Effect of PGF2 alpha on Oestrus and Fertility rate in repeat breeder cows treated with Norgestomet-Oestradiol

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Abstract

A total of 48 repeat breeder cows were equally divided in to two treatment groups as NOR and NOR-PG and were treated with norgestomet ear implants on day 10 following natural oestrus and a control group. At the time of ear implant insertion, 2 ml of SMB injection was administered intramuscularly to all the cows. The implant was removed after 9 days. Cows in NOR-PG group were injected with 0.98 mg of PGF2a at the time of implant removal. In NOR and NOR-PG groups, AI was done at 48 and 72 hours of implant withdrawal. In control group, cows were artificially inseminated twice at 24 hours interval during natural oestrus. Blood samples were collected at the time of implant insertion and withdrawal in all the treated cows for progesterone assay. There was 100 per cent oestrus response following implant removal in NOR and NOR-PG groups. The conception rate obtain in NOR, NOR-PG and control groups were 43.75, 37.50 and 18.75 per cent, respectively. The overall mean level of progesterone (6.31±0.32 ng/ml) noticed at the time of implant insertion was significantly reduced to a lower level (1.38±0.16 ng/ml) by the time of its removal in treated cows. It is inferred that norgestomet–oestradiol alone without PGF2a may be used to augment fertility in repeat breeder cows under field conditions.

Key words: PGF2 alpha, Oestrus, Norgestomet, Oestradiol, Fertility Rate, Repeat Breeder Cows.

Introduction

One of the causes of repeat breeding might be an incomplete natural luteolysis thereby creating suprabasal progesterone concentrations and leading to asynchrony between onset of oestrus and ovulation which might result in fertilization failure or alteration in embryonic development (Duchens et al., 1995). Prostaglandins and Norgestomet ear implant treatments have been found to be highly effective in regulating oestrous cycle in dairy cows (Odde, 1990). Therefore, it was postulated that administration of prostaglandin following norgestomet ear implant treatment may improve conception rate in repeat breeder crossbred cows. Hence, the present investigation was undertaken to study the effect of injection of PGF2a on estrus response and fertility in repeat breeder cows treated with norgestomet-oestradiol.

Material and Methods

Apparently healthy, parous crossbred cows which failed to conceive after three or more AIs were subjected to thorough gynecological examination and 48 cows which were free from any gross palpable abnormalities and obvious infections of the genital tract were randomly and equally assigned to two treatment groups as NOR and NOR-PG and a control group, each group comprised of 16 cows. Norgestomet ear implants (Syncromate-B, SMB system, Sanofi, Animal Health Inc., USA) containing 6 mg of synthetic progesterone (norgestomet) were inserted subcutaneously in the middle third of the outer surface of the pinna of the ear in all the cows of NOR and NOR-PG groups using an applicator on day 10 following natural oestrus. At the time of ear implant insertion, 2 ml of SMB injection (Sanofi, Animal Health Inc., USA) containing 5 mg oestradiol valerate and 3 mg norgestomet was administered intramuscularly to all the cows. The implant was removed after 9 days. Cows in NOR-PG group were in addition injected with 5 ml (0.98 mg) of PGF2a (Iliren, Tiaprost, Hoechest India Ltd., India) at the time of implant removal. Oestrus was detected by visual observation of all the cows before and after treatment. Further, rectal examination was carried out to confirm the visual observation. In NOR and NOR-PG groups, AI was done at 48 and 72 hours of implant withdrawal. In control group, cows were artificially inseminated twice at 24 hours interval during natural oestrus. Rectal examination was carried out in all the treated and control cows at 60 days after AI to

confirm the pregnancy.

Oestrus response was calculated in percentage as number cows exhibited oestrus out of number of cows treated. First service conception rate was calculated in NOR and NOR-PG groups as number of animals conceived at induced oestrus divided by number of animals treated and was expressed in percentage. Similarly, in control group, first service conception rate was calculated following AI at natural oestrus. Blood samples were collected at the time of implant insertion and withdrawal in all the treated cows for progesterone assay. Serum was separated by centrifuging the clotted blood at 3000 rpm for 10 minutes. The serum samples were stored at -80.C until progesterone assay which was carried out using progesterone RIA kit (PROG- CTK – 4; DiaSorin, s.r.l. Saluggia (vc), Italy) employing solid phase Radioimmunoassay technique. The radio activity was measured in I125 gamma counter.

Results and Discussion

In the present investigation, 100 per cent oestrus response was obtained in NOR and NOR-PG groups. This was in agreement with the findings of Lokhande et al. (1983) and Odde (1990) in norgestomet and oestradiol valerate treated cows. However, marginally lower oestrus responses of 80 to 90 per cent were reported in earlier studies (Pratt et al., 1991 and Cavalieri et al., 1997). The effectiveness of norgestomet in this study might be attributed to the combined effects of progestagen priming on the brain and the direct effect on the hypothalamus by both exogenously administered oestrogen and the high concentration of oestrogen that occurred in association with use of norgestomet- oestradiol (Cavalieri and Fitzpatrick, 1995). Further none of the cows in this study exhibited oestrus during the implant period. Norgestomet was found to have approximately 300 folds more biological activity than natural progesterone in the dairy cows (Barnes et al., 1981). This might be the reason for the effective control of estrus during the implant period in norgestomet treated cows in NOR and NOR-PG groups. Therefore, it was concluded that norgestomet plus oestradiol or norgestomet -estradiol valerate in combination with PGF2a were effective to induce oestrus in repeat breeder crossbred cows. In this study, since all the cows treated in NOR and NOR-PG groups showed 100 per cent oestrus response, the PGF2a injection at the time of implant removal had no significant effect and might not be necessary as suggested by Cavalieri et al. (1997).

The conception rate obtained in NOR, NOR-PG and control groups were 43.75, 37.50 and 18.75 per cent, respectively. More or less similar conception rate was obtained in earlier studies in norgestomet (Hixon et al., 1981) and norgestomet- PGF2a treated cows (Whitter et al., 1986). Many investigators recorded that the first service conception rate ranged from 33 to 68 per cent in norgestomet treated cows (Odde, 1990 and Cavalieri and Fitzpatrick, 1995). The conception rate in this study was found to be higher in NOR and NOR-PG groups compared to control group (18.75 per cent). This increased conception rate might be due to the fixed time breeding of norgestomet treated cows (Cavalieri et al., 1997) and altered secretion of oestrogen and progesterone (Gupta et al., 1998).

However, failure of conception in other cows in this group might be related to altered secretion of LH and hypoluteal function following norgestomet treatment as described by Rentfrow et al. (1987), abnormal time of ovulation in relation to oestrus (Odde,1990) and other possible causes of repeat breeding syndrome in these cows. The induction oestrus and breeding at fixed time might have helped in eliminating errors in oestrus detection and possibly in bringing more favorable hormonal and uterine milieu and might resulted in increased conception rate in these two groups. Although in NOR-PG groups, PGF2a was injected at the time of implant withdrawal it did not have any effect on either oestrus response or on fertility rate as described by Cavalieri et al. (1997). In the present study, NOR group had improved fertility rate in repeat breeder crossbred cows when compared to NOR-PG and control groups. . It clearly indicated that injection of PGF2a at the time of implant withdrawal did not help to improve fertility in repeat breeder cows. Since, norgestomet- oestradiol treatment showed vastly improved conception rate, it was concluded that norgestomet-oestradiol alone might be used in repeat breeder crossbred cows to enhance fertility.

The mean levels of serum progesterone at the time implant insertion and withdrawal in cows which became pregnant were 7.19±0.46 and 1.45±0.24 ng/ml. The corresponding values in non-pregnant cows were 5.24±0.43 and 1.29±0.20 ng/ml, respectively. The difference in the concentration of progesterone between pregnant and non-pregnant cows both at the time of insertion and withdrawal was statistically significant (P>0.01). The overall mean level of progesterone (6.31±0.32) noticed at the time of initiation of treatment in animals studied was significantly reduced to a lower level (1.38±0.16 ng/ml) by the time of implant removal in pregnant and non-pregnant cows. Similar trend was also noticed in previous studies in norgestomet treated cows (Cavalieri and Fitzpatrick, 1995). The drastic reduction in progesterone concentration at the time of implant removal indicated the luteolysis of the corpus luteum following treatment with norgestomet-oestradiol proving that the injection of PGF2a at the time of implant removal was unnecessary. The higher concentration of progesterone observed on the day 10

of the previous cycle in pregnant cows (7.19±0.46) compared to non-pregnant cows (5.24±0.43 ng/ml) was in accordance with the findings of Breuel et al. (1989). Folman et al. (1973) reported that the progesterone level during the oestrous cycle preceding insemination was closely related to the occurrence of conception. Hence from this study, it is inferred that norgestomet –oestradiol alone without PGF2a may be used to augment fertility in repeat breeder cows under field conditions.

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