

USE OF PROSTAGLANDIN (PGF₂ α) TO INDUCE OESTRUS IN POSTPARTUM SAHIWAL COWS

M. AMJAD, M. ALEEM AND M. A. SAEED

Department of Theriogenology, University of Veterinary and Animal Sciences,
Lahore, 54000, Pakistan

ABSTRACT

Twenty-four postpartum Sahiwal cows that did not show oestrus upto 85 days postpartum were randomly divided into two equal groups, A and B. Group A cows were injected 2 ml Prostavet injection containing 5 mg Etiproston, a synthetic analogue of PGF₂ α (Virbac, France) intramuscularly at day 85 postpartum on chronological basis of calving dates without palpation. A second injection was given 11 days later to those cows that did not respond to first injection. A third injection was given at 118 days postpartum to those cows that had not responded to 1st and 2nd injection of PGF₂ α and did not show oestrus. The cows in group B were not given any treatment and served as control. The cows found in oestrus were artificially inseminated 12 hours after the detection of oestrus. The cumulative oestrus response was higher (66.66%) in group A than in group B (25%). Similarly, in group A the behavioral symptoms and physical changes were more pronounced as compared to group B. Mean (\pm SE) interval from treatment to onset of oestrus in group A was 96 ± 15.08 hours whereas, mean interval to oestrus from beginning of experiment was 25.0 ± 1.0 days in group B. Statistically non significant difference was observed in the mean duration of oestrus (23.25 ± 1.99 vs. 20.33 ± 1.45 hours) between animals of the two groups. However, a significant ($P < 0.05$) difference was observed for the mean calving to first oestrus interval (89 ± 0.62 vs. 110 ± 0.19 days) in groups A and B. From the results, it is concluded that PGF₂ α is useful for treatment of unobserved oestrus in postpartum Sahiwal cows.

Key words: PGF₂ α , induction of oestrus, postpartum, Sahiwal cows.

INTRODUCTION

Pakistan is an inhabitant of genetically superior cow breeds i.e. Sahiwal and Red Sindhi. Sahiwal cattle are well suited to the tropical environment of Pakistan. Their heat tolerance and tick resistance are some of the few qualities that make them ideal dairy animal of the tropics. Their milk yield is 1500-2200 liters per lactation, with fat contents of 4.5% (Shah, 1994). In spite of large population of cows, demand of milk in the country is not being met satisfactorily, particularly in summer season when the requirement is even greater, compared to the winter season. Low milk production during summer is attributed to the seasonal calving trend in buffaloes (which has major share in the milk production in the country). A period of anoestrus following parturition is a normal physiological event and the ovarian cyclicity resumes as the involution of uterus is completed. When postpartum anoestrus period exceeds 60 days, it increases the service period and consequently the calving interval and also makes dairying an unprofitable business.

The use of hormones is a major component of cattle reproduction. Prostaglandin F₂ alpha (PGF₂ α) is a potent luteolytic agent in cows and buffaloes and has been used successfully for induction of oestrus in cows that fail to show oestrus signs.

The present study was carried out to determine the role of PGF₂ α in inducing oestrus in postpartum Sahiwal cows that did not show oestrus upto 85 days after calving.

MATERIALS AND METHODS

Experimental animals

Twenty-four Sahiwal cows that failed to show oestrus upto 85 days postpartum were selected for this study. The parity of the cows ranged from 1 to 8. During the study period, the cows were allowed to graze during day and green fodder was provided *ad libitum* in the evening. All the cows were having uniform body condition. No concentrates were fed to these animals. The cows were divided into two equal groups (A and B: n=12/group) after considering parity, milk production, age and body weights. All the cows were kept under similar nutritional and managerial conditions during the experimental period.

Treatment

The cows (n=12) in group A received intramuscular injection of 2 ml prostaglandin F₂ α (Prostavet containing 5 mg of Etiproston, Virbac, France) at day 85 postpartum on the chronological basis of calving dates. Eleven days later, a second injection

of PGF2 α was given to those cows which did not show oestrus in response to the first injection. Third injection of PGF2 α was given at 118 days postpartum to cows which did not respond to first two injections. The cows (n=12) in group B were not given any treatment and served as control.

Oestrus detection

All the animals were monitored for the manifestation of oestrus symptoms three times daily i.e., at 6 am, 2.00 pm and 10.00 pm for six days after each injection by parading a teaser bull. The cows were also monitored both for behavioral symptoms (frequent urination, bellowing, raised tail, restlessness and licking of external genitalia by other animals) and physical changes (vulvular oedema and mucus discharge) of the reproductive tract. The animals were examined rectally to confirm the oestrus phase.

The time from the injection of prostaglandin to the onset of oestrus was recorded in hours. Duration of oestrus was taken in hours from the time of first receptivity (standing firm) of a cow for teaser bull (time of onset of oestrus) to the time of refusal to teaser bull (end of oestrus).

Artificial insemination

Cows showing signs of true oestrus were inseminated 12 hours after the onset of oestrus. For this purpose, frozen-thawed semen (0.25 ml straw) of one bull was used for all the experimental cows and all inseminations were performed by the same technician.

Statistical analysis

Data pertaining to the postpartum interval to estrus and duration of estrus were analyzed by using unpaired t-test (Steel and Torrie, 1982). Estrus response and frequency of different symptoms of estrus were expressed in percentage.

RESULTS

Oestrus response

In group A, two cows out of twelve showed signs of estrus after the 1st injection of PGF2 α . The 10 cows, which did not respond to 1st injection, received 2nd injection 11 days after first injection (96 days postpartum). Four cows out of 10 exhibited oestrus behavior in response to this treatment. Six remaining cows were administered 3rd PGF2 α injection at day 118 postpartum and 2 of them responded positively. The oestrus response in group A after 2nd injection was 50% and the overall response to oestrus in this group after third injection was 66.66% (Table 1). Four animals did not respond to either first, second or third injection. In group B, three out of twelve cows (25%) exhibited oestrus during the experimental period (Table 1).

Interval to onset of oestrus

In group A, the mean (\pm SE) interval from PGF2 α injection to the onset of oestrus was 96 \pm 15.08 hours. The average intervals to oestrus after first, second and third injections were found to be 72, 126 and 60 hours, respectively. In group B, mean interval to onset of oestrus from beginning of experiment was 25 \pm 1.0 days (Table 1). The mean (\pm SE) postpartum period from calving to first oestrus was 89 \pm 0.62 and 110 \pm 0.19 days in groups A and B, respectively and the difference was statistically significant ($P < 0.05$, Table 1).

Duration of oestrus

The mean (\pm SE) length of oestrus in animals of group A was 23.25 \pm 1.99 hours, whereas it was 20.33 \pm 1.45 hours in group B. The difference in duration of oestrus between the two groups was non-significant (Table 1).

Table 1: Values for various parameters of study in postpartum Sahiwal cows of two groups

Parameters	Group A (n=12)	Group B (n=12)
Oestrus response (%)	66.66	25.00
Interval to oestrus after treatment (hrs.)	96.00 \pm 15.08	-
Interval to oestrus after start of experiment (days)	-	25.00 \pm 1.00
Duration of oestrus (hrs.)	23.25 \pm 1.99	20.33 \pm 1.45
Interval from calving to onset of oestrus (days)	89.00 \pm 0.62*	110.00 \pm 0.19*

*Values in the same row differ significantly ($P < 0.05$).

Symptoms of oestrus

The incidence of behavioral symptoms was higher in the animals of the treated than control group whereas, for physical changes there was not much difference between the two groups. Data pertaining to behavioral symptoms and physical changes in the reproductive tract during oestrus are presented in Table 2.

DISCUSSION

On the basis of results obtained in the present study, the overall oestrus response in group A was higher than in group B (66.66 vs. 25%). This indicates that cows injected with prostaglandin 11 days apart have better oestrus response, since by the time of second injection most of cows had functional corpus luteum. The findings of Stum (1983), MacLoughlin *et al.* (1987), Santos *et al.* (1988) and Mosesov and Ibragimov (1991) are comparable to the findings of this study, as these workers reported oestrus response as 55, 62.2, 66.7 and 64.32%, respectively after the second injection of PGF2 α . However, Turman *et al.* (1975), Godfrey *et al.* (1991) and Wiggin *et al.* (1991) reported higher oestrus response of 92.2, 85.00 and 83.33% after the second injection of PGF2 α , respectively. The differences might be due to differences in age and physiological stage of the animal at the time of

Table 2: Behavioral symptoms and physical changes in the genitalia at oestrus in postpartum Sahiwal cows of two groups

Behavioral symptoms	Group A (n=8)		Group B (n=3)	
		%age		%age
Standing heat	5	62.50	1	33.33
Frequent urination	4	50.00	1	33.33
Raising of tail	5	62.50	1	33.33
Bellowing	6	75.00	2	66.66
Restlessness	4	50.00	1	33.33
Licking of external genitalia by other animals	8	100.00	2	66.66
Physical changes				
Uterine tone	8	100.00	3	100.00
Mucus discharge	8	100.00	2	66.66
Swollen vulva	7	87.50	3	100.00

treatment, season of the year and dose and chemical nature of PGF2 α used. Moreover, low oestrus response in this study may be due to nutritional effect because of scarcity of fodders during early summer days due to late cuts of berseem and high ambient temperature. This inadequate feed results in low body condition scores, and may adversely affect the follicular growth and ovulation.

The results of present study revealed that mean interval to onset of oestrus after PGF2 α treatment was 96 \pm 15.08 hours in group A. The average intervals to oestrus in group A after first, second and third injection were 72, 126 and 60 hours, respectively. Previously Roche (1974), Smith (1976), Schaneemann (1983), Santos *et al.* (1988), Whittier (1989) and Thakur *et al.* (1990) have reported an average interval to onset of oestrus as 96, 94, 93.3 \pm 6.1, 96, 120 and 79.1 hours, respectively, which are similar to the findings of this study.

However, Oh *et al.* (1986) and Parez and Florin (1992) reported average interval of 56.0 \pm 12.74 and 50.4 \pm 4.9 hours, respectively, which are less than that of the present study. Turman *et al.* (1975) and Dhoble and Gupta (1987) reported average interval to oestrus of 8 and 20.58 days, respectively. These differences can be attributed to differences in breed, climate, method and frequency of estrus detection, presence of large follicle at the time of treatment, body condition and milk yield of the animal.

In the present study, non-significant difference was observed between the groups A and B for the duration of oestrus (23.25 \pm 1.99 vs. 20.33 \pm 1.45 hours). This

indicates that prostaglandin treatment does not affect the duration of estrus. These results are in agreement with the observations of Kanai and Shimizu (1983), who reported oestrus duration of 17.3 \pm 4.6 hours (range from 9 to 24 hours) in swamp buffaloes and Chaudhry (1985), who reported oestrus duration of 24.7 \pm 1.6 hours in Nili-Ravi buffaloes. Chenault *et al.* (1976) and Parez and Florin (1992) found that average duration of oestrus was 10 and 10.6 hours, which were lower than those of the present study. The differences may be due to the variation of species, breeds, postpartum days and different methods use to record these observations.

Conclusion

On the basis of the results of the present it is concluded that PGF2 α can be used for treatment of unobserved oestrus in postpartum Sahiwal cows.

REFERENCES

- Chaudhry, M. A., 1985. Studies of postpartum buffaloes, changes in reproductive organs and onset of oestrus after parturition. MSc Thesis, Dept. Anim. Reprod., Univ. Agri., Faisalabad, Pakistan.
- Chenault, J. R., W. W. Thatcher, P. S. Kalra, R. M. Abrams and C. T. Wilcox, 1976. Transitory changes in plasma progesterone, estradiol and luteinizing hormone approaching ovulation in the bovine. *J. Dairy Sci.*, 58(5): 709-717.
- Dhoble, R. L. and S. K. Gupta, 1987. Induction of oestrus and ovulation with prostaglandin F2 alpha analogue in postpartum oestrus buffaloes. *Indian J. Anim. Sci.*, 57(4): 290-291.
- Godfrey, R. W., D. D. Lunstra, J. A. French, J. Schwartz, D. L. Armstrong and L. G. Simmons, 1991. Oestrus synchronization in the Guar; behavior and fertility to artificial insemination after prostaglandin treatment. *Anim. Breed. Abst.*, 59(5): 435.
- Kanai, Y. and H. Shimizu, 1983. Characteristics of oestrous cycle of the swamp buffalo under temperate conditions. *Theriogenology*, 19: 593-602.
- Macloughlin, R., A. Gualdieri and M. Piergalin, 1987. Use of prostaglandin analogue for the control of silent oestrus. *Revista Argentina de Prod. Anim.*, 7(2): 213-217.
- Mosesov, S. G. and M. Ibragimov, 1991. Synchronization of oestrus in heifers in the arid zone of the Turkmen. *Anim. Breed. Abst.*, 61(2): 97.
- Oh, S. J., B. S. Yang, H. S. Kim, K. S. Lee and H. M. Oury, 1986. Studies of frozen embryo transfer in cattle. 1. Synchronization of oestrus with prostaglandin analogue. *Res. Report of Rural Dev. Admn., Livestock and Vet. Korea.*, 28(2): 6-13.

- Parez, V. and B. Florin, 1992. Synchronization of oestrus in heifers by means of a PGF₂ α analogue prior to embryo transfer. *Anim. Breed. Abst.*, 60(11): 858.
- Roche, J. E., 1974. Synchronization of oestrus and fertility following artificial insemination in heifers given PGF₂ α . *J. Reprod. Fertil.*, 37(1): 135-138.
- Santos, E. A., A. C. Warnick, J. R. Chenault, D. L. Wakeman and M. J. Fields, 1988. A novel approach for PGF₂ alpha oestrus synchronization in beef cattle. *Anim. Breed. Abst.*, 59(7): 636.
- Shah, S. I., 1994. *Animal Husbandry*, National Book Foundation, Islamabad.
- Smith, J. F., 1976. Use of synthetic prostaglandin analogue for synchronization of oestrus in heifers. *New Zealand Vet. J.*, 24(5): 71-73.
- Steel, R. G. D. and J. H. Torrie, 1982. *Principles and Procedures of Statistics: A Biometrical Approach*. 2nd Ed., McGraw Hill Int. Book Co., Tokyo, Japan.
- Stum, H., 1983. Control of the calving intervals in cattle through oestrus induction with prostaglandin analogues before the 40th day postpartum. *Anim. Breed. Abst.*, 53(9): 5746.
- Turman, E. J., R. P. Wettemann, T. D. Rich, D. Lyons, W. E. Sharp and R. R. Frahm, 1975. Synchronization of oestrus in beef cattle with prostaglandin. *Res. Report; Agri. Exp. Stat. Oklahoma State Univ., USA*. 94: 176-185.
- Thakur, M. S., B. K. Singh and A. K. Gaur, 1990. Fertility following oestrus induction in Murrah buffaloes with different routes of PGF₂ α administration. *Indian Vet. Med. J.*, 14(4): 242-244.
- Whittier, W. D., F. C. Gwazdauskas and M. L. Mcgilliard, 1989. PGF₂ α usage in a dairy reproduction programme for treatment of unobserved oestrus, pyometra and ovarian luteal cysts. *Theriogenology*, 32(4): 693-704.
- Wiggin, L. S., E. Hepburn and C. G. Velez, 1991. Fertility in beef cattle following oestrus synchronization and artificial insemination. *Anim. Breed. Abst.*, 60(11): 862.