

OESTRUS CONTROL IN CATTLE USING PROSTAGLANDIN F2 α

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The luteolytic action of prostaglandin (PGF2 α) on the *corpus luteum* has been demonstrated in many species (McCracken, Carlson, Glen, Goding, Baird & Samuelsson, 1972).

The efficacy of PGF2 α as an agent for controlling oestrus and ovulation in cattle has been described (Rowson, Tervit & Brand 1972; Lauderdale, 1972; Shelton, 1973; Henricks, Long, Hill & Dickey, 1974). However, oestrus response was variable and the precise timing of heat and ovulation was not established. Rao & Sharma (1973) demonstrated that an optical isomer of (+) INPEA (N-isopropyl-p-nitro-phenyl-ethanolamine hydrochloride) had a potentiating effect on the activity of PGF2 α when used on the isolated rat uterus. Moreover, injections of oxytocin or oestrogenic substances have been shown to inhibit functional *corpora lutea* and reduce the plasma progesterone level in cattle (Armstrong & Hansel, 1959; Kaltenbach, Niswender, Zimmerman & Wiltbank, 1964). The rationale for using potentiating agents was to improve the response to PGF2 α , thus making oestrus control a more practical proposition.

The purpose of this experiment was to test the efficacy of (+) INPEA as a potentiating agent to PGF2 α and to compare its action with that of oestradiol benzoate and oxytocin.

Forty cycling lactating cows were allocated to four equal treatment groups. Cows were observed to be in heat and were subsequently treated between days 5 and 16 of the oestrous cycle. Cows in Group 1 served as controls and each cow received 5 mg of PGF2 α .

Cows in Group 2 each received 5 mg of PGF2 α in addition to 1 gm of (+)INPEA. The (+)INPEA was mixed with the PGF2 α and deposited in the uterine horn ipsilateral to the *corpus luteum*. Cows in Group 3 each received 5 mg PGF2 α and 30 mg oxytocin intramuscularly.

Cows in Group 4 each received 5 mg PGF2 α and 5, 10 or 15 mg oestradiol benzoate (E₂B) intramuscularly.

The PGF2 α was administered into the uterine horn ipsilateral to the *corpus luteum* where possible. Heat was detected by examining cows three times daily for visual signs of heat. In those cows which did not allow penetration into the uterus, the PGF2 α was deposited in the cervix. All treated cows on heat were inseminated with frozen semen from a bull of known high fertility.

Occurrence of oestrus

The occurrence of oestrus after the various treatments is illustrated in Fig. 1. The most successful treat-

ment appeared to be with the oestradiol benzoate in conjunction with the PGF2 α , where 90% of the animals were in heat.

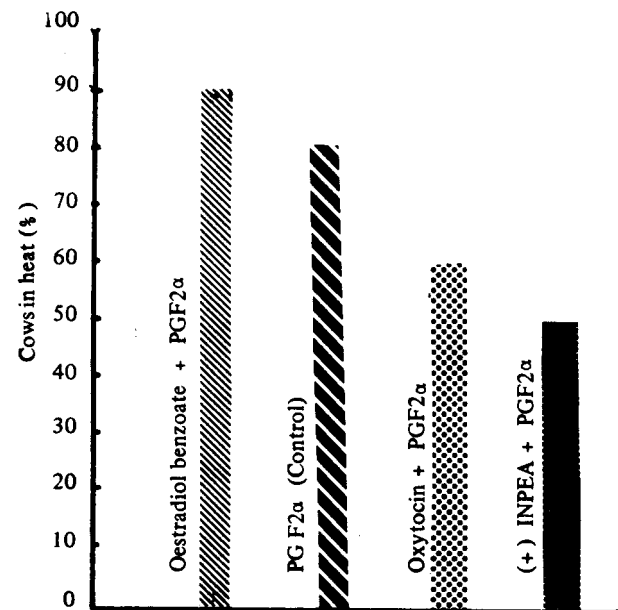


Fig. 1 The occurrence of oestrus in cows after treatment with prostaglandin F2 α (PGF2 α)

The group receiving (+) INPEA did not respond as expected from the *in vitro* studies of Rao & Sharma (1973). However, considerable difficulty was experienced in administering the (+)INPEA as it was difficult to maintain in solution. In addition to this fact, there were no guidelines to follow as to the time of administration.

The control and oxytocin groups gave satisfactory responses, but there appeared to be no advantage to be gained from the use of oxytocin over and above that of the control. Armstrong & Hansel (1959) demonstrated that frequent injections of oxytocin induced luteolysis in cattle. However, no information is available on the use of a single injection of oxytocin with PGF2 α .

Distribution of oestrus

The most disappointing aspect of the entire experiment was the widespread occurrence of oestrus after treatment with PGF2 α and the various potentiating or luteolytic agents (Fig. 2). This is in contrast to

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the work of Rowson *et al.* (1972) and Louis, Hafs & Morrow (1972), we reported that the majority of cows treated with PGF₂α exhibited oestrus within a three day period after treatment. There appeared to be no advantage from using any of the agents other than oestradiol benzoate and this advantage was negated by the erratic occurrence of heat and subsequent poor conception. The (+)INPEA appeared to be of little value in the precise timing of ovulation.

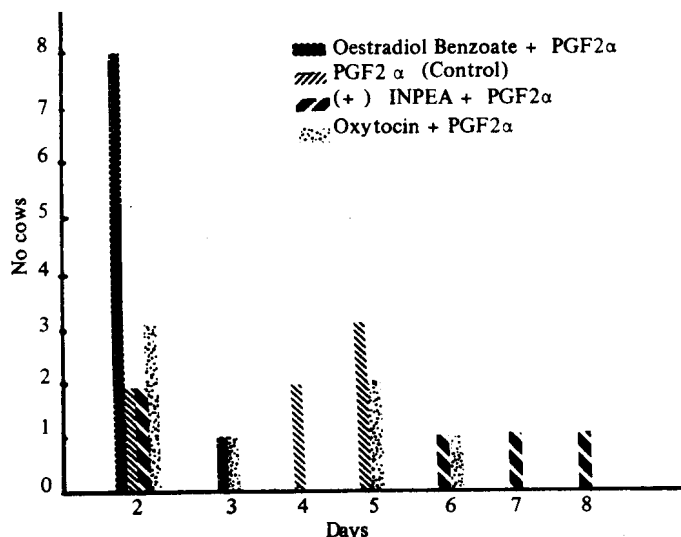


Fig 2 The distribution of oestrus in cows treated with prostaglandin F₂α (PGF₂α)

Route of administration

The PGF₂α was administered via the cervix into the horn ipsilateral to the *corpus luteum*. However, it

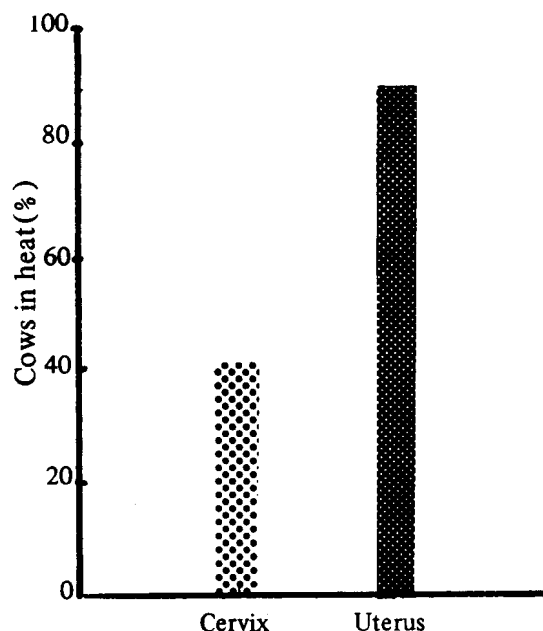


Fig. 3 The occurrence of heat in cows as affected by the route of administration of prostaglandin F₂α

was impossible to penetrate the cervix in some and consequently the PGF₂α was deposited in the cervix. The occurrence of heat in response to route of administration is presented in Fig. 3. It appears from these data that the route of administration is critical and that the PGF₂α must be placed in close apposition to the *corpus luteum*. Lauderdale, Seguin, Stellflug, Chenault, Thatcher, Vincent & Loyancano, (1974) demonstrated that PGF₂α when administered intramuscularly in large doses (30 mg), would induce luteolysis in cattle. This would appear to be the most practical route of administration as penetration of the cervix is difficult during the luteal phase of the cycle in addition to the fact that the uterus is also prone to infection during this period.

Fertility

The fertility data are presented in Table 1. One of the cows in group 3, even though in heat, could not be inseminated as it was impossible to penetrate her cervix. Of the cows inseminated only 34% became pregnant.

Table 1
Fertility following PGF₂α treatment in cattle

Treatment	No. cows in trial	No. cows inseminated	% Pregnant
PGF ₂ α	10	8	28,5
PGF ₂ α and (+)INPEA	10	4	50
PGF ₂ α and OXYTOCIN	10	6	50
PGF ₂ α and OESTRADIOL BENZOATE	10	8	12,5

Data presented in Fig. 2 demonstrate that a high percentage of cows showed heat after treatment with either 5, 10 or 15 mg of oestradiol benzoate. However, out of 8 cows inseminated only 1 cow was pregnant; this cow received 15 mg of oestradiol benzoate, suggesting that the high level of oestradiol *per se* was not entirely responsible for the low fertility. The present results demonstrate that although the dosage of PGF₂α may be reduced by intrauterine administration, the resultant fertility was too low to warrant such a procedure.

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