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INDUCTION OF PARTURITION IN SWINE WITH CLOPROSTENOL

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RINGKASAN

Daripada sekumpulan babi betina yang mempunyai purata tempoh bunting 114 ± 1.6 hari, 61 ekor telah dipilih secara rawak pada 113 hari kebuntingan dan dibahagi kepada tiga kumpulan seperti berikut: (I) menerima 175 μg kloprostenol, (II) menerima 175 μg kloprostenol yang telah dicairkan dengan 2 ml air suling, dan (III) kumpulan kawalan. Klosprostenol telah diberi secara suntikan. Dari kumpulan perlakuan (I) dan (II), 73% ekor babi telah melahirkan anak dalam tempoh 30 jam. Kelahiran pada waktu siang (7 pagi hingga 5 petang) telah berlaku untuk 43%, 63% dan 36% ekor babi dari kumpulan (I), (II) dan (III) masing-masing. Suntikan klosprostenol tidak membawa kesan buruk terhadap kelahiran atau kemandirian anak-anak babi sehingga penceraian susu.

INTRODUCTION

Controlling the time of farrowing is a valuable technology in the swine industry. It would allow efficient use of labour and reduce cost by concentrating farrowing supervision to a few appointed hours. If farrowing could be induced during normal working hours, some piglet losses could be avoided, as it has been reported that up to 75% of stillbirths occur during the later stages of parturition in swine (DZIUK, SPRECHER, WEBEL and HARMON, 1972; RANDALL, 1972; DZIUK, 1979).

Prostaglandin F_2 (DIEHL, GODKE, KILLIAN and DAY, 1974; EHNVALL, EINARSSON, LARSSON, SEGERSTAD and WESTERBERG, 1977) or its synthetic analogues (CERNE, 1978; HOLTZ, DIALLO, SPANGENBERG, ROCKEL, BOGNER, SMIDT, and LEIDL, 1979; JAINUDEEN and BRANDENBURG, 1980) has been successfully used to induce farrowing in late gestation. Farrowing has been satisfactorily induced between 110 and 113 days of gestation. Higher piglet mortality at birth was observed in induced farrowing earlier than 111 days (HOLTZ *et al.*, 1979) or 112 days (JAINUDEEN and BRANDENBURG, 1980) of gestation.

Great variation in response to farrowing induction with prostaglandin F_2 has been reported. DIEHL, BAKER and DZIUK (1977) attained 47% farrowing between 24 and 48 hours post injection, CERNE (1978) 93% farrowing between 20 and 30 hours while JAINUDEEN and BRANDENBURG (1980) 96% farrowing within 48 hours.

DIEHL *et al.* (1977) evaluated the effect of volume of carrier of prostaglandin F_2 , but did not attain any significant effects on farrowing characteristics. Volume of carrier or diluent has also been reported to affect the rate of absorption (MACDIARMID, 1983).

The aims of this study were to induce farrowing with cloprostenol injected at a predetermined stage and time of gestation and to evaluate its response on farrowing.

MATERIALS AND METHODS

A total of 61 crossbred Landrace, Australian Landrace, Duroc and Chester-white sows and gilts in their last stage of gestation were used to study the response of prostaglandin F_2 (PGF_2) on farrowing. The mean gestation length of the breeding herd was 114 ± 1.6 days. The animals were randomly assigned to three groups. Group I (14 animals) received a single injection of 175 μg cloprostenol while those in Group II (16 animals) received 175 μg cloprostenol in 2 ml diluent (sterile distilled water).

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Table 1. Interval between cloprostenol injection and onset of farrowing

Treatment group	No. of animals (n)	Onset of farrowing after treatment (hours)					
		<20		20–30		>30	
		n	%	n	%	n	%
I	14	5	35.7	6	42.9	3	21.4
II	16	1	6.2	10	62.5	5	31.3
Total	30	6	20.0	16	53.3	8	26.7

Nothing was given to the animals in Group III (31 animals) which served as control. Cloprostenol was administered by deep intramuscular injection in the neck region on the 113th day of gestation at 1100 hours.

All the animals in the experiment were fed similar ration according to NRC standard. Observation for any side effects on the animals began immediately after injection for an hour. The observation for farrowing was continued for 20 to 30 hours after the injection *i.e.* between 0700h and 1700h the following day. The data recorded for all animals included the time of induction, duration of farrowing, interval between birth of piglets, piglet viability at birth and weaning, litter size and piglet weight at birth and weaning. Weaning was done at four weeks.

Analysis of variance and Chi-square test were done between groups for the different parameters studied (STEEL and TORRIE, 1960; LI, 1964).

RESULTS

No adverse side effects were observed except for a slight increase in defecation in some animals. More than half of the farrowings (53%) occurred during the day-time (0700–1700h) *i.e.* between 20 and 30 hours post injection *(Table 1)*. Within treatment, 43% and 63% in Groups I and II respectively, farrowed during the day-time. In the control group only 36% farrowed during the day-time. The average gestation lengths of Group I, II and III were 114.1, 114.3 and 113.7 days respectively.

The mean duration of farrowing *(Table 2)* of Groups I, II and III was 1.7 ± 0.3, 3.4 ± 0.9 and 2.1 ± 0.3 hours respectively. Though there was a difference in the mean duration of farrowing, the difference was not statistically significant ($P<0.05$).

Table 2. Duration of farrowing following cloprostenol injection

Treatment Group	No. of animals observed	Duration (hours)	
		Range[a]	Mean[b]
I	6	0.8– 3.2	1.7±0.3
II	13	0.1–10.5	3.4±0.9
III (Control)	13	0.5– 3.5	2.1±0.3

[a]Indicate the shortest and longest duration of farrowing.

[b]Indicates the time interval between the delivery of the first and the last piglet in a litter (Mean ± standard error).

Piglet viability *(Table 3)* showed no significant difference in stillbirth or pre-weaning mortality rate between the three groups.

Table 3. Piglet mortality

Treatment group	No. of animals	Piglet mortality (%)[a]	
		At birth (stillbirth)	Up to 4 weeks (pre-weaning mortality)
I	14	0.9±0.8	7.3±2.4
II	16	4.8±2.1	18.2±4.4
III (Control)	31	1.8±0.7	13.7±2.4

[a]Mean ± standard error.

There was no significant difference ($P<0.05$) between the treatment groups for the mean interval between births *(Table 4)*. In calculating the interval between birth, any sow or gilt having an interval of more than 60 minutes was excluded and classified as dystocia. Based on this classification, dystocia was observed in 27%, 33% and 18% of Groups I, II and III respectively.

Mean litter size and piglet weight at birth and weaning *(Table 5)* for the treated and control animals were not significantly different ($P<0.05$).

DISCUSSION

Farrowing commenced within 30 hours in 79% and 69% of animals in Groups I and II respectively. These values are low compared with other reports (CERNE, 1978; BOLAND and HERLIHY, 1982). Day-time farrowing (0700–1700h) occurred in 43% of Group I and 63% of Group II, the latter being similar to that observed by JAINUDEEN and BRANDENBURG (1980). The possibility of high mid-day ambient temperatures delaying day-time farrowing needs further investigation, especially in the tropics.

Piglet mortality at birth and during the four weeks to weaning, duration of farrowing, interval between birth of piglets, incidence of dystocia, litter size and piglet weight at birth and weaning were not significantly different between the three groups. All these indicate that prostaglandin treatment did not affect the normal process of parturition or the vitality and development of piglets at birth and during the four-week period to weaning, as observed by other workers (CERNE, 1978; JAINUDEEN and BRANDENBURG, 1980; BOLAND and HERLIHY, 1982).

Animals in Group II which received the hormone diluted to increase the volume of carrier, exhibited a higher proportion of day-time farrowing compared with Group I (63% *vs* 43%). Although these values were not significantly different, enchancing the effect of PGF_2 by this way needs further investigations.

Adverse side effects following administration of natural prostaglandins such as restlessness, salivation and frequent urination (ASH and HEAP, 1973; ROBERTSON, KING and ELLIOT, 1978) were

Table 4. Interval between birth of piglets

Treatment group	No. of piglets observed	Range (min)		Mean interval (min)[a]
		Minimum	Maximum	
I	27	0.03	49.00	13±2.2
II	55	0.03	51.00	13±1.4
III (Control)	88	1.00	59.00	14±1.9

[a]Mean ± standard error.

Table 5. Litter size and piglet weight at birth and weaning[a]

Parameter	Treatment group		
	I (n=14)	II (n=16)	III (Control) (n=31)
Litter size at birth (n)	7.6±0.6	8.0±0.8	7.9±0.5
Litter size at weaning (n)	6.9±0.6	6.3±0.7	6.5±0.4
Piglet weight at birth (kg)	1.6±0.1	1.6±0.1	1.5±0.1
Piglet weight at weaning (kg)	6.5±0.4	5.9±0.4	6.0±0.3

[a]Mean ± standard error.
n = number of animals.

not observed for the synthetic analogue, cloprostenol, in the present study and those by JAINUDEEN and BRANDENBURG (1980).

In conclusion, results show that PGF_2 can be used to induce farrowing in swine during late gestation without any detrimental effects on the animal or its piglets. Results also indicate that a high proportion of animals can be induced to farrow during the day-time (69% in Group II *vs* 36% in control) and this is a valuable tool since supervision could be provided for farrowings occurring during this time and any incident affecting the survival of the piglets such as dystocia or crushing could be dealt with promptly. However, further studies on the possibilities of increasing the proportion of day-time farrowing using PGF_2 under local conditions need to be carried out.

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ABSTRACT

Sixty-one sows and gilts, selected from a herd with a mean gestation length of 114 ± 1.6 days, were allocated randomly on day 113 of gestation to three treatment groups as follows: (I) 175 μg cloprostenol, (II) 175 μg cloprostenol diluted in 2 ml sterile distilled water and (III) untreated control. Of the treated animals (Groups I and II), 73% farrowed within 30 hours. Farrowing during day-time (0700–1700h) occurred in 43%, 63% and 36% of Groups I, II and III respectively. Farrowing induction had no effect on duration of farrowing, interval between birth, incidence of dystocia, piglet viability at birth and during the four weeks to weaning, litter size and piglet weight at birth and weaning. Results indicate that cloprostenol can be used to induce farrowing without any ill effects.

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