

SYNCHRONIZATION OF OESTRUS WITH PROSTAGLANDIN F_{2α} IN HOLSTEIN COWSS Lopez-Barbella, C Falon¹ and N Martinez

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In a study of PGF_{2α} as an oestrus synchronization agent, a total of 50 cycling post partum Holstein cows was examined per rectum to verify that reproductive tracts were normal and that whether a corpus luteum or follicles were present. Thirty of these animals were injected twice intramuscularly with 33.5mg PFG₂ - Tham Salt (Upjohn) at a 12 d interval. All animals were observed twice daily for signs of oestrus. Cows were inseminated 12 hr after detection of the PGF_{2α} induced oestrus or natural oestrus (Control). The efficacy of dual administration of PGF_{2α} for synchronizing oestrus was observed in 80% of the treated Holstein cows. There was a non-significant ($P < .10$) shortening in the interval from treatment to oestrus after the second dose of PGF_{2α} (44.4 ± 15.8 vs 39.3 ± 15.2 hr). Fertility of the PGF_{2α} induced oestrus was significantly ($P < .05$) lower than the control group (30 vs 45% respectively). However, this difference was diminished when it was compared with the fertility of the first post-experimental period oestrus (56.6 vs 60.0% respectively). It is concluded that more endocrinological studies are required to devise means of increasing the fertility of the first PGF_{2α} induced oestrus.

Key words: Cattle , fertility, prostaglandins

Numerous experiments have demonstrated that Prostaglandin F_{2α} (PGF_{2α}) a luteolytic hormone whose effectiveness as a synchronizing agent of oestrus in cattle is shown in those stages of the oestrus cycle in which there is an active-corpora luteum in the ovaries (Rowson et al 1972). With the aim of exceeding the critical days, Inskeep (1973) suggested a hormonal procedure in which animals received two doses of PGF_{2α} at an interval of 10 to 12 d. Later experiments have shown that this procedure works and that the resulting fertility is comparable with that of a control group (Cooper 1974; Hafs 1975). In Venezuela, there is no information relating to the use of PGF_{2α} as an oestrus synchronizing agent. The objective of this study therefore, was to demonstrate the feasibility of using this hormone for synchronization of oestrus in Holstein cows.

Materials and Methods

50 Holstein cows of known fertility and more than 45 days post-partum were palpated per rectum to verify that the reproductive tracts were normal and that follicles and/or corpora lutea were present in the ovaries. Thirty of these animals were injected twice intramuscularly, with 33.5mg PGF_{2α} Tham Salt (Upjohn), at an interval of 12 days between the two hormonal doses; the remaining 20 cows formed the untreated control group. The animals were observed twice daily for signs of oestrus with the help of a nymphomaniac cow; they were artificially inseminated 12 hr after the appearance of oestrus. Pregnancy was determined by rectal palpation at 45 d post-service. Comparison of the means was made using a simple t-test.

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Results and Discussion

The efficacy of a double administration of PGF 2α for the synchronization of oestrus is shown in Table 1. As was expected only 70% of the cows were synchronized with the first dose of PGF 2α . It is very well established that PGF 2α is not effective during the first five days of the oestrus cycle; therefore in a proportion of cycling cows, potentially 75% of the animals (based on a cycle of 21 d) will respond when this drug is administered on a day of the oestrus cycle selected at random.

Table 1 :
Responses to a double injection with Prostaglandin F 2α

	Synchronization and/or detection of oestrus (%)	Appearance of oestrus (hr)
After first injection	70	44.4 \pm 15.8 ¹
After second injection	80	39.3 \pm 15.2 ¹
Control	85	

¹ X \pm SE

The 10% increase in the percentage of animals which showed heat after the second dose of PGF 2α is considered a normal response under this hormonal regime (Hafs 1975; Fields et al 1977; Lopez 1977). The structural regression of the corpus luteum was shown in a period of 44.4 \pm 15.8 and 39.3 \pm 15.1 hr after the first and second doses of PGF 2α respectively. Cupps et al (1976) reported that the administration of PGF 2α in previously synchronized heifers controlled the interval and reduced the variability in the onset of oestrus in addition to increasing the number of animals which were showing heat. Dobson et al (1975) suggested that the second induction of luteolytic hormone would allow the wave of follicular growth caused by the first dose of F 2α to progress and ovulate instead of regressing. Rajakoski (1960) reported that this type of follicular growth originating at 4 d post-oestrus culminates in a simple follicle in the 10th or 12th d of the cycle. This suggests that the presence of a corpus luteum, and therefore the absence of a decreasing wave of luteinising hormone, brought about, as a result, the atrophy of the follicle. One of the explanations for the phenotypic response to the second injection of PGF 2α may be supported by the observations reported by Dobson and Rajakoski.

Table 2:
Comparison of pregnancies to the first service during and after the experimental period.

Experimental group	First experimental oestrus		First post-experimental oestrus
	% of synchronized	% of total	% of total
PGF 2α	37.5	30	56.6
Control	52.9	45	60.0
Probability	0.01	0.05	

Comparison of the pregnancy percentages during the experimental period in the first post-treatment oestrus can be seen in Table 2. As can be appreciated the percentage of animals which conceived during the oestrus corresponding to the experimental period was significantly better (P < .05) for the control group (45%),

When these percentages were calculated on the basis of the number of animals inseminated during the experimental period, the difference in pregnancy rate between both groups becomes more significant (52.9 vs 37.5% for the control and PGF $_{2\alpha}$ group respectively). Nevertheless, the superiority of the control group over the hormone treated group is greatly reduced when we compare the pregnancy percentage (60 vs 56.6% respectively) after the first post experimental oestrus. These data agree with those reported by Lauderdale et al (1974), Roche(1974) and Hafs et al (1977). Lopez (1977) suggested that the lower fertility obtained during the first oestrus, induced by a double injection of PGF $_{2\alpha}$ may be due to stereotypic ovulation resulting from an advance of 12 hr in the pre-ovulatory level of the luteinising hormone.

Conclusions

The accumulated data in this experiment show that the hormonal procedure which was followed was suitable for synchronizing the oestrus in 80% of the animals in a space of 15 d. Although the fertility of the oestrus subsequent to the experimental period was not suppressed by the use of the PGF $_{2\alpha}$, that corresponding to the induced oestrus for the hormonal treatment only favoured 35% of the injected animals. In conclusion another alternative type of procedure must be studied to guarantee an improved efficiency in the use of PGF $_{2\alpha}$ for the synchronization of oestrus at the farm level. Equally, experiments must be directed towards elucidating the causes of low fertility in induced oestrus following a double dose of PGF $_{2\alpha}$.

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