

Assessment of Problems Associated with Artificial Insemination Services in and Around Gondar Town, North West Ethiopia

Tessema Reta and Atnaf Alebie

Department of Veterinary Pharmacy and Biomedical Sciences,
Faculty of Veterinary Medicine, University of Gondar, P.O. Box: 196, Gondar, Ethiopia

Abstract: A cross sectional study was conducted to assess the problems associated with the artificial insemination service in 6 kebeles of North Gondar Administrative Zone from October 2013 to April 2014. The study was performed by questionnaire survey on 388 dairy cattle owners and artificial insemination technician (AIT). There was no significant difference ($\chi^2=22.995$, $P>0.05$) in signs of estrus used in order to report cows for artificial insemination (AI) service. However, there was a significant difference among the study areas in shortage of artificial insemination technician, shortage of inputs, distance from the dairy owners' home to the artificial insemination center, satisfaction of dairy cattle owners, weekends and holidays service and major problems associated with artificial insemination service ($P<0.05$). The maximum distance from dairy owners' home to the artificial insemination service center was in Gonderochmariam kebele (95%) where as the insignificant distance from dairy cattle owners' to AI service center was in Maraki kebele (16.67%). The least service usage of artificial insemination in weekends and holidays was found in Tseda kebele (6.8%) and the highest was found in Azezo (62.2%). The greatest shortages of AIT present in Gonderochmariam kebele (83.3%) while the lowest in Maraki kebele (16.7%). There was the highest lack of government attention to AI service in Azezo 50(67.56%) while the least lack was in Gonderochmariam 25(41.67%). A total of 320(82.5%) of respondents were not satisfied by artificial insemination service. The questionnaire surveys indicated that artificial insemination is not doing well in all kebeles of the Zone. Therefore, the artificial insemination service requires urgent measures to change the situation to bring about the development of this developing country.

Key words: Artificial Insemination • Questionnaire Survey • North Gondar Administrative Zone

INTRODUCTION

Agriculture (mainly crop and livestock production) is the mainstay of the Ethiopian economy employing approximately 85% of the total population. Livestock production accounts for approximately 30% of the total agricultural GDP and 16% of national foreign currency earnings [1].

The total cattle population for the rural sedentary areas of Ethiopia is estimated to be 43.12 million, of which 55.41% are females. Out of the total female cattle population, only 151,344 (0.35%) and 19,263 (0.04%) heads are hybrid and exotic breeds, respectively. With an average lactation length of 6 months and an average daily milk production of 1.44 liters per cow, the total milk produced during the year 2006/07 was recorded to be 2.634 billion liters. This suggests that the total number of

both exotic and hybrid female cattle produced through the crossbreeding work for many decades in the country is quite insignificant indicating unsuccessful crossbreeding work. This again suggests that Ethiopia needs to work hard on improving the work of productive and reproductive performance improvements of cattle through appropriate breeding and related activities [2].

In spite of the presence of large and diverse animal genetic resources, the productivity from meat and milk of livestock remains low in many developing countries including Ethiopia for various reasons such as inadequate nutrition, poor genetic potential, inadequate animal health services and other management related problems [1]. Cattle breeding are mostly uncontrolled in Ethiopia making genetic improvement difficult and an appropriate bull selection criteria have not yet been established, applied and controlled [3]. Although artificial

Corresponding Author: Atnaf Alebie, University of Gondar, Faculty of Veterinary Medicine, Department of Veterinary Pharmacy and Biomedical Sciences, P.O. Box: 196, Gondar, Ethiopia.

insemination, the most commonly used and valuable biotechnology has been used in Ethiopia for over 30 years, the efficiency and impact of the operation has not been well-documented [4]. Reproductive problems related to crossbreed dairy cows under farmers' conditions are immense [5].

It is widely believed that the artificial insemination (AI) service in the country has not been successful to improve reproductive performance of dairy industry [6]. AI service is weak and even declining due to inconsistent service in the smallholder livestock production systems of the Ethiopian highlands. The problem is more aggravated by wrong selection and management of AI bulls along with poor motivations and skills of inseminators [7]. Hence, the objectives of this research are:

- To identify the problems associated with artificial insemination services in the study area.
- To generate information for the better application on the sector and give feedback to decision makers to take appropriate majors on it.

MATERIALS AND METHODS

Study Area: A cross sectional study was conducted from October, 2013 to April, 2014 in Gondar city, capital of North Gondar zone in Amhara regional state. It is located 750 km northwest of the capital city, Addis Ababa. It is situated between 12°36'N and 33°28'E at an altitude of about 2300 m above sea level with an average temperature of 20°C and an average annual rainfall of 1800 mm. Being a highland area, the city is spread on different mountains, slopes and in valleys and has three small rivers, many streams and a lake. The city has a population of 186,077 [8]. According to Office of Agriculture and Rural Development, the population size of Gondar town in 2008 is about 112,249 out of which 60,883 are males and 51,366 are females. The livestock population in the area comprises of cattle (8,202), goat (22,590), sheep (2,695), horse (1,065) and donkey (9,001) [9].

Study Population: Artificial insemination technicians and dairy cattle owners in six randomly selected kebeles were represented in the study population.

Sample Size Determination: The required sample size was estimated by considering 50% prevalence. Thus, the sample size was calculated according to Thrushfield [10] using 95% confidence interval and 5% absolute precision. This is calculated by using the following formula:

$$n = \frac{1.96^2 \times P_{exp}(1-P_{exp})}{d^2}$$

where,

n = Required sample size

P_{exp} = Expected prevalence

d² = Desired absolute precision (5%)

Based on this formula, the total number of dairy cattle owners and artificial insemination technicians to be sampled was 384. However, to increase the precision, a total number of 388 dairy cattle owners and artificial insemination technicians were included in the study.

Study Design: A cross-sectional type of study supported by questionnaire survey was carried out from October 2013 to April 2014 in six randomly selected kebeles.

Data Collection Methods: Structured questionnaires were prepared to interview dairy cattle owners, AI technicians to collect data on the status of AI services and constraints associated with the service. During the interview process, every respondent included in the study was briefed about the objective of the study before starting presenting the actual questions. Then the questions were presented to the respondents.

Data Management and Analysis: The data collected were entered and scored in Ms excel worksheet and coded and entered to SPSS version 20.0 for statistical analysis. Descriptive statistics analysis such as percentage and chi-square tests were used to summarize and present the data collected.

RESULTS

From 388 dairy cattle owners and artificial insemination technicians data was collected by questionnaires survey in six kebeles in North Gondar Administrative Zone. A total of 320 (82.5) respondents were not satisfied by artificial insemination service. There was statistically significant difference ($P<0.05$) among the kebeles in shortage of artificial insemination technician (AIT), shortage of input, distance to the artificial insemination service, weekends and holidays services and major problems associated with artificial insemination service (inefficiency of artificial insemination technician, lack of government attention, lack of awareness) (Table 1). However, there was no significant difference in signs of estrus used in order to report cows for artificial insemination service in kebeles ($P>0.05$).

Table 1: Artificial insemination used in different times and condition

Kebele	Weekends and holidays service usage		Shortage of artificial insemination technician		Shortage of inputs		Distance to artificial insemination service center		Satisfaction by artificial insemination service	
	Total	No	Total	Yes	Total	Yes	Total	Yes present	Total	Yes
Tseda	74	93.2%	74	44.5%	74	59.4%	74	81%	74	5.4%
Gonderochmariam	60	86.67%	60	83.3%	60	76.67%	60	95%	60	3.3%
Maraki	60	75%	60	16.67%	60	33.3%	60	16.6%	60	58.3%
Blagig	60	63.3%	60	75%	60	83.3%	60	91.6%	60	13.3%
Azezo	74	37.8%	74	32.4%	74	24.3%	74	24.3%	74	18.9%
Bilikko	60	58.3%	60	31.6%	60	26.67%	60	33.3%	60	8.3%
Total	388	68.8%	388	46.6%	388	50%	388	56.7%	388	17.5%
χ^2	67.557		85.040		82.629		1.678		89.344	
P-Value	0.000		0.000		0.000		0.000		0.000	

Table 2: The results of signs of estrus used to report cows for AI service:

Redness of vulva	Kebele	Blagig	G/mariam	Azezo	Bilikko	Maraki	Total	P-Value
Tseda	10	3	5	10	5	12	45	0.084
Mounting on other cows	35	40	30	34	5	28	208	
Restlessness	15	14	15	15	10	11	80	
Inappetace	14	3	10	15	5	9	56	
Total	74	60	60	74	60	60	388	

Table 3: Major problems associated with AI service:

Kebele	Lack of government attention	Inefficiency of AI technician	Lack of awareness	Total	χ^2	P-Value
Tseda	47(63.5)	16(21.6)	11(14.8)	74		
Gonderochmariam	25(41.67)	24(40)	11(18.3)	60	28.431	0.002
Maraki	40(66.67)	5(8.3)	15(25)	60		
Blagig	40(66.67)	10(16.67)	10(16.67)	60		
Azezo	50(67.56)	10(13.5)	14(18.9)	74		
Bilikko	30(50)	13(21.67)	17(28.3)	60		
Total	232(59.8)	78(20.1)	78(20.1)	388		

Table 4: Results of time of insemination to be successful

	Frequency	Percentage	χ^2	P-Value
Morning	324	83.5%	30.515	0.000
Afternoon	64	16.5%		
Total	388	100%		

The least artificial insemination service usages in weekends and holidays was found in Tseda kebele (6.8%) whereas the highest weekends and holidays service usages was found in Azezo (62.2%).

The greatest shortage of AIT present in Gonderochmariam kebele (83.3%) while the slightest in Maraki kebele (16.7). The chief value of shortage of input present in Blagig kebele (83.3%) and the highest lack of awareness about the AI service present in Gonderochmariam kebele (18.3) and Blagig kebele (16.67%). The maximum distance to AI service present in Gonderochmariam kebele (95%) and the insignificant distance of AI service present in Maraki kebele (16.67%).

The results of estrus signs used to report cows to be inseminated for AI service are presented in (Table 2).

There was no statistically significant difference among the study areas in signs of estrus used to report cows to be inseminated for AI service ($P = 0.084$), which is ($P > 0.05$).

The results of major problems associated with AI service in study areas are presented in (Table 3). There was statistically significant difference among the study kebeles in lack of government attention, lack of awareness and inefficiency of AI technician ($P = 0.002$). From 388 dairy cattle owners and AI technicians 232 (59.8%) responded the existence of lack of government attention. According to the result there were the same problems associated with AI service, lack of awareness and inefficiency of AI technicians 78 (20.1%). There was the highest lack of government attention to AI service in Azezo 50 (67.56%) while the least lack of government attention was in Gonderochmariam 25(41.67%).

From the total dairy cattle owners and artificial insemination technicians most of them choice morning as their appropriate time to inseminate and to be successful (83.5%) where as only (16.5%) choice afternoon as the appropriate time (Table 4). There was high statistically significant difference among the study kebeles in time of insemination ($P = 0.000$).

DISCUSSION

Assessment of problems associated with artificial insemination services in North Gondar administrative zone was conducted on 388 dairy owners and AI technicians supported by questionnaire survey in six different kebeles. The research showed that from 388 cattle owners and AI technicians 320(82.5%) were not satisfied in different ways in the use of AI service. This might be due to the lack of government attention, distance from their home to the artificial insemination center and presence of very little AI service on weekends and holidays. On the other hand, 68 (17.5%) were satisfied in AI service, this result agrees with the reports of Dessalign [11] and Zerihun [12].

In all the study kebeles, there was statistically significant difference in shortage of AIT ($P < 0.05$) this might be due to the cattle population and AI service were not synchronized. This agrees with the reports of Dessalign [11].

Among the study kebeles, Maraki had the least shortage of AI technicians which accounts about (16.67%) from the total study population where as the highest number of shortage of AI technicians were found in Gonderochmariam (83.3%). This great difference between this kebeles could be due to misplacement of artificial insemination technicians by zonal agricultural and development office and concerning bodies.

There was statistically significant difference among the study areas in shortage of inputs ($P < 0.005$). This might be due to uneven distributions and production of semen in both national artificial insemination center (NAIC) and Amhara regional administrative state artificial insemination center (ARASAIC).

There was statistically significant difference among the study areas in distance to AI service ($P < 0.05$) probably due to the reason that the dairy cattle owners live in far away from the AI service center. The maximum distance from dairy cattle owners' home to AI service center was found in Gonderochmariam kebele (95%) and the least distance from dairy cattle owners' home to AI service center was found in Maraki kebele (16.6%).

There was a high significant variation in dairy cattle owners and AI technicians in satisfaction by artificial insemination service ($P = 0.000$). This was probably due to the lack of government attention to this sector. This agrees with the reports of Dessalegn [11] and Allen *et al.* [13].

There was statistically significant difference among the study kebeles in time of insemination to be successful ($P < 0.05$). About 83.5% of dairy cattle owners choice morning as their appropriate time of insemination, this was probably due to most of them detect estrus signs when their cows are housed and observe vaginal discharge in the morning.

The highest value of inefficiency of AI technician was found in Gonderochmariam kebele (40%) and result of the least value of inefficiency of AI technician was found in Maraki kebele (8.3%). This might be due to the variation of lack of job trainings indicating a need for upgrading the capacity of artificial insemination technicians by opening the way on job trainings throughout the kebeles. This agrees with the suggestions of Zewde [14].

There was statistically significant variation in lack of government attention, lack of awareness and inefficiency of artificial insemination technician for artificial insemination among the study areas ($P < 0.05$). This might be due to the ignorance of the responsible bodies. This agrees with the reports of Zerihun [12].

There was no statistically significant difference among the study areas in signs of estrus used to report cows to be inseminated for AI service ($P = 0.084$).

CONCLUSION

Artificial insemination service in North Gondar Administrative Zone has been given little or no emphases at zonal or kebele levels. The most important constraints associated with AI service in North Gondar Administrative Zone include lose of structural linkage between AI center and service giving units, absence of collaboration and regular communication between dairy cattle owners and artificial insemination technicians, inadequate resources interms of inputs and facilities, inefficiency of artificial insemination technician lack of government attention, lack of estrus detection in both dairy cattle owners and artificial insemination technicians, lack of awareness of dairy cattle owners for artificial insemination service, presence of distance from dairy cattle owners' home to artificial insemination service center and absence of giving concern for artificial insemination technicians by federal and zonal

agriculture and Development management office. Hence, it can generally be concluded that the artificial insemination service in North Gondar Adminstrative Zone on the verge of total collapse unless urgent corrective measures are taken.

Recommendations: The zonal body responsible to coordinate and monitor AI service should be established and very well organized in human and material resources; Professional associations should critically work in close collaborations with zonal Agriculture and Rural Development in formulatig policies and implementaion stratégies; The AI technicians and dairy cattle owners should communicate regularly; Trainings should be given at federal and/or zonal level for AI tecnhicians to make them efficient in artificial insemination service; The artificial insemination service provision should be restructured in such a way that it responds well to the breed improvement programs of the country.

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