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Research Article

Evaluation of Failure of Oestrus Synchronization and Mass Insemination in Conception Rate of Dairy Cows in Silte Zone

Sharew Mekonnen Haile*, Tigist Wondala Tesfa, Mesobework kassa
Department of Animal Science, College of Agriculture, Werabe University, Adis Abeba, Ethiopia

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ABSTRACT

Background: Starting with 2012 up to 2020 in Silte zone many cows were synchronized and inseminated. However, there were a failure of Conception Rate after synchronized and inseminated and so far the mechanisms of failure of Oestrus Synchronization and Mass Insemination in conception were not understood. Therefore, the aim of this study was to determine the cause of failure of Oestrus Synchronization and Mass Insemination in conception of dairy cattle.

Result: Among the 130 injected cows, 72 (55.38%) of them were responded from day 2 up to day 3 after hormone treated and then inseminated them. As a result, the quality of semen in Dalocha and Sankura districts was facing with quality problem. There was AIT efficiency difference on Conception Rate based on their work experience in this study. Low no of AIT and mass number of cow provide during OSMI, lack of awareness about heat detection of farmers and cows not properly managed after hormone and semen treated were the main cause of failure of Conception Rate which is ranked 1 up to 3.

Conclusion: Generally, there is a great need of skilled and experienced technician and capacity building of farmers in heat detection, husbandry practices, and good handling practice of semen in the office and improvement strategy. Therefore, improvement in facilities and management should be necessary before implementing an effective estrous synchronization and mass Artificial Insemination programs.

Keywords: Failure, Oestrus Synchronization and Mass Insemination (OSMI), Semen quality, AITs efficiency and constraints

***Correspondence:** Sharew Mekonnen Haile, Department of Animal Science, College of Agriculture, Werabe University, AdisAbeba, Ethiopia, E-mail: sharewmekonnen21@gmail.com

INTRODUCTION

In Ethiopia, studies pertaining on hormone-assisted oestrus synchronization in cattle started in the late 1980s by a team of researchers in the animal health and reproduction section of the International Livestock Center for Africa (ILCA), and International Livestock Research Institute (ILRI). The research program was initiated with a long-term objective of integrating emerging reproductive technologies, such as estrus synchronization and mass insemination, AI, embryo transfer and associated techniques to improve the genetics and breeding of indigenous cattle for desirable traits and to explore the opportunities of using these technologies for genetic conservation of indigenous cattle in Africa. This focus of the research program was broadly defined as genetic improvement of cattle for milk and meat production, genetic improvement of trypanotolerant cattle breeds and genetic improvement of cattle for feed utilization efficiency (Tegegne A, *et al*., 2016).

To improve the efficiency of Artificial Insemination practices in Ethiopia, hormonal synchronizations of oestrus has been available for the past few years and has enjoyed success as a tool to make Artificial Insemination more practical (Tegegne A, *et al.*, 2012; Gizaw S, *et al.*, 2016). However, farmers expressed low satisfaction with the service, although evaluation of the technology by farmers is confounded with low Conception Rates (Gizaw S, *et al.*, 2016). The development of effective methods of estrus synchronizing and ovulation has been based on our understanding of the physiological and hormonal mechanisms controlling estrous cycle and the initiation of estrous cyclicity and pre -puberty in heifers and postpartum cows. Estrus synchronization products (Prostaglandin F2-alpha (PGF2α), Megestrol acetate (MGA), Controlled Internal Drug Release (CIDR), and Gonadotropin releasing hormone (GnRH)) and protocols have changed over time, the basic physiological principles underlying how these products work have not. An understanding of how these products impact the bovine estrous cycle and an understanding of how management decisions impact pregnancy success will affect on the success of any reproductive program. Estrus synchronization and Artificial Insemination (AI) are among the most powerful and applicable technologies for genetic improvement of beef herds (Seidel Jr GE, 1995). For a synchronization program to be successful, herd nutrition (cattle must be in good body condition), cycles of estrus (must be a normal cycle), and herd health (free from diseases and parasites) and weight of the animals must be considered (Cliff LG, 2010). Moreover, Tegegne A, *et al.*, 2012 reported that awareness creation, proper training, careful animal selection (good body condition score, cows free from disease and with functional ovaries), good animal handling facilities at a convenient location, a well-trained, organized and motivated multidisciplinary team (livestock science, feed and nutrition experts, veterinarians, AI Technicians, etc.) actively participant community and proper leadership and coordination are key elements for the success of synchronization program. The change of hormone-treated dairy cows was not as expected in Ethiopia (Gizaw S, *et al.*, 2016). This is due to

- Lack of proper understanding of the concept of oestrus synchronization by woreda experts and farmers.
- The communication of farmers with woreda experts in explaining the concept and process involved in oestrus synchronization was very low and the selection of unsuitable animals.
- Poor preparation of materials for oestrus synchronization and AI service like shortage of liquid nitrogen and semen delayed the implementation plan.
- Transport and fuel shortage limited the movement of experts to supervise field activities.
- Weak support from administrative bodies and assignment of woreda experts to other activities after the synchronization work.
- Poor oestrus detection by farmers and exposure of hormone-treated cows to local bulls.

Cattle breeding are mostly uncontrolled in Ethiopia making gen-

etic improvement difficult. Low pregnancy rate following Artificial Insemination in most African countries is attributed to poor semen quality, poor semen handling procedures, inadequate insemination skills, poor estrus detection, and wrong time of insemination (Tegegne A, *et al.*, 1995).

Statement of the problem

According to the cited by GebreMedhin D, *et al.* 2009 in Tigray region, estrus synchronization and mass insemination and Conception Rate were extremely low performance mainly due to the lack of skilled Artificial Insemination Technicians, using of fixed time insemination in the synchronization protocol, unplanned strategic feed supplementation of synchronized cattle and animal selection problems. In Southern nation, nationality and people of region, the Conception Rate using synchronization hormone was 33.3%. Starting with 2012 up to 2020, records indicated that in Silte zone many cows were synchronized and inseminated. However, they faced for 7 year's trial a failure of Conception Rate after synchronized and mass insemination and so far no detailed comprehensive evaluation and assessment to analysis about the cause of failure of oestrus synchronization and mass Artificial Insemination in CR thereafter there were no detailed general study pertaining to the results and status of this program which addresses Silte zone bureau of livestock and fishery resource. Therefore, this study was designed to evaluate the cause of, failure of Oestrus Synchronization and Mass Artificial Insemination in Conception Rate using PGF2 alpha treatment and identify the problems why they faced such kind of failure problems associated with this technology in Silte zone, the southern nation nationality people of Ethiopia.

General objective

The overall objective of this research is to evaluate failure of Oestrus Synchronization and Mass Insemination in the CR of dairy cattle in the Silte zone.

Specific objectives: To evaluate semen quality by laboratory test in in National Animal Genetic Improvement Institute (NAGII) laboratory. To compare the efficiency of AI technicians on Conception Rate based on work experience.

MATERIALS AND METHODS

Description of the study area

The study was conducted from October 2019 to April 2020 in Silte zone. Silte zone is one of the fourteen zones in the Southern Nation Nationality and People Regional State (SNNPRS). The Zone is bordered on the south by Alaba special woreda and the south west by Hadiya, East by the Oromia region, on the north by Gurage zone. The zone's main town (Worabe) is located on the road to Hosanna, just 172 km from Addis Ababa and it has 10 districts and 3 administrative town.

Different types of livestock populations are found in the area. From the total of 10,543,129 livestock population found in the region, 17% (1,793,033) are found in Silte zone. Out of this, 29.3% (525,178) are cattle of which 99.5% are local breeds with the remaining 0.5% (2,556) representing cross breeds. Cattle are used as a source of draft power, manure, milk, meat, and a source of income to the sale of animals. The main livestock feed sources in the area are natural pastures and crop byproducts including hay and teff and wheat straw zonal bureau of agriculture.

Sample size determination

From Silte zone, three districts (Dalocha, Lanfro, and Sankura) were selected using multistage stratified purposive sampling technique based on potentiality of the districts and proximity to animal handling crush and cattle population, number of availability of synchronization and, AI practice, attitude of farmers to adopt Oestrus Synchronization and Mass Insemination (OSMI) technology, accessibility, and availability of infrastructure. The number of farmers involved in the OSMI was identified from district record data.

Design of experimental animal

For convenience, the current study was carried out on a total of 130 local and crossbred cows selected purposively. 87 local and 43 crossbreds of cows were selected purposively from the 3 districts. Pre-conditions fulfilled by the selected cows for estrus synchronization before the practically started. Body condition score range from 2 to 5 on a scale of 1 to 5. Rating the body condition was done subjectively based on fat cover and flesh over the rips, loin and tail head. Prior to the start of the experiment, status of reproductive problem of cows was confirmed by artificial inseminator through rectum palpation. Animals that included to experiment they possess mature corpus luteum on either of ovaries.

Laboratory experiment

To identify the failure of Conception Rate, from Dalocha (23), Lanfro (33), and Sankura (37) straw semen were collected already distributed by zone livestock and fishery resource office. Thereafter, take to in National Animal Genetic Improvement Institute (NAGII) laboratory and checked motility and quality of semen.

Synchronization protocol and practical procedures

Tested and qualified HF (Holstein Cow) straw semen bought from NAGII and used for insemination purpose in Lanfro, Dalocha and Sankura districts. Training was given for AITs before the research was performed about how to palpate and the presence of Corpse Lutetium (CL) before the cow to be inject hormone to prevent abortion due to hormone treatment and ovarian dis functionality. Among 130 cows, from Dalocha (50), Lanfro (50) and Sankura (30) cows were selected purposively based on body condition, age, health status, and absence of pregnancy during synchronization and injected (2 ml) PGF2 α intramuscular single injection of the PGF2 α hormone, and inseminated fixed time AI. The female's animals which were diagnosed to be cycling with the presence of functional CL was determined through rectal palpation by AI technician. Finally pregnancy diagnosis was carried out at 4 months of post-artificial insemination by rectal palpation and recorded. The questionnaire was administered to the AI technicians and livestock expert which was focused on the factor affecting Conception Rate in OSMI program.

Effects of work experience of AITs on CR

To determine the effects of AITs work experience on Conception Rate, Artificial Insemination Technicians (AITs), were classified in to three groups thereafter they inseminated six cows per each AITs based on their work experience using already selected cows in the three districts in the same semen and environment.

Collected data

Breed type, semen, number of hormone treatment responded cow, Conception Rate, factor affecting Conception Rate in OSMI program from 9 AIT and 4 livestock expert were collected.

Data analysis

The data were interred in Microsoft Excel and SPSS, checked, and analyzed by descriptive statistics using SPSS and SAS computer software program (versions 20 and 9) respectively. Quantitative data obtained from the experiment was analyzed by using one-way ANOVA. Whereas qualitative data analyzed by chi-square using cross tabulation.

The Model used for Conception Rate in OSMI program of dairy cows:

$Yij=\mu+ai+ei$

Where,

Yij=Observed values of semen quality (motility, viability) on Conception Rate in OSMI program)

μ=Overall mean

ai=Random effect of ith districts (i=3: Dalocha, Lanfro and Sankura)

ei=residual error

The Model used for Conception Rate in OSMI program of dairy cows for bull breed effect:

Yij=μ+bj+ej

Where,

Yij=Observed values of semen quality (motility, viability) on Conception Rate in OSMI program)

μ=Overall mean

bj=fixed effect of jth sire breed blood level (j=3: 50%, 100% HF exotic breed and Jersey)

ej=residual error

Conception and oestrus response rate determination:

Conception Rate CR(%)=(Number of conceived cows/heifers)/(Number of inseminated cows/heifers) × 100

Oestrus Rate (OR) (%)=(Number of treated cows/heifers)/(Number of responsed cows/heifers) × 100

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

RESULTS

Evaluation of oestrus response and CR

The results pertaining to the oestrus response and CR using single injection PGF2 alpha are presented in *Table 1*. The study shows that most of hormone treated cows show responsive. About 44.6% of cows were not response after PGF2 α treated. Furthermore, the conception and Oestrus Rate were significantly different across the study areas of Dalocha (D), Lanfro (L), and Sankura (S). The studies further indicate that most of inseminated cows were not conceived. The results pertaining to that among 130 numbers of inseminated cows were 72 of them responsive. Whereas the remaining cows did not show heat, signs as a result they were not inseminated as shown in *Table 1.*

The effect of breed on estrus response and CR

The findings as presented in *Table 2* show that there were significance differences in oestrus response and Conception Rate between native and cross cow breeds across the studied locations. The results further indicate that the percentage of CR between breeds was too varied ($p<0.001$), i.e., cross cow which was higher ($p<0.001$) in CR.

Effect of district and breeds on semen quality

Effect of districts on semen quality: The results indicated that the quality of semen after laboratory results was presented in *Table 3*, per district. As indicated by *Table 3*, there was a significance difference between districts in semen quality. Depend on motility, Dalocha district was lower as compared to the remaining two districts as indicated.

Effect of breed on semen quality: The current result shows that the quality of semen was significantly difference per breed. As indicated by *Table 4*, Jersey breed semen was lower motility as compared to Holstein Frisian and Holstein Frisian cross with Borena breed semen motility. Depend on semen motility of breed, was higher motility than Jersey and Holstein Frisian breeds as indicated.

Overall summary of semen quality evaluation based on motility standard per district

The result was shown that the summary of semen quality presented in *Table 5* the overall percentage of semen quality (85.7%) of semen sample was pure and standard and above the standard motility quality on the other hand 14.3% was below the standard semen motility quality as identified in NAGII of laboratory. Semen quality was a significance difference ($p<0.05$) across in the study districts. The standard and above the standard motility of bull semen was (65.22%) in Dalocha (100%) in Lanfro compared to Sankura (89.19%) districts in the study area.

Cause of failure in CR in synchronization and mass insemination program

The findings in *Table 6* further indicated that, low number of AIT and mass number of cows provide during OSMI program, lack of awareness about heat detection of farmers and cows did not properly managed after hormone and semen administrated were ranked 1-3 those indicate that the major limiting factors across the study areas reported by artificial inseminator and livestock expert. It show that over stressed during OSMI program this is the evidence listed below table.

Effect of AITs work experience on CR in OSMI program

The result indicated in the *Table 7* pertained that the effect of work experience of Artificial Insemination Technician (AIT) was statistically significantly difference across the three AITs based on work experience in Sankura district. Based on their work experience, they inseminated individually 6 cows per AITs. As a result, AIT1 from 6 inseminated, cows no one cows were conceived, but he has 4 years' experience in Sankura district. This shows that there were AITs efficiency difference rather than work experience.

The result showed in the *Table 8* concerned that the effect of work experience of AITs on CR was statistically significantly difference between AITs 1 and 2 in Dalocha district. In same way AITs 2 differ with AITs3 on CR in Dalocha district. AIT1 and AIT3 have better performance as compared to AIT2 but their work experience was differed as a result the CR was not based on work experience in Sankura district. AIT3 has 2 year experience from the total inseminated cows two cows were conceived, but he has lower work experience as compared AIT1 and AIT2.

The results reported in *Table 9* show a dependence of the CR on inseminator work experience related factors as well as those of the efficiency of them. Indeed, the CR varies significantly by AITs ($p<0.02$) in Lanfro district.

Table 1: The overall conception and response rate of cows in silte zone per district

Description	Districts						Overall
	Dalocha		Lanfro		Sankura		
	N	%	N	%	N	%	
Number of hormone treated cows	50	100	50	100	30	100	100
Number of responsive cow (OR)	25	50	30	60	17	57	55.4
Number of inseminated cow	25	100	30	100	17	100	100
Number conceived cow (CR)	9	36	12	40	2	12	29.3
Note: OR: Oestrus Rate; CR: Conception Rate; N: Number of cattle							

Table 2: The effect of single dose PGF2α on estrus response and conception rate per breed

Breed type	N	Prostaglandin F2-alpha (PGF2α) treated cows	Responsive cow(OR)	Inseminated cow	Conceived cow(CR)
Native	87	87	40 (45.97)	40(45.97	9(22.5)
Cross	43	43	32(74.42)	32(74.42)	14(43.75)
Overall	130	130	72(55.38)	72(55.38)	23(31.94)
Note: The number outside the bracket is number of cows and inside the bracket is percent of OR and CR; OR:Oestrus Rate; CR:Conception Rate; N:Number of cattle					

Table 3: Analysis of variance table for semen motility affected by districts

Source of variation	Degrees of freedom	Mean square
Rep	37	157.27NS
District	2	1132.28**
Error	54	9368.77
Total	93	
Note: NS: Non-Significant; **:Significant at $p \leq 0.01$		

Table 4: Analysis of variance table for motility affected by breed

Source of variation	Degrees of freedom	Mean square
Rep	37	157.27NS
Breed	2	1132.28**
Error	54	9368.77
Total	93	
Note: NS: Non-Significant; **:Significant at $p \leq 0.01$		

Table 5: The overall summary of semen quality evaluation laboratory result per districts

Semen quality%	Districts						Overall
	Dalocha		Lanfro		Sankura		
	N	%	N	%	N	%	
Standard and above the standard motility	15	65.2	33	100	33	89.2	85.7
Below the standard motility	8	34.8	0	0	4	10.8	14.3
Total	23	100	33	100	37	100	100
Note: N: Number of straw semen							

Table 6: Ranks of 9 AITS (Artificial Insemination Technicians) and 4 livestock expert response on cause of failure of conception rate in OSMI (Oestrus Synchronization and Mass Insemination) program in the study areas

Parameters	Ranks of cause of failure of conception rate in OSMI program							
	1	2	3	4	5	6	Index	Rank
Low no of AIT and mass number of cow present during OSMI	47	41.1	1.9	10	0	0	0.25	1**
Lack of awareness about heat detection of farmers	10	21.8	38	23.7	3	3.5	0.194	3**
Cows not properly managed after hormone and semen treated	39	14.5	35.9	10.3	0	0	0.229	2**
Low feeding management practice	3	15	1.48	56	24.2	0	0.15	4
Semen quality	0.3	5.8	12.7	0	33.8	47.4	0.094	5
Lack of inseminator equipment	0.7	1.7	10	0	38.8	48.8	0.085	6
Note: **:Double stars indicates that more challenging problem; Index: The sum of (6 times first order+5 times second order+4 times third order+3 times fourth order+2 times fifth order+1 times sixth order) for individual variables divided by the sum of (6 times first order+5 times second order+4 times third order+3 times fourth order+2 times fifth order+1 times sixth order) for all variables								

Table 7: Effect of AITs work experience on CR (Conception Rate) in Oestrus Synchronization and Mass Insemination (OSMI) program in Sankura districts

Sankura district			
Name of AITs	**Work experience of AIT per year**	**PD+(%)**	**PD-(%)**
AIT1	4	0	6(100)
AIT2	2.3	2(33.3)	4(66.7)
AIT3	5	0	6(100)
Note: PD+: Pregnancy positive and PD-: Pregnancy negative; The number outside the bracket is number of cows and inside the bracket is percent; AIT: Artificial Insemination Technicians			

Table 8: Effect of AITs work experience on CR in OSMI program in Dalocha districts

Dalocha			
Name of AITs	**Work experience of AIT per year**	**PD+ (%)**	**PD-(%)**
AIT1	6	4(66.67)	2(33.33)
AIT2	3	1(16.67)	5(83.33)
AIT3	2	4(66.67)	2(33.33)
Note: PD+:Pregnancy positive and PD-:Pregnancy negative; The number outside the bracket is number of cows and inside the bracket is percent			

Table 9: Effect of AITs work experience on CR in OSMI program in Lanfro districts

Lanfro district			
Name of AITs	**Work experience of AIT per year**	**PD+ (%)**	**PD-(%)**
AIT1	2.5	3(50)	3(50)
AIT2	5	4(66.67	2(33.33)
AIT3	7	5(83.33)	-16.67
Note: PD+:Pregnancy positive and PD-:Pregnancy negative; The number outside the bracket is number of cows and inside the bracket is percent			

DISCUSSION

Hormonal response and CR

The current finding, using a single injection of Prostaglandin F2α protocol response rate was lower compared to (Tegegne A, *et al.*, 2012) who reported that 97.7% in Hawassa-Dale milk shade and 100% in Adigrat-Mekelle milk shade areas. Kebede A, *et al.* 2013 reported an Oestrus Rate was 89.3% in Bahir Dar milk shed; 72.3% Oestrus Rates reported in West Shoa zone by (Worku A, 2015; Gebrehiwot G, *et al.*, 2015) stated that 92.17% in Wukro Kilte Awulaelo district, in Northern Ethiopia. Moreover, using the same protocol with the current study, 55.4% Oestrus Rate was reported in eastern zone of Tigray region, Ethiopia (Gugssa T, 2015). This difference may be due to the current research performed under small holder farmer management system and nutritional status of cows per partum after oestrus synchronization influenced the CR and postpartum ovarian cycles reported by (Wildeus S, 2000). The difference may be due to animals reared in the intensive system showing higher pregnancy than extensively kept animals 13 (62%) and 40 (55.6%), respectively, as reported by (Chanyalew Y, *et al.*, 2018) and in addition, (Son DS, *et al.*, 2007) reported that lower CR resulted from various factors related to lactation status, postpartum interval, and herd nutrition and management.

The current study on CR (29.3%) was higher than 13.7% reported by (Kebede A, *et al.*, 2013) in Bahir Dar milk shed area. This finding was in close agreement with those of 32.17% was reported by (Gebrehiwot G, *et al.*, 2015) in Wukro Kilte Awulaelo district and (Nordin Y, *et al.*, 2004) that records 32% CR. On the other side this finding was contradicted with the finding of (Tegegne A, *et al.*, 2012) 57.7% in Hawassa-Dale milk shade, and in Adigrat-Mekelle milk shade 61.7% of pregnant animals was reported by (Gugssa T, 2015). According to the AITs response, constraints that associated with this lower rate of pregnancy in the study districts were related to semen quality, low number of AIT and mass, number of cows present during synchronization and mass AI, feeding management, inability of heat detection of farmers were some of the associated factors affecting CR.

The effect of PGF2 alpha on estrus response and CR per breed and district

The effect of prostaglandins on estrus response and CR per breed and district was presented in *Table 2.* District showed a significant ($p<0.05$) effect on CR. Both Dalocha and Lanfro districts showed higher CR than Sankura. This study was in agreement with the study of (Gebremichael D, 2015) in the central zone of Tigray. The difference per district might be the lack of awareness creation in Sankura about the estrus synchronization during the study period. Most of the farmers answered during the study that they provided noncling cows and not gave birth for a long period of time. In other case, the experience, commitment, and acceptance of the technology by the farmer might be attributed to the difference in Conception Rate in the study area.

The current finding pertained that the effect of PGF2 α on estrus response rate per breed was too varied ($P<0.05$), which means it is higher successful in cross-breed compared to native breeds. This is contradicted with the study of (Legesse D, 2016) that stated 87.9% native and 86.9% cross cows respond oestrus. However, there was no significance difference effect of prostaglandin on estrus response per district. The results further indicate that the percentage of Conception Rate between breeds which implied that CR in cross cows, was higher ($P<0.05$). The Conception Rate per district was higher ($P<0.05$) at Lanfro and Dalocha compare Sankura district.

Semen quality and factors affecting CR

The results as presented in *Tables 3-5* indicated that total, of ninety three straws of semen of different bulls as that of Silte zone were taken and

checked for qualification in NAGII laboratory for assessing the reasons why the synchronization and mass AI Conception Rate was so low, semen quality complained by farmers and AITs. The results indicated that there was a significant difference ($p<0.05$) in semen quality among the three districts including per breed. This finding was in line with (Ashebir G, *et al.*, 2016). However, a special case was observed whereby the average value of motility for semen obtained from Dalocha district was as low as 36.95%. Similarly, the average motility of semen obtained from Sankura district was 42.27% low compared to Lanfro district. Sire breed, or genotype had effect ($P<0.05$) on frozen semen motility, this is in agreement with the study of (Legesse D, 2016).

The overall results shown in *Table 6* about 85.7% of semen straw was good quality while 14.3% was under the quality standared. The reduction of semen quality maybe, transportation system, not timely top up of liquid nitrogen, breed type and not regularly checking up in the study district. Engidawork B studied that the motility of the same semen after freezing at the same center was 58.7%, on average 21.3% loss due to freezing (Engidawork B, 2018). After transportation and further storage at the regional AI service center, the average motility of frozen semen was further reduced to 49.4% (9.3% loss). The loss happened might be through differences in chilling and freezing environment, including the volume and temperature of liquid nitrogen storage and transportation of semen to the regional AI service center. As a result, not only low semen quality, and the fact that affect synchronization and mass AI fail in Conception Rate but also there were other factors like low number of AIT and mass number of cows present during synchronization and mass AI, lack of awareness about heat detection of farmers and cows did not properly managed after hormone and semen intake reported by AITs and farmers in the study districts. A study conducted by (Joint FA, 2005) indicated that if there are 40% or more of semen moving actively forward after freezing and thawing, the quality is acceptable for Artificial Insemination, which is consistent with the current study.

Effect work experience of AI technicians on Conception Rate

The finding showed that Conception Rate was not based on AIT, s work experience but there was significance difference regarding to AIT, s skills on Conception Rate, this is contradicted with the report of (Chanyalew Y, *et al.*, 2018) stated that there was great variation in terms of using different work places with the highest degree of conception success 76.9% for T3 followed by T4 (70%), T1 (54.6%) and T2 (27.3%) in North Shoa zone. The difference may be due to the technological application strategies, system of AITs, genotype of cows and farmer management system of cows after inseminated. The current finding was inclose agreement with the finding of (Mouffok C, *et al.*, 2019) who reported that Ins 1(63.4), Ins 2(19.5), Ins 3(6.7), Ins 4(6.0) and Ins 5(4.3) in percentage.

CONCLUSION

As pertaining to the results of this study, using single injection, prostaglandin PGF2-alpha was relatively effective to synchronize cows. The results further indicate that the percentage of Conception Rate between breeds was too varied ($P<0.05$). Cross cow was higher ($P<0.05$) in CR. The Conception Rate per district had no significance difference between Dalocha and Lanfro, but it is a significance difference between Sankura and the two districts. The lower percentages of Conception Rate which was observed in this study were associated with heat detection problems of farmers, low number of AIT and mass, number of cows provided during synchronization and mass AI, lack of awareness about heat detection of farmers, lack of inseminator equipment and cows did not properly managed hormone and semen intake reported by AITs and livestock expert.

We conclude that the current study results, shown that the causes of OSMI conception failure were not only semen quality but also the low number of AITs and mass number of cows provided during synchronization and mass AI, low feeding management practice and lack of awareness about heat detection of farmers were the major limiting factors. To improve the effectiveness of this technology, skilled and experienced technicians as well as capacity building of farmers in heat detection, qualified semen, and improved breed and husbandry practices were major concern.

RECOMMENDATIONS

- To improve OSMI conception and heat response rate the program must be done in a small scale and increase through time rather than mass cows provide at a time.
- Training and creating awareness for farmers must be giving before the OSMI program take place.
- Even if there were many challenging problem that cause of failure of OSMI in the study areas it is important to perform by community breeding program service.
- Skilled and experienced technicians as well as capacity building of farmers in heat detection, qualified semen, and improved breed and husbandry practices are the major concerns.
- It needs checked by other research cooperatively with zone livestock and fishery resource office and stakeholder together for better result by using double dose of PGF2-alpha treatment.

DECLARATIONS

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Authors' contribution

Sharew Mekonnen done the whole part of the research. Tigst Wondala and Mesobework kassa commented, edited and guidance of the research. All authors read and approved the final manuscript.

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Availability of data and materials

The datasets used and analyzed during the current study are available from the corresponding author on reasonable request.

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