%)	400

$X^2=3.538$ $P=0.618$

The perception of AI beneficiaries on the time of insemination was assessed and found out that 208(52%) of the owners request AI service for their cows in the morning if the cow show heat in the afternoon of the previous

day and which is the right time of insemination but, the rest 159(48%) of the dairy cattle owners inseminate their cows in the wrong time. while when the cow show heat in the morning 197(49.25%) of the dairy cattle owners inseminate their cows in the afternoon of that day which was the right time but the rest 203(50.75%) of the dairy cattle owners inseminate their cows in the wrong time. Among the study districts 50.6% of AI beneficiaries inseminate their cows and heifers at the right time of insemination. Thus, when the cow shows heat sign at the afternoon of the day and morning, they allow their cow to be inseminated at early morning of the next day and late afternoon of that day respectively while 49.4% of smallholder dairy farmers allow the service in a wrong time.

This result indicates that almost half of AI users have no knowledge on timing of insemination which could in turn contribute for repeat breeding and conception failure. There was statistical significant difference in time of insemination among the study sites (P<0.05).

When AITs come too late or the service discontinues due to different reasons, 208(52%) households pass without breeding their cows from AI and natural mating in the study areas whereas 192(48%) use natural mating. There was statistical significant difference among the study districts in pass without breeding from AI and natural mating (P=0.003).

Table.3. cows pass without breeding from AI and Natural mating

	When AITs come too late for a service			**X^2**	**P.value**
Districts	Pass form AI & NM	Use NM	Total	9.014	0.003
O/ bultum	119(59.5%)	81(40.5%)	200		
Doba	89(44.5%)	111(55.5%)	200		
Total	208(52.0%)	192(48.0%)	400		

The result of this study shows that when cows at heat fails to conceive at first service, 273(68.2%) of farmers use AI again and again and the rest 127(31.8%) farmers use natural mating. In case of repeat breeding, the maximum perception of AI users towards using of AI again and again is recorded in Oda bultum district with 149(74.5%) respondents. There was statistical significance difference between districts in using AI again and again (P=0.007).

Table.4. showing AI beneficiaries in using AI again and again with respect to their districts

	If cows do not conceive with repeated insemination			**X^2**	**P**
Districts	Use AI again&again	Use NM	Total	**7.211**	**0.007**
Oda bultum	149(74.5%)	51(25.5%)	200		
Doba	124(62.0%)	76(38.0%)	200		
Total	273(68.25%)	127(31.75%)	400		

4.1.3. Results of Questionnaire Survey about Disease Condition and easy animal health service in the Study Sites

Health problem by which farmers faced with tentatively diagnosed are: mastitis 119(29.8%), respiratory problem 95(23.8%), external parasite infestation 78(19.5%), bloating 57(14.2%), reproductive problem 51(12.8%). While 170(42.5%) of respondents get animal health service easily, 230(57.5%) of them did not get the service easily. There was statistically significant difference in animal health service among districts (P>0.05).

Table.5. Showing easy animal health service in relation to study site

		Districts			
Easy access to animal health service	Response	**O/Bultum**	**Doba**	**X^2**	**P.value**
	Yes	95(23.8%)	75(18.8%)		
	No	105(26.2%)	125(31%)	**4.092**	**0.43**

A total of 245(61.2%) respondents were not satisfied and 155(38.8%) of respondents were satisfied with the overall Artificial Insemination service in the study sites. There was statistical significant difference among districts (P=0.003).

Table.6. Satisfaction level of farmers within their respective districts

Satisfaction level	**Doba**	**O/Bultum**	**Total**	**X^2**	**P. value**
Not satisfied	137(55.9%)	108(44.1%)	245(61.25%)		**0.003**
Satisfied	63(40.6%)	92(59.4%)	155(38.75%)	**8.858**	

Table.7. Major AI service problems identified in the study sites.

problems of AI service	Doba	O/Bultum	Total	X2	P.value
conception failure	82(22.4%)	79(21.58%)	161(43.9%)	4.026	P=0.403
Unavailability of AITs	59(16.12%)	50(13.66%)	109(29.78%)		
Death/Distocia	35(9.56%)	33(9.01%)	68(18.58%)		
conception failure &unavailability of AITs	11(3%)	17(4.64%)	28(7.65%)		
Total	187(51.09%)	179(48.9%)	366(100%)		

The idea of the dairy farmers regarding selection of the type of semen 85(21.2%) of them said they use milk production factors, 28 (7%) breed type and 287 (71.8%) of them use both milk production and breed type factors to select the type of semen. The result of the questionnaire survey indicated that almost all farmers (94%) participated in the study confirmed their willingness to pay more fees for the service if they are provided with reliable and effective services.

289(72.2%) of the dairy farmers were evaluated the efficiency of AITs in giving the service for them non-cooperatively. While 76(9%) of the dairy farmers evaluate cooperatively and 35(8.8%) of them didn't give any information how to evaluate the efficiency of AITs giving the service for them. There was no statistical significant difference among the districts (P=0.085).

4.1. Results of Questionnaires of the AI Technicians

Results of questionnaires survey of the AITs revealed that 4(50%) of the AITs evaluated the quality of training as good. 3(37.5%) of them evaluated as very good and only one respondent evaluated as poor. About 3(37.5%) of them responded that they never got on job trainings and no incentives at all. 5(62.5%) of them were giving service on the weekend and holidays on personal agreements while (37.5%) didn't give service because they are not provided with overtime payment. Half (50%) of the AI technicians complained that material inputs including liquid nitrogen is not readily available and the rest disagreed with them. Result of questionnaire survey of the AITs shows that 25% of the AITs got timely semen obtaining problem, While 75% of the AITs got important equipment provision and transportation problems.

All of the AITs provide both stationed and mobile service delivery by using motor bike and they cover a maximum of 1-20 Km (62.5%) and 20-30 Km (37.5%) which is convenient for the service they deliver. The average numbers of cows being covered by AITs ranges from 1-10 per day. However all of them thought that the number of services varies between seasons. All of them have no other job which affects their work. One fourth of them (25%) said that they do believe that National Artificial Insemination Center (NAIC) is doing its responsibilities properly. 6(75%) of AI technicians revealed that they don't get necessary supports by the respective districts and regional bureaus of agriculture to perform their duties appropriately. similarly, 62.5% of them said that AI service delivery is not consistent in their respective areas.

62.5% of the AI technicians responded that farmers did not report on time for insemination due to lack of knowledge in heat detection. 25% and 75% of the AITs confirmed that they started their careers as AITs after 1990EC and 2000E.C respectively. And the length of their training as well as the year they attended the AI-course varied even though, the training is not long enough which is from two to four months. The most obvious heat signs that have practical importance used by AITs are mucus discharge from the vulva, reddening and swelling of the vulva and Bellowing. All of the technicians said that they check for heat and pregnancy before performing insemination and all of them said that they wouldn't perform the insemination if the cow didn't show any signs of heat. Seven (87.5%) of the AITs revealed that farmers are willing to pay more fees for the service if they get reliable and quality services. 62.5 percent of AITs said that AI service delivery was not consistent in their respective areas. Furthermore 75% of them revealed that they are not satisfied and neither are they happy with their jobs as AITs because of the very little attention given to the service by all responsible bodies.

4.2. Results of Questionnaire Survey of AHPP

From 17 AHPPs in the study areas 11(64.7%) of them responded that there is no functionally effective responsible bodies at regional, zonal and district levels to coordinate the AI services and it was also found that there are problems associated with the AI service as regards to properly carrying out responsibilities by the NAIC and the zone/ district agriculture bureaus. 9(53%) of the AHPPs confirmed that there are no appropriate collaborations and communications between the NAIC, regional, zonal, district and other stakeholders at all. In relation to this, 7(41.2%) of them didn't have any information about the semen obtained from NAIC is believed to be the desired quality or not.

Thirteen (76.5%) of AHPP said that, AI service is not a success at national regional and zonal level in general. Similarly, 8(47%) of the respondents explained there is no any control mechanism employed in region, zone or district to evaluate semen for quality. Animal health and production professionals raised inadequate budget allocation (5.8%), deficiency and irregular supply (liquid nitrogen and semen) of inputs (11.8%), shortage of AITs (29.4%), insufficient AI center (23.5%), insufficiency of concerned body support (17.6%) and

poor awareness creation in dairy farmers about the AI service (11.8%) is the major problems associated with AI in the study area in particular. Similarly, 13(76.5%) of them confirmed that emphasis given to animal health in the study site is very low which could result in reproduction and production problems. Less nitrogen plant center, lack of attention and incentives to AI technicians, limitation of inputs and facilities, shortage of AITs and poor collaboration of government bodies with NGO's, community and other concerned bodies are the major problems associated with AI in the country in genera.

4.3. Retrospective Data Study Result

Retrospective data obtained from AIT recording book covering from year 2013/14- 2016/17 indicates an increment in number of inseminated dairy cows from year to year in both O/Bultum and Doba districts. Similarly, as the numbers of dairy cows inseminated are increasing from year to year, the numbers of calves born are also increasing in relation to numbers of inseminated cows. Pregnancy diagnosis is also done well in both districts and identifies the pregnant from non-pregnant cows. The number of female calves born is greater than male calves born in all years. However, the number of calves born is almost half of the number of cows inseminated in all years. This shows that almost half of inseminated cows did not conceive which could be due to reproductive problem of cows, AITs inexperience, or abnormal semen and heat detection problem. For example the average number of cows inseminated in 2016 in both districts was 736 cows. Out of these only 398 calves were born. This result shows that there is high conception failure rate in both districts. In general, the result of this retrospective data revealed that the AI service at this study area is still weak and it requires urgent measures to change the situation and to achieve a success.

5. DISCUSSION

Assessment of problems associated with artificial insemination services in West Hararghe zone was conducted on 400 smallholder dairy farmers, 17 animals' health and production professionals (AHPPs) and 8 artificial insemination technicians (AITs) supported by questionnaire survey in two different districts namely Oda Bultum and Doba. The present study revealed that 152(38%) of dairy farmers have got AI service regularly and without interruption while 248(62%) of them do not get the service due to discontinuation of service on weekends and holidays (39.4%), shortage of AITs (25.65%), shortage of inputs (20%) and long distance travel (14.87%). The result of this study indicates that majority of the farmers do not get the AI service regularly which is similar with the work of Ibrahim *et al*. (2014) (41% and 59%) at Jimma zone and higher than the result reported by Desalegn (2008) and Ephrem (2011) (27.7% and 72.3%) at Kaliti and (3.2% and 96.8%) at Wolayta Sodo town respectively. Among the study districts Doba has higher shortage of AITs (16.36%) as compared to Oda bultum (9.3%) with statistically significant difference between the districts in shortage of AITs ($P<0.05$). This might be due to uneven distribution of AITs, uneven distribution of number of dairy cattle owners and due to the difference in accessibility of farmers within their respective districts which is in line with Ibrahim *et al.* (2014) and Zerihun *et al.* (2013).

The current study revealed that 52% of AI users pass and wait for another 21 days for service when the AITs are too late for servicing and when the service discontinues due to different factors while 48% AI beneficiaries use natural mating. These were the possible solutions of AI users when the service discontinuous due to holiday and absence of AITs during time of onset of cows and heifers on heat. This result is similar with the report of Zerihun *et al.* (2013) (37.5% and 55.79%) and comparable with the reports by Woretaw *et al.* (2015) (61.8%, 38.2%) and Ibrahim *et al.* (2014) (62.5% and 37.5%). However the result reported by Milkessa (2012) (20% and 78.6%) conducted at Ambo is in contrast with this result. In this study there was statistical significant difference between districts ($P<0.05$) in pass without breeding. This may indicate that some of dairy cattle owners who use natural mating may have low awareness about the use of AI or may have kept bull for breeding because of inaccessibility of the AI service in their area. This result may also indicate that majority of the farmers are aware of the use of AI for the improvement of dairy cattle production or there is absence of bull for natural mating.

The current study shows out of the total 400 dairy cattle owners, 245(61.25%) were not satisfied in different ways in the use of AI service as a result of absence of service during weekends and holidays, shortage of AITs and shortage of inputs. On the other hand, 155(38.75%) were satisfied in AI service in the study area. This result is comparable with the result reported by Ibrahim *et al*. (2014) which is 59%and 41% respectively. On the other hand this result disagrees with the report by Desalegn (2008) 73.3% and 27.7% respectively. This result indicates that, although most of the dairy cattle owners have awareness and want to use AI service for improvement of the genetic potential of their animals, they are unable to get the service mainly due to discontinuation of the service during weekend and holidays, shortage of AITs and AI inputs.

Among the study districts in estrus detection 31 % of the dairy farmers detect their dairy cows by observing mounting of the cow on other animals, 18% bellowing, 16.2% mucus discharge from the vulva, 13.5% Inappetence, 11.5% Restlessness and nervousness, and 9.8% redness and swelling of the vulva. Majority of this

result is higher than the result reported by Milkessa (2012) (32.6) with 16.9% for mounting of the cow on other animals, 10% for redness and vulva discharge, 4.6% for bellowing and 3.1% for restlessness. Among the study districts 50.6% of AI beneficiaries inseminate their cows and heifers at the right time of insemination. Thus, when the cow shows heat sign at the afternoon of the day and morning, they allow their cow to be inseminated at early morning of the next day and late afternoon of that day respectively while 49.4% of smallholder dairy farmers allow the service in a wrong time.

This result indicates that almost half of AI users have no knowledge on timing of insemination which could in turn contribute for repeat breeding and conception failure. This result is greater than the result reported by Ibrahim *et al*. (2014). This difference could be due to the awareness of the community about AI service, poor perception about time of insemination, the AI beneficiaries exposed to loss of time, money and energy to perform AI at the allocated center repeatedly. Having profound knowledge and skill on aforementioned points the best recommendable insemination time to achieve maximum conception rate was at standing heat (more specifically, from the middle of standing heat to 6 hrs. after standing heat) (Oscar, 2003).

The outcome of the assessment of AI technicians regarding to the evaluation of the quality of training, (50%) of them evaluated as good, (37.5%) of them evaluated as very good and 12.5% of them evaluated as poor. Half (50%) of them responded that input availability including liquid nitrogen is good, 2(25%) and 1(12.5%) of them responded as satisfactory and poor respectively. Again, it was revealed that all concerned bodies are not giving proper attention to the AI service indicating that decision makers need to work hard to change the current situation of the AI operation at national level. Furthermore, the outcome of the study also indicates that absence of appropriate collaboration and communications among the farmers, NAIC, regional, zonal, district concerned bodies and other stakeholders consequently contributed to the unsuccessfulness of the service.

Retrospective data result from year 2013/14- 2016/ indicates that, as number of AI users increasing from year to year, rational increment in the number of participatory farmers and the numbers of calves born also increasing in relation to numbers of inseminated cows. However the number of calves born is almost half of the number of cows inseminated in all years. This indicates that almost 50% of inseminated cows did not conceive which could be due to reproductive problem of cows, AITs inexperience, or abnormal semen and heat detection problem. This result shows that there is high conception failure rate in the study sites. In general, the result of this retrospective data revealed that the AI service at this study area is still weak and it requires urgent measures to change the situation and to achieve a success.

The common constraints of AI services that were reported by dairy cattle owners in the study area were conception failure (43.9%), followed by unavailability of AITs (29.8%), death or dystocia (18.58%), and conception failure and unavailability of AITs (7.65%). There was no statistically significant difference among the study sites. Although different in magnitude; Ibrahim *et al. (*2014) also reported the most common constraints of AI service as AITs (31.3%) and conception failure (18%). They also reported other constraints of AI service like insufficient distribution of AI centers in the country, poor, awareness creation in dairy farmers about the AI service, insufficiency of concerned body support, and deficiency of inputs. According to Tadesse (2008) the most serious constraints of AI service were feed source, perception of AI users about AI, poor estrous detection systems, efficiency of AITs, distance from local AI center, input for AI activity, price for AI and disease in the order of their importance. Haileyesus (2006) ranked major AI service constraints as efficiency of AITs, heat detection systems, unavailability of AI service, perception of AI users about AI, distance from local AI center and price for AI in order of their importance. The difference in the response of dairy cattle owners in the different study areas may be attributed to the difference in their location from NAIC or local AI center, awareness of farmers about the use of AI, knowledge of signs estrus and proper heat detection, proper time of insemination, knowledge and skill of AITs about handling of semen during transportation, skill and time of insemination.

Moreover, according to this study result 53% of the AHPPs confirmed there is no appropriate collaboration and communications between the farmers, NAIC, regional, zonal, district concerned body and other stakeholders at all and 70.5%of the AHPP and 75% of the AI technicians indicated that lack of attention and incentives to AI technicians, limitation of inputs and facilities, poor collaboration of government bodies with NGO's, community and other concerned bodies and lack of breeding policy were identified as another major problems. These findings are in agreement with the suggestions of Desalegn (2005), Zewde (2007) and Zerihun *et al.* (2013).

6. CONCLUSION AND RECOMMENDATIONS

In this study, the most important constraints associated with AI service in the study site include discontinuation of service on weekends and holidays, shortage AITs, conception failure, shortage of input, death or dystocia, AITs inefficacy, insufficiency of concerned body support, loss of structural linkage between AI center and service giving units, absence of collaboration and regular communication between regional artificial insemination center, zonal, district and other dairy cattle owners and inadequate resource in terms of budget and facilities, insufficient animal health service, poor awareness creation in dairy farmers and insufficiency of AI

center. This result indicates that less than half (38%) of smallholder respondents have got the AI service regularly. Similarly dairy cattle owners, AITs and animal health professionals are not satisfied in the AI service delivery system. Generally, this study result shows AI service in the study districts has been given little or no emphasis. Therefore based on the above conclusions the following recommendations are recommended.

- AI service provision should be improved and functional breeding policy and strategy should be given at most priority.
- Endeavors should be made to improve the current status of conception rates at large by improving awareness of farmers, efficiency of AITs, and heard health in general.
- The AI service provision should be restructured in such a way that it responds well to the breed improvement programs of the country. It should be well organized with clearly defined duties and responsibilities of stakeholders.

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