

Oestrus response and fertility of suckled Kedah-Kelantan (KK) cows following oestrus synchronization using cloprostenol and a progesterone-releasing intravaginal device

(Kedatangan galak dan kesuburan lembu betina Kedah-Kelantan selepas mengaruh kedatangan galak dengan kloprostenol dan alat pengeluaran progesteron dalam faraj)

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Key words: oestrus synchronization, oestrus response, fertility, suckled KK cows

Abstrak

Tiga percubaan untuk mengaruh kedatangan galak pada lembu Kedah-Kelantan (KK) yang sedang menyusu anak dengan menggunakan alat pengeluaran progesteron dalam faraj (progesterone releasing intra-vaginal devices – PRID) dan kloprostenol telah dilaksanakan di Stesen MARDI Keluang, Johor. Lembu betina Kedah-Kelantan yang lepas 60–90 hari melahirkan anak telah dibahagikan secara rawak kepada dua kumpulan: (1) Kumpulan kawalan dan (2) Kumpulan PRID + kloprostenol (PRID dimasukkan ke dalam faraj selama 7 hari + kloprostenol disuntik 24 jam sebelum PRID dikeluarkan). Lembu betina yang dikesan galak di dalam Kumpulan 1 dikahwin suntik sebanyak dua kali dengan air mani beku pada waktu pengesanan galak dan 12 jam kemudiannya. Lembu betina dalam Kumpulan 2 dikahwin suntik sebanyak dua kali, pada 48 jam dan 72 jam selepas PRID dikeluarkan dari faraj. Kebuntingan lembu ditentukan dengan merabarasa melalui rektum 60–90 hari selepas pernianian beradas. Peratus lembu dalam Kumpulan 2 yang datang galak dalam masa 5 hari selepas PRID dikeluarkan ialah 91.7%, 82% daripadanya telah dikesan di antara hari kedua dan ketiga. Kadar kebuntingan berbeza ($p < 0.05$) di antara Kumpulan 1 (43%) dan Kumpulan 2 (53.4%). Kajian ini menunjukkan kombinasi PRID dengan kloprostenol (PRID₇ + kloprostenol₆) adalah sangat berkesan untuk mengaruh kedatangan galak bagi lembu betina KK yang menyusukan anak.

Abstract

Oestrus synchronization using progesterone releasing intra-vaginal devices (PRID) in combination with cloprostenol were studied in three trials at MARDI Research Station, Keluang, Johore. A total of 125 heads of Kedah-Kelantan cows between 60–90 days post-partum were allotted randomly into two treatment groups: (1) Control (untreated) and (2) PRID + cloprostenol (PRID in place for 7 days + cloprostenol 24 h before PRID removal). Cows in the control group, detected in oestrus, were inseminated twice with frozen

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semen, at heat detection and 12 h later. Cows in the treated group were inseminated twice, at 48 h and 72 h following PRID removal. Pregnancy was diagnosed by rectal palpation at 60–90 days after insemination. Oestrus response within 5 days after PRID removal was 91.7%, of which 82% of the cows were observed in oestrus between day 2 and day 3. Pregnancy rate in the control group (43%) was significantly lower ($p < 0.05$) than in the treated group (53.4%). This study demonstrates that PRID + cloprostenol treatment regime is very effective in inducing and synchronizing fertile oestrus in post-partum suckling cows.

Introduction

The use of artificial insemination (AI) in beef cattle in Malaysia has been very limited. Unsatisfactory conception rate, as a result of poor oestrus detection, is one of the major factors which limits the use of AI in cattle (Mohamad 1983). Oestrus synchronization (OS) with fixed time insemination eliminates the need to detect oestrus. Synchronization of oestrus can be achieved through the use of prostaglandin $F_2 \alpha$ ($PGF_2 \alpha$) and its analogue or the use of progesterone.

Treatment with $PGF_2 \alpha$ (Rowson et al. 1972; Inskeep 1973; Lauderdale et al. 1974) or its analogue (Cooper 1974) induced and synchronized oestrus in cycling heifers and cows except those cows that are not in the luteal phase of oestrus cycle (Rowson et al. 1972). Fertility rate of cattle following oestrus synchronization using $PGF_2 \alpha$ and fixed time insemination have been low and variable (Lauderdale et al. 1974; Nancarrow 1976; Jainudeen and Camoens 1977; Nordin et al. 1980; Tan et al. 1984, 1986). The low and variable fertility rate could be due to lack of precision of synchrony of oestrus following treatment with $PGF_2 \alpha$ (Lauderdale et al. 1974).

Using $PGF_2 \alpha$ in combination with progesterone treatment produced good oestrus synchronization and fertility (Roche 1976a; Chupin et al. 1977; Smith et al. 1981; Beal 1983; Folman et al. 1983). An effective regime is a 7-day insertion of progesterone releasing intravaginal devices (PRID) plus injection

of $PGF_2 \alpha$ or its analogue 24 h prior to PRID removal. This treatment not only produced precise synchrony of oestrus and excellent fertility following fixed-time insemination (Roche 1976a; Smith et al. 1981, 1984) but also induced fertile oestrus in lactating anoestrus cows (Smith et al. 1981).

The objective of the present study is to evaluate oestrus response and fertility rate of suckled post-partum Kedah-Kelantan (KK) cows following oestrus synchronization using combined progesterone-releasing intravaginal devices (PRID) plus cloprostenol (an analogue of $PGF_2 \alpha$) treatment and double fixed-time insemination.

Materials and methods

A total of 130 suckled KK cows were used in this study. The cows were between 3–5 years of age and about 60–90 days post-partum. Before the start of the experiment, rectal palpation was carried out to determine the status of the ovarian activity. The cows were allotted randomly to two groups: (1) Control (untreated) and (2) PRID + cloprostenol (PRID in place for 7 days plus cloprostenol intramuscular injection 24 h before PRID removal). The experiment consisted of three trials conducted during a 1-year period at MARDI Research Station, Keluang, Johore.

A total of 65 KK cows were allocated to the control group, of which 53 cows had palpable corpora lutea (CL) and 12 cows with inactive ovaries. These cows were

run with penile deviated teaser bull fitted with a chinball mating device for a 25-day breeding period. The cows were checked twice daily (0800 h and 1500 h) for the presence of ink marks on their backs. Cows with ink marks indicated that the cows were in standing oestrus. Control cows were artificially inseminated twice with frozen semen, at standing oestrus and 12 h later.

A total of 65 cows were allocated to the treatment group of which 50 cows had palpable CL and 15 cows with inactive ovaries. Cows in the treated group were fitted with PRID (Ceva, Abbott Laboratories) without reference to the stage of oestrus cycle for 7 days. A single intra-muscular injection of 0.5 mg cloprostenol (Estrumate, ICI) was given to each cow 24 h before PRID removal. A penile deviated teaser bull fitted with a chinball mating device was run with treated cows for 5 days after PRID removal. Oestrus detection was done as described in the control group. All the treated cows were inseminated twice with frozen semen at 48 h and 72 h following PRID removal.

Pregnancy of the control and treated cows was determined by rectal palpation at 60–90 days following insemination.

The pregnancy rate was defined as the percentage of cows pregnant from the total number of cows in the group or treated. The difference in pregnancy rate between the control and treated groups in the three trials was tested using analysis of variance.

Results and discussion

Five cows lost their PRID and data from these animals were excluded from the analysis. Fifty-five out of the 60 cows (91.7%) treated with PRID + cloprostenol were detected in oestrus within 5 days after PRID removal (*Table 1*). The distribution of the onset of oestrus following PRID removal is shown in *Figure 1*. Oestrus was observed in 82% of the cows between day 2 and day 3 after PRID removal.

Short term progesterone treatment (PRID) for 7 days plus an injection of cloprostenol 24 h before PRID removal effectively induced and synchronized oestrus in post-partum suckling KK cows. Oestrus response in terms of the number of cows observed in oestrus within 5 days following PRID removal was high (91.7%). This response is comparable to those reported by other investigators using similar synchronization regime

Table 1. Oestrus response and fertility rate following oestrus synchronization using combine PRID + cloprostenol treatment

Trial	Month/ year	Control			PRID ₇ + cloprostenol ₆		
		No. treated	In oestrus ^a (%)	Preg- nant (%)	No. treated ^b	In oestrus ^c (%)	Preg- nant (%)
1	Jan. 1987	25	84.0	44.0	23	91.3	52.1
2	May 1987	20	65.0	40.0	19	89.6	52.6
3	Sept. 1987	20	85.0	45.0	18	94.4	55.6
Total		65	78.0	43.0	60	91.7	53.4 ^d

^aNo. of cows in oestrus within a 25 day period/number in the group x 100

^bNo. of cows with retained PRID and was injected with cloprostenol

^cNo. of cows in oestrus within 5 days of PRID removal/number treated x 100

^dSignificantly different from control group at $p > 0.05$

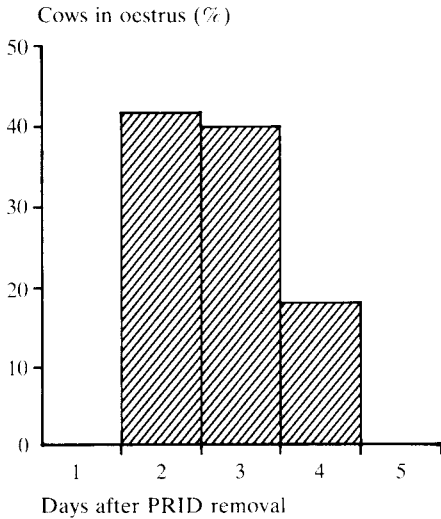


Figure 1. Distribution of oestrus in treated KK cows in the three trials within 5 days following PRID removal

(Roche 1976a; Smith et al. 1981, 1984). A higher percentage of cows was detected in oestrus following a combination of PRID + cloprostenol treatment (91.7%) than the untreated control group (78%). This is probably because the combined PRID and cloprostenol treatment induced oestrus in non-cycling cows as 60% of the non-cycling cows (9/15) treated with PRID plus cloprostenol were detected in oestrus. None of the 12 cows with inactive ovaries at the beginning of the experiment in the control group was detected in oestrus during the 25-day period. The combined treatment of progestin and luteolysin induced ovarian activity in anoestrus post-partum cows (Zaied et al. 1976; Prybil and Butler 1979; Beal 1983).

The degree of synchronization following PRID + cloprostenol treatment was also high, since 82% of the cows detected in oestrus were observed between Day 2 and Day 3 after PRID removal (Figure 1). A low variance in the interval from PGF₂ α treatment to oestrus was reported following PRID₇ + PGF₂ α₆ treatment regime, suggesting that a 24-h delay in PRID removal

improved synchrony of the onset of oestrus (Smith et al. 1984). The results obtained in this study suggested that PRID and cloprostenol treatment induced precise synchrony of oestrus in KK lactating cows necessary to allow successful insemination at a preset time.

Pregnancy rates within the control and treatment groups did not differ across trials (Table 1). However, pregnancy rate of cows in the treated group (53.4%) differs significantly ($p > 0.05$) from that of the control group (43%). Of the 15 non-cycling cows treated with PRID plus cloprostenol, only three cows (20%) were pregnant. Since only those cows with a functional corpus luteum can be induced to be on oestrus by PGF₂ α (Rowson et al. 1972), this study indicated that with the inclusion of PRID, about 66.7% of the non-cycling females (without CL) were on oestrus and 20% were pregnant.

The combined PRID plus cloprostenol treatment in the present study produced better pregnancy rate in post-partum suckled KK cows than the control group ($p > 0.05$). Roche (1976a) also reported a similar finding in which a higher proportion ($p > 0.05$) of lactating beef cows become pregnant after PRID₇ + PGF₂ α treatment regime than in the control or the double PGF₂ α treatment regime. The better fertility obtained in both of these studies perhaps could be due to the combined treatment of PRID + cloprostenol induced ovarian activity in anoestrus cows (Zaied et al. 1976; Prybill et al. 1979) resulting in fertile oestrus or perhaps PRID inserted for 7 days maintained a higher progesterone concentration in blood during treatment and this could have a stimulatory effect on non-cycling cows (Roche and Ireland 1983). The effects of exogenous progesterone on ovarian function during anoestrus and the interaction of the steroid hormones, gonadotropins and fertility need further investigation.

During the period of treatment, 92% of the PRID were retained and was comparable to those cited by other investigators (Roche 1976b; Mohamad 1984).

This study demonstrates that the combined treatment of PRID and cloprostenol induced oestrus in post-partum suckled KK cows and produced a precise synchrony of oestrus necessary for insemination to be carried out at pre-determined time. This regime of treatment could be recommended for oestrus synchronization in post-partum lactating Kedah-Kelantan cows because it eliminates the need to detect oestrus, since AI can be carried out at preset time without reduction in fertility. Furthermore, it induced oestrus in anoestrus lactating cows. Adoption of this oestrus synchronization treatment regime as a management tool can simplify the breeding operation in a beef cattle herd. Further studies should be carried out to determine the effects of flushing in conjunction with exogenous hormonal manipulation on the pregnancy rates.

Acknowledgements

The authors wish to thank Mr Daud Endam, Mr Ali Mian and Mr Mashodi Surip for their assistance in the study. They also wish to thank Mr Chiew Key Szu for the statistical analysis of the result and Mrs Kunaeswary Thambirajah for typing this paper. Special thanks are due to Mr Musaddin Kamaruddin and Mr Eng Pei Kong for useful comments of this paper.

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