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Evaluation of Artificial Insemination Efficiency in and Around Ejere District, Western Shoa Zone, Ethiopia

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Abstract: A cross sectional study was conducted from August to November 2014 in and around Ejere district, western Shoa zone, Ethiopa to assess and evaluate the perception of community members towards artificial insemination service, identify the major challenges associated withartificial insemination services in six selected villages. In this study a structured questionnaire was used and 134 respondents (120 small holders' farmers and 14 artificial insemination service professionals) were interviewed. According to the study result 85% of the respondents have got AI service regularly and without interruptions while 15% of them do not ask for artificial insemination service due to in availability of artificial insemination technicians (8.3%), long distance from artificial insemination service center (5%) and discontinuation of service on weekends and holidays (2%). The study has clearly confirmed that more than 85% of the respondents showed satisfaction with the overall artificial insemination services. The retrospective data showed that cattle owners lived 30 km away-from AI centers do not get the service. Among the small holder respondents (95.8%) identified the problems of inbreeding like: low milk production (33.3%), low genetic improvements (19.2%), low milk production and genetic improvement (43.3%) and low resistance to diseases (0.8%). The awareness of the respondents toward in breeding problem was 55.6% in cross breed, 28.7% in local breeding and 15.6% in exotic breed. The major identified constraints of artificial insemination service in the study area should be inefficiency of artificial insemination technicians, conception failure and unavailability of semen on time. The retrospective data at artificial insemination centers also showed that the number of artificial insemination users increasing from year to year but the number of calves born are decreasing in relation to numbers of inseminated cows due to conception failure and heat detection problem. Therefore, the operation of artificial insemination service in the study area requires immediate measures to change the situation.

Key words: Conception Failure · Cross Sectional Study · Heat Detection · Inbreeding · Retrospective Data

INTRODUCTION

The cattle population in Ethiopia is estimated to be 41.5 million [1], of which 99.4% were indigenous breeds and the remaining and 0.5% are cross and 0.1% are exotic breeds.

In order to improve the low productivity of local cattle selection of the most promising breeds and cross breeding of these indigenous breed with highly productive exotic cattle have been considered a practical solution [2]. Thus, the need for clear strategies on the improvement and maintenance of indigenous cattle genetic resource is required along with clear breeding program for sustainable genetic improvement.

To date, artificial insemination (AI) is recognized as the best biotechnological technique for increasing reproductive capacity and has received widespread application in farm animals [3].

In Ethiopia, AI was introduced in 1938 in Asmara, then part of Ethiopia, which was interrupted due to the Second World War and restarted again from 1952. It was again discontinued due to unaffordable expenses of importing Semen, liquid nitrogen and other related inputs requirement. From 1967 an independent service was started in Arsi Region, Chilalo Awraja under the Swedish International Development Agency (SIDA). It has described that the technology of AI for cattle has been introduced at the farm level in the country over 35 years

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ago as a tool for genetic improvement [4]. Thus, AI has become one of the most important techniques ever devised for the genetic improvement of farm animals. It has been most widely used for breeding dairy cattle and has made bulls of genetic merit available to all [5, 6].

Despite the wide application of AI and it success throughout the developed world, as a matter of fact, the success rate in Ethiopia is still low owing to a number of technical, financial, infrastructural and managerial and heat detection problems [3]. Therefore, the objectives of this study were to assess the perception of farmers towards artificial insemination service and to identify major challenges associated with the artificial insemination service in the study site.

MATERIALS AND METHODS

Description of the Study Area: The study was conducted in and around Ejere town, Ejere district from August to November 2014, which is located in western Shoa Zone of Oromia regional state located 44 km west of Addis Ababa at altitude of 2060-3085 masl 38° -22' E longitude and 9° 2'N latitude. The climate condition of the area is 45% highland and 55% mid altitude. The area receives an average annual rain fall of 1075 mm, more than 80% of which falls between May and September (Wet season). The average annual temperature ranges between 26°C and 27°C, with a mean of 26. 5°C. The prevailing farming system in the area is mixed farming system. The total cattle population in the area is 93152 [7]. All the study villages were purposively selected because artificial insemination service is rendered only in these villages out of the 27 villages in the district. These selected villages of Ejere district namely 01,02,03, Damotu, Chiri and Kusaye villages.

Study Population: The study population was represented by cattle owners who were beneficiaries of artificial insemination service in the district. In addition to that retrospective data obtained from inseminator's recording book. Some cows under small holders are managed extensively and depend on grazing, while other under large farms are housed and feed with cut and carry system in addition to field grazing.

Study Design: A cross-sectional typeof study supported by questionnaire survey was carried out in smallholder dairy farms to evaluate problems associated with Artificial Insemination (AI) in the study site.

The study design used was comprised retrospective study. Retrospective study was used to collect data from the service records of AI service covering the period from 2009 to 2014. Artificial insemination recording were obtained from AI certificates and from inseminations recording books. Information regarding the date at first calving, birth date, parity and number of services per- conception, date of population, time of insemination and conception date were collected and recorded.

In questionnaire survey, questionnaire survey format was prepared and 134 respondents (120 small holders and 14 AI professionals, respectively) were asked accordingly. In AI professionals 2 AITS and 12 animals health professionals and veterinarians were included. Hence problems and challenges they faced were identified and evaluated after they are provided with questionnaire survey format and interviewed in the study site.

Sample Size Determination: The sample size was calculated by using (15-20)% of the AI user at AI center of the study site according to the formula given by Roberts [8]. The recorded data of the AI center shows that the maximum numbers of dairy cows inseminated per year in last 5 years were found to be 400 animals. But the numbers of AI users in 2014 were estimated to be 440 people. Thus 20% of these AI beneficiaries were taken for sample size determination as follows:

440 x20% =Thus, 88 small holder respondents were required. But 120 small holder respondents were interviewed and 14 professionals were purposively included in this study.

Data Collection Techniques: Structured questionnaire was used to collect data from farmers and professionals to collect data on the status of AI service and constraints associated with the service. During the interview process before starting the interview every respondent briefed about the objectives of the study. Then the questions were presented to the respondents for quantitative study. Observation checklist was also used to review the records.

Data Analysis: Quantitative data were cleaned, edited, coded and entered in Ms-Excel spread worksheet after the completion of datacollection work from the study areas. Then the analysiswork was done using SPSS version 16 descriptively using frequency tables.

RESULTS

Results on farmers questionnaire survey showed that among 120 small holders, 32(91.4%) in village 01, 28(93.3%) in village 02, 22(88%)in village 03, 17(85%) in Chiri village, 2(33%) in Dhamotu village and 1(25%) in Kusaye village have got the AI service regularly and without interruption while 18(15%) of the respondents couldn't get the AI service regularly due to shortage of Artificial Insemination technicians (AITS) 10(8.3%), 2(2%) discontinuation of service on weekends and holidays and 6(5%) of the farmers travel long distance to get the service.

Almost 115(95.8%) respondents identified the problem of inbreeding. The maximum perception of the respondents towards inbreeding problem was recorded in 01 village 34(29.6%) followed by 02 village 27(23.5%) and the minimum one recorded in Kusaye village 4(3.5%).

About 23.3% of the small holders detect their cows by observing mounting of the cow on other animal, vulva discharge (12.5%), mounting and vulva discharge (35.8%), bellowing (1.7%), restlessness (2.5%), swollen red vulva and frequent urination (0.8%) and all above mentioned estrus sign (7.5%). On the other hand 87.5% of the respondents isolated their cows from the male animals and 12.5% of them live the cow with male animals. When they face the repeat breeding problem, they use AI service repeatedly (91.7%) and natural mating (8.3%).

Constraints of the AI Service at the Study Site: The study has clearly confirmed that 49 (40.8%) of small holder respondents indicated that they usually have herd health problem (Table 3), which directly have impacts on the efficiency of the AI service. They also indicated that 96 (80%) of them satisfied while 24 (20%) of them were unsatisfied with the overall AI service due to disease, management problem, reproductive health problems, conception failure, unavailability of AITs and unavailability of semen on time.

Study Result of Retrospective Data: Retrospective data obtained from artificial insemination service recording book covering from year 2009-2014 indicated an increment numbers of inseminated cows. Even through the numbers of cows inseminated were increasing from year to year the numbers calves born are decreasing in relation to number of inseminated cows due to conception failure and heat detection problems.

Results of Questionnaire Survey of Professionals: Results of questionnaires survey of the professionals (Table 2) showed that from 14 professionals, 12 of them were animal health professionals and veterinarians while 2 of them were AITs. The most obvious heat sign that have practical importance used by AITs is clear mucous discharge from the vulva 9(64.3%) followed by swelling and reddening of the vulva 4 (28.6%). Almost all (11; 91.7%) of the professionals revealed that cows come

Table 1: Perception of respondents on inbreeding problems in relation to breed

	Breed		Total number of respondents (%)	
Variable	Local	Cross	Exotic	
Low milk production	9 (25.7%)	21 (32.3%)	10 (50%)	40 (33.3%)
Low genetic improvement	10 (28.5%)	12 (18.5%)	1 (5%)	23 (19.2%)
Low resistance	0	0	1 (5%)	1(0.8%)
Low milk production and low genetic improvement	14 (40%)	31 (47.7%)	6 (30%)	52 (43.3%)

Table 2: Awareness of AI beneficiaries on time of insemination in the study site

	When cows and heifers show heat	
Time of insemination	Show heat at afternoon	show heat at morning
	Number of respondents (%)	Number of respondents (%)
As heat sign is seen on it	90(75%)	88(73.3%)
Morning of the next day	25(20.8%)	--
As the technician ordered	5(4.2%)	10(8.3%)
On the same day after noon	__	22(100%)
Total	120(100%)	120(100%)

Table 3: The prevalence of diseases in relation to breed in the study site

	Breed			
Variable	Local	Cross	Exotic	Number of respondents (%)
Mastitis	1(2.9%)	20(30.8%)	5(25%)	26(21.7%)
reproductive Health problems	3(8.6%)	10(15.4%)	2(10%)	15(12.5%)
Mastitis and reproductive Health problems	0	3(4.6%)	2(10%)	5(4.2%)
Dermatophilosis	1(2.9%)	2(3.3%)	0	3(2.5%)
Respiratory diseases	5(14.3%)	7(10.8%)	1(5%)	13(10

Table 4: Artificial insemination delivery constraints and the ways of improvement suggested

AI Constraints	Number of respondents (%)	Means to improve the AI service in the future	Number of respondents
Semen and Liquid Nitrogen doesn't come on time	3 (21.4%)	providing necessary material on time	4(28.6%)
AIT problems	4 (28.6%)	Awareness creation to farmers about AI Service	5(35.7%)
Heat detection problem	1 (7.1%)	providing support from the concerned body	3(21.4%)
Conception failure	4(28.6%)	To training AIT very well	1(7.1%)
Insufficiency support of concerned body	2(14.3%)	Expanding AI center in the country	1(7.1%)

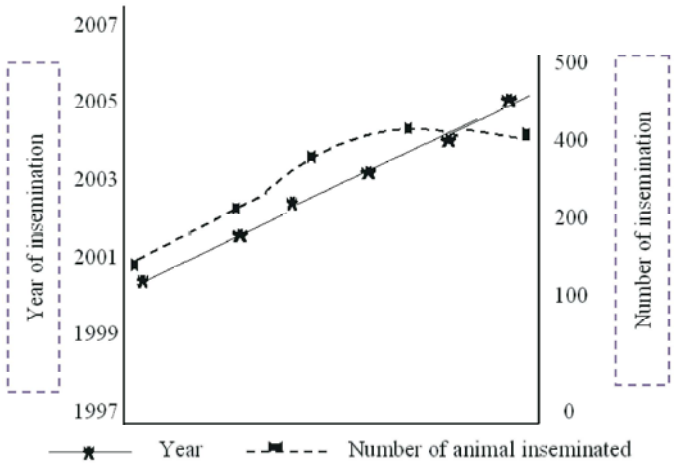

Fig. 1: Retrospective data showing the number of cows inseminated from year 2009-2014.

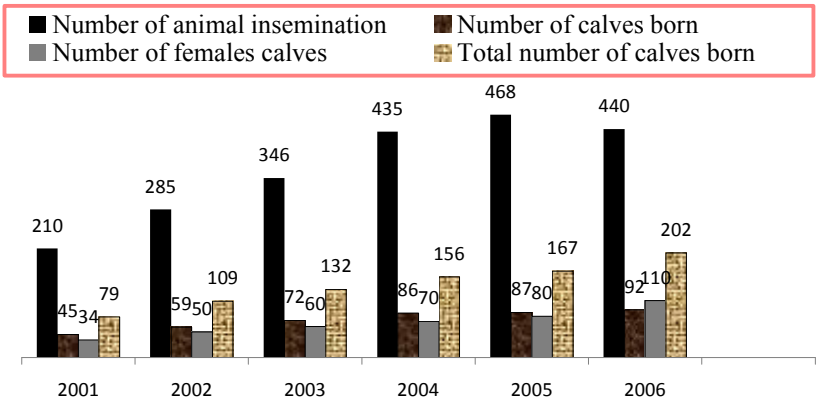

Fig. 2: Retrospective data showing the number of cow inseminated and calves born from year 2009-2014.

to heat early in the morning should be inseminated on the same day after noon and other respondent indicated that the cow should be inseminated after she is checked for oestrus sign (1; 8.3%).

Animal health workers and artificial inseminationtechnicians raised constraints in delivery artificial insemination like AIT problems (28.6%), Conception failure (28.6%) and semen and liquid nitrogen

provision (21.4%). In order to improve the artificial insemination delivery service in the study area 35.7% of the professional recommended creating awareness to to smallholder farmers about AI service, provision of necessary materials on time (28.6%) and getting support from concerned body (21.4%).

DISCUSSION

This study result showed that about 85% of the AI users have got AI service regularly and 15% of them didn't have continuous AI service due to shortage of AITs (8.3%), long distance coverage by farmers (5%) and discontinuation of service on weekends and holidays (2%). The current study revealed that the AI beneficiaries use natural mating (20%) when the service discontinued due to different factors and postpone time of insemination for the next cycle of insemination (78.6%). 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 which is greater than the result reported by Ephrem [9] that was 38.5% and 62.5%, respectively.

About 20.8% AI beneficiaries inseminate their cows and heifers at the light 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. The maximum perception of the respondents towards inbreeding problems was recorded in village 01(33; 28.7%) followed by ~~02~~ village 02 (29; 25.2%) and the minimum is recorded at third one Kusaye (4; 3.5%).

Heat detection was done by visual observation for a period of one hour in the morning and afternoon based on different signs of heat. According to Tadesse [10], poor heat detection leads to prolonged calving interval, long lactation, low milk yield, few calf crop and loss due to repeat breeding expenses. Poor heat detection results from poor accommodation, over crowdedness, poor feeding, lack of education and inadequate observation. In order to improve heat detection practice, these conditions can be resolved with checkup of cows at least twice a day for 20-30 minutes [11].

Mekonen and Goshu [12] evaluated the reproductive performance of zebu, Friesian and their crosses and reported that the number of services required per conception tends to decrease with increasing Friesian in heritance among dam breeds. Hence, the highest number of service per conception was required for Fogera cows. According to Tadesse[10], the number of insemination per technicians does not major the skill and efficiency of AI technicians, rather than measuring the number of service per conception.

Among the major diseases reported in the area in order of prevalence were mastitis with 21.7%, reproductive problem with 12.5%, respiratory disease with 10.8% and Dermatophilosis with 2.5%.

The problem of repeat breeders was also mentioned by farmers and hence needs to be seriously addressed. High numbers of services per conception are the result of problems associated with poor semen quality, poor semen handling practices, discontinuation of incentives to AI technicians, season of breeding, management factors in relation to estrus detection, timing of insemination and skill of pregnancy diagnosis and poor insemination practices. Efficiency of AITs, distance from local AI center and input for AI activity were also serious problems for AI delivery system. Regarding AI technicians problems it was not only their skill, but also motivation, attitudes and the facilities available have profound influence on the outcome of AI delivery system [10].

The retrospective data result covering from year 2009-2014 indicates that in contrast to an increasing number of AI users form year to year, the numbers of calves born are decreasing in relation to numbers of inseminated cows due to conception failure and heat detection problem.

For the future as possible solutions, providing necessary materials on time, awareness creation to small holders about AI service, providing support from the concerned body, expanding AI center in the country and training of AITs is suggested by all professionals.

CONCLUSION

The present study indicated that the success rate was still low owing to a number of technical, financial, infrastructural and managerial and heat detection problems. Among these, the most important constraints associated with AI service in Ejere district include insufficiency of concerned body support, conception failure, heat detection problems and AITs problem, loss structural linkage between AI center and service giving units, lack of breeding policy and herd recording system, inadequate resource in terms of inputs and facilities, absence of incentives and rewards to motivate AI technicians and lack of training for the society about AI. The repeat breeding and conception failure situation were a very alarming finding. Among diseases reported in the area mastitis, respiratory disease, reproduction problems

and dermatophilosis were the major identified ones. The AI delivery system was not evenly distributed throughout the study area, but the major AI activity delivery system is stationed, on call basis and combination of both. These constraints in collaboration with other problems can result in reproduction and production losses. AI service in the study site has been given little emphasis at regional or district levels during the last years. Hence, it can generally be concluded that the AI service in area is not satisfactory unless urgent corrective measures are taken.

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