



Research Paper

PROSTAGLANDIN (PGF₂ α) BASED OESTROUS SYNCHRONIZATION IN POSTPARTUM LOCAL COWS AND HEIFERS IN BAHIR DAR MILKSHED

Adebabay Kebede^{1*}, Getinet Zeleke², Yeshwas Ferede¹,
Temesegen Abate² and Azage Tegegne³

*Corresponding Author: **Adebabay Kebede**, ✉ adugsen@gmail.com

The study was conducted in Bahir Dar Zuria, Mecha and Dangila Districts of Bahir Dar milk shed with the objective of evaluating the effect of prostaglandin on oestrus synchronization of postpartum local cattle. Appropriate animal handling facilities were installed in a centralized location and all logistical arrangements were spelled out. There after a total of 534 primiparous, multiparous and nulliparous post partum local cattle (358 of parity 1 to 3 cows and 176 heifers) with good body condition > 4.0 were injected 5 ml prostaglandin intra muscular (Perry *et al.*, 2002 and Gokhan *et al.*, 2010). Within 2 to 5 days after injection, 477 postpartum local cattle in heat were inseminated artificially using 100% Holstein Frisian bull semen. The average weight of cows and heifers were 239(130-340) kg and 235 (143-308) kg, respectively. Pregnancy diagnoses were undertaken 3 months later through ovarian palpation and foetus size smaller than the suggested size at three months were regarded as bull pregnant. The mean number of cows/heifers responded to prostaglandin injection were 89.3% with a conception rate of 13.7%. Variations in both response to prostaglandin injection and conception rate was also observed due to a difference in parity and body condition. From the findings of this study it can be inferred that prostaglandin was effective to synchronize post partum local cows and heifers. In contrast, the rate of pregnancy was very low. Therefore, selection of dairy belts, farmers and cattle for synchronization should be done carefully. Moreover, strategic feed supplementation of synchronized cattle should not be neglected. Those cows that show standing oestrus should only be inseminated. The maximum expected heat detection date should be extended to 10 days not to miss delayed oestrus.

Keywords: Conception rate Prostaglandine, Synchronization, Oestrus

INTRODUCTION

Fertility is an important factor for the production and profitability in dairy herds (Gokhan, 2010). A

calving interval of 12 to 13 months is generally considered to be economically optimal, but often difficult to achieve. To meet this goal cows must

¹ Andassa Livestock Research center, PO Box 27, Bahir Dar, Ethiopia.

² Amhara Regional Agricultural Research Institute, P.O.Box 1790, Bahir Dar, Ethiopia.

³ International Live Stock Research Institute, P.O. Box No. 30709, Nairobi 00100, Kenya

cycle and become pregnant within an average of 85 days postpartum. Besides, the incorporation of efficient and accurate heat detection, proper semen handling and servicing techniques, and timely insemination relative to ovulation of the egg are also key factors. However, a long postpartum anoestrous period is a very common problem in cows reared in a tropical environment (Million, 2010). Estrus (heat) detection has been cited as the most important factor affecting the reproductive success of artificial insemination programs. However, proper control of the time of estrus is difficult, since peak estrus activity often occurs at night, and determination of the actual onset of standing estrus may be difficult without 24 h observation (Aulakh, 2008).

These days, prostaglandin is used to synchronize oestrus in dairy cattle operations to boost the efficiency of AI by inducing the regression of the corpus luteum (Murugavel *et al.*, 2010; Diaz *et al.*, 2005). Prostaglandin is the first method of heat synchronization that depends on the presence of a functional CL particularly in the diestrus stage of the estrous cycle (day 7 to 17 of the cycle) (Cordova-Izquierdo *et al.*, 2009). Its effectiveness usually affected by heat stress, asynchronous ovarian events exhibiting incomplete or delayed luteolysis, and weak or delayed estrous (Mgongo *et al.*, 2008; Lamb, 2010 and Dejarnette, 2004).

To this effect, the benefits of using technological options and approaches to improve supply of desirable animal genetic material that incorporates estrus synchronization and AI can be tremendous. These systems allow producers to reach certain production or economic goals quicker than natural service and can open the doors to value added markets as well by shortening and concentrating the calving and

breeding season; inducing anestrous cows and pre-pubertal heifers to cycle; introducing new genetics into the herd; increasing calf performance and weaning weights with earlier birthdates; enabling more cows to be artificially inseminated to a genetically superior bull and decreasing the labor cost for heat detection (Bambal, 2011)

Therefore to boost the dairy and meat industries, evaluation and demonstration of the effect of Prostaglandin on estrus synchronization under small holders' condition is indispensable.

OBJECTIVES

General Objectives

- To develop technological options and approaches that improves supply of desirable animal genetic material for dairy cattle.

Specific Objectives

- To evaluate the effect of prostaglandin on oestrus synchronization of postpartum local cattle.
- To assess the perception of smallholder dairy producer farmers.

MATERIALS AND METHODS

The study was conducted in Bahir Dar Zuria, Mecha and Dangila Districts of Bahir Dar milk shed. Prior to prostaglandin injection appropriate animal handling facilities were installed in a centralized location and all logistical arrangements were spelled out. Thereafter a total of 534 primiparous, multiparous and nulliparous post partum local cattle (358 of parity 1 to 3 cows and 176 heifers) with good body condition >4.0 were injected 5 ml prostaglandin intra muscular (Perry *et al.*, 2002 and Gokhan *et al.*, 2010). Within 2 to 5 days after injection, 477 postpartum

local cattle in heat was inseminated artificially using 100% Holstein Friesian bull semen. The average weight of cows and heifers were 239 (130-340) kg and 235 (143-308) kg, respectively. Pregnancy diagnoses were undertaken 3 months later through ovarian palpation and foetus size smaller than the suggested size at three months were regarded as bull pregnant.

Age of the cow, body condition of the cow, parity, last calving date, body weight, corpus luteum orientation, date and time of hormone treatment, date and time of oestrus detection, time of Sex fixer application, Bull No., Date and time of insemination, pregnancy rate, and Sex ratio of newborn cows were recorded. The data were analyzed using General Linear Model of SAS (1999).

Animal handling crash, Sex fixer (aulprofem); Prostaglandin (Lutalyse); Long sleeved gloves; Latex hand gloves, Needles (18" x 21); Drenching Gun; Syringes (5-10 ml); Sheath; Ear tag applicator; Ear tags and marker were the materials used in this study.

RESULTS AND DISCUSSION

The response of Prostaglandin and rate of pregnancy across districts

Local cattle in Dangila showed the highest rate of response to prostaglandin followed by Mecha and Bahir Dar Zuria districts. The oestrus rate of postpartum local cattle to PGF 2α found in this study is lower than the result obtained in Adigrat-Mekelle Milkshed, Tigray (99.5%) and higher than what was reported in Hawassa-Dilla Milk shed, SNNPR (76.1%) in a similar mass synchronization campaign (IPMS, 2011) and million, 2010 (67.3%). But, it was extremely higher than the results for

Brown Swiss (61.1%) and Holstein (50.8%) cows. The same was also true for Brown Swiss (54.6%) and Holstein Frisian in heifers (Diaz *et al.*, 2005) with two injections of PGF 2α 11 days apart. It also agrees with the results of Murugavel and his colleagues (2010) who confirmed 70 to 90% oestrus rate within 2 to 5 days when PGF 2α was administered to cows with a functional corpus luteum.

The mean oestrus interval of cows and heifers after injection were 51(6-98) and 50 (21-98) hours, respectively. The same result was reported by Million and his colleagues (2010). In contrast, the oestrus interval of cows found in this study (51 h) was lower for Boran (70.67 h) and its Holstein Frisian crossbred (54.58) cattle in prostaglandin synchronization with a protocol based on estradiol benzoate or gonadotrophin releasing hormone.

The highest rate of pregnancy was recorded for Mecha (14.53%) followed by Bahir Dar zuria (13.64%), leaving least rate of conception in Dangila district. The average rate of pregnancy (13.2%) recorded in this study is much lower than the national rate of pregnancy (27%) reported by Desalegn *et al.* (2010) and the preliminary results of mass synchronization in SNNPR (63%) and Tigray (62%) (IPMS, 2011). The rate of pregnancy was also less than the rate of pregnancy stated in the guideline, 50% of prostaglandin responsive cows and heifers should conceive and what was reported by million (2010) (47.5%). Such extreme discrepancy might be due to shortage of feed; heat stress, anoestrus cattle despite good body condition and exposure of synchronized cows for local bulls immediately after insemination as evidenced in our field visit.

Table 1: Variations in Oestrus Rate to PGF2 α and Pregnancy Rate Across Districts

Districts	N	NR	R (%)	Inseminated					Conception		Pregnancy Rate (%)
				DN	D	SL	T	M	P	B	
Bahir Dar Zuria	89	76	85.4	71	2	0	0	8	9	5	13.64
Mecha	345	303	87.8	289	4	1	2	7	42	33	14.53
Dangila	100	98	98.0	98	0	0	0	5	8	4	8.10
Total	534	477	89.3	448	6	1	2	20	59	42	13.17

Note: N= Number of Prostaglandin injected cows/heifers; NR=Number of cows/heifers responded to PGF2 α ; R (%) =Rate of response to PGF2 α ; DN=Number of diagnosed for pregnancy; D=Dead; T=transferred (sold/dowry/divorce); M=Missed and SL=Slaughtered.

Variations in Prostaglandin Response and Pregnancy Rate Due to Parity

Oestrus rate of cows to PGF2 α is 90.22% while, the oestrus rate of heifers was 87.5%. The average rate of pregnancy of local cows and heifers in the study districts was 13.31% and 12.86%, respectively. The overall mean oestrus rate was 89.32%, while, the overall mean rate of pregnancy of was 13.2%. The differences in oestrus rate within cows of different parity were slight. The same was also true for the difference between cows and heifers. But cows of different

parity had showed varied differences in the rate of conception. Slight difference had also been observed in the rate of pregnancy between heifers and cows.

Variations in Prostaglandin Response and Pregnancy Rate Due to Difference in Body Condition

A slight difference was observed in oestrus rate of postpartum local cattle of different body conditions. In contrast, cattle with body condition score of 5.5 have the highest rate of conception compared to others. Consistent with the

Table 2: Oestrus Rate to PGF2 α and Pregnancy Rate of Postpartum Local Cattle

Injected with PGF $_2\alpha$		NR	RR%	Inseminated				PD Status		Pregnancy Rate
Cows(Parity)	N			Diagnosed	Undiagnosed*			P	Bull	
				N	D	M	T			
1	135	121	89.63	117	3	2	0	14	14	11.97
2	143	128	89.51	120	1	5	1	19	12	15.83
3	80	74	92.50	71	2	2	0	8	1	11.27
Total	358	323	90.22	308	6	9		41	27	13.31
Heifers	176	154	87.5	140	0	11	0	18	15	12.86
Over all	534	477	89.32	448	29	59	42	13.17		

Note: *D=dead; SL=Slaughtered; M=missed T= transferred/ sold; N=Number of cows/heifers; NR=Cows/heifers responded to PGF $_2\alpha$; P=positive.

Table 3: Variation in Oestrus and Pregnancy Rate Due to variation in Body Condition

Injected with PGF ₂ α		NR	RR%	Inseminated					PD Status		Pregnancy Rate Bull
BCS	N			Diagnosed	Undiagnosed*				P		
				N	D	SL	T	M			
4.0	45	41	91.11	43	0	0	0	0	2	1	4.65
4.5	207	183	88.40	170	2	1	1	10	21	16	12.35
5.0	213	191	89.67	181	2	0	0	6	24	21	13.26
5.5	46	42	91.30	35	2	1	1	4	9	3	25.71
6.0	22	20	90.91	19	0	0	0	0	3	1	15.79
Total	534	477	89.32	448	6	1	2	20	59	42	13.17

Note: *D=dead; SL=Slaughtered; M=missed T= transferred/ sold; N=Number of cows/heifers; NR=Cows/heifers responded to PGF₂α; P=positive.

theoretical fact, the least rate of pregnancy was recorded for cattle with the least body condition score.

Variation Due to Technicians

There was great variation in terms of skill of technicians with the highest degree of conception success (20.47%) for T₂ followed by T₇ (16.28%) and T₃ (13.8%). The highest degree of success was achieved by experienced technicians from

Mekelle and Chagni Ranch in line with the prior expectation.

Variation Due to Semen Sources

In terms of degree of success of conception of semen from different bulls, Bull 10204 was the highest (15.41%) followed by bull 10211 (12.17%). The least figure was recorded for bull 10217.

Farmers' Perception

The farmers had confirmed that prostaglandin

Table 4: Variation in Conception Degree of Success Due to Technicians

Technicians(T)	N	Conception	Degree of success (%)
T 1	59	7	11.86
T 2	127	26	20.47
T 3	129	17	13.8
T4	13	0	0
T5	56	0	0
T 6	12	1	8.3
T 7	43	7	16.28
T 8	9	1	11.11
Overall	448	59	13.17

Table 5: Variation Due to Semen Sources

Bull No.	N	Conception	Degree of success (%)
10194	40	4	10
10204	201	31	15.42
10211	189	23	12.17
10217	18	1	5.56
Overall	448	59	13.17

was very effective in triggering oestrus despite low rate of pregnancy probably due to severe feed shortages, palpation and sex fixer stress. Farmer had also suggested that the time of synchronization should be in seasons with better feed availability especially at the beginning of October. Besides, they have emphasized that the heat detection period had to be prolonged to 7 to 10 days as most of their cows came to standing oestrous after the mass synchronization operation was winded up. The essentiality of monitoring after the Synchronization operation was also another remark made by the farmers. According to farmers saying, the technology also helped non cyclers cows even beyond 10 years long to cycle. In contrast, fewer cattle treated with sex fixer were overstressed which led to aggressiveness, loss in body condition and milk yield. Few farmers also underlined that Outbreak of foot and mouth diseases this year was also another factor contributed to least rate of pregnancy.

CONCLUSION AND RECOMMENDATION

From the findings of this study it can be inferred that prostaglandin was effective to synchronize post partum local cows and heifers. In contrast, the rate of pregnancy was very low. Therefore, selection of dairy belts, farmers and cattle for synchronization should be done carefully. Moreover, strategic feed supplementation of

synchronized cattle should not be neglected. Those cows that show standing oestrus should only be inseminated. The maximum expected heat detection date should be extended to 10 days not to miss delayed oestrus.

REFERENCES

1. Aulakh B S (2008), "In vivo Sex fixing in Dairy Animals to produce female progenies", Proceedings of the 15th congress of FAVA, pp. 243. Bangkok, Thailand.
2. Bambal A M and Jais Patel (2011), "To study oestrus synchronization in crossbred animals and buffaloes in Navsari district", MDTTC Vasudhara Dairy.
3. Cordova-Izquierdo A C A, Cordova-Jimenez M S, Cordova-Jimenez C G and Ruiz L J A (2009), "Oestrus synchronization and percentage of pregnancy in dairy calves using prostaglandins by two via of administration", *Australian journal of basic applied sciences*, Vol. 3, No. 3, pp. 2834-2837. Insinet publication.
4. Dejarnette M (2004), "Estrus synchronization: A reproductive management tool", Select Sires inc. www.selectsires.com. Retrieved on 31/07/2012.

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5. Diaz C A G, Ebru Emsen N Tuzumen, M yanar, M kutluca and Koycegiz F (2005), "Reproductive Performance and Synchronization of oestrus in Brown Swiss and Holstein Frisian cows and heifers using PGF2 α ", *Journal of Animal and Veterinary Advances*, Vol. 4, No. 5, pp. 551-553, Grace Publications.
 6. Gokhan D, Sariban M K, Fikret K and Ergun Y (2010), "The comparison of the pregnancy rates obtained after the ovysnch and double dose PGF2 α +GnRH applications in Lactating Dairy cows", *Journal of Animal and Veterinary Advances*, Vol. 9, No. 40, pp. 809-813, *Medwell Journals*.
 7. IPMS (Improving Productivity and Market success of Ethiopian Farmers) (2011), 14th Progress report. pp 11-12. Retrieved on 31/07/2012.
 8. Million T, Theingthan J, Pinyopummin A, Prasanpanich S and Azage T (2011), "Oestrus Performance of Boran and Boranx Holstein Fresian Crossbred Cattle Synchronized with a protocol based on Estradiol benzoate or Gonadotrophin-Releasing Hormone".
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