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Calving patterns in dairy heifers following single "set-time" inseminations and re-synchrony preceding second inseminations

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ABSTRACT

Records were obtained for 1617 heifers in 26 herds using the Genermate™ Programme during October 1993. This synchrony programme involved each heifer having a CIDR device inserted to release progesterone for 10 days, as well as oestradiol benzoate (10 mg) at device insertion and half of the normally recommended dose of prostaglandin F_{2α} injected on the sixth day of CIDR treatment. All inseminations were from 50 to 52 h after device removal. Previously used devices were reinserted 16 days later for a period of 5 days to re-synchronise returns-to-service so that second inseminations could be made following detected oestrus only at 48 h (13 herds), or at 48 and 72 h after device removal (13 herds).

On average, 62.0% of all of the treated heifers calved to first inseminations. A further 14.6% calved to second inseminations and 7.5% failed to calve following a further period of natural mating.

The convenience of single set-time inseminating and avoiding the need to provide extra bulls for a short period by using re-synchrony are elements of a synchrony programme which is being recommended and adopted in an increasing number of herds of heifers.

Keywords: Oestrous synchrony; set-time inseminating; re-synchrony; calving rates; empty rates.

INTRODUCTION

The long-term goal of synchrony research programmes in cattle has been to produce a practical treatment protocol which will allow every animal in a herd to be inseminated during a single period of up to 3 h. This protocol must be sufficiently robust to be used with suckling or non-lactating animals, under intensive or extensive management systems and with a minimum of investment in handling or inseminating facilities.

Original attempts to achieve this goal involved using a progestagen or prostaglandin F_{2α} (PGF). Fertility or synchrony were improved by combining two hormones into treatment regimes, usually a progestagen or progesterone (P₄) with an oestradiol (O) or PGF. Although O was included because of its luteolytic properties, its effects may also be follicular (Macmillan *et al.*, 1993; Burke *et al.*, 1994) and even reduce precision in synchrony in systems using a CIDR™ intravaginal device (InterAg, Hamilton, NZ) for 7 days with PGF at device removal. In contrast, the inclusion of O at device insertion improved the precision of synchrony with CIDR-treatment periods of 9 or 10 days and also increased pregnancy rates to synchronised first inseminations (Macmillan *et al.*, 1993).

These results lead to the marketing by the Livestock Improvement Corporation of a modified Genermate™ synchrony programme in 1993. It involved the strategic administration of O, P₄ and PGF, but also gave clients an option of inseminating all of the treated heifers in a herd from 50 to 52 h after device removal. Previous programmes required inseminating on detection for 2 or even 3 consecutive days.

The numbers of heifers returning to oestrus about 20 days after the first day of synchronised inseminating can frequently exceed the serving capacity of bulls run at normal ratios (1:25 to 1:33). Re-synchronising returns to service for second

inseminations is an alternative. These re-synchrony programmes involve reinserting devices previously used to synchronise the first inseminations and removing them 21 days after the date of these inseminations.

The western region of the Bay of Plenty has had a high proportion of herd owners using the Genermate Programme, but 1993 was their first opportunity to use single set-time first inseminations and re-synchronising returns-to-service. Calving dates and patterns occurring in 1994 among these herds are the final outcome of these recent changes to this Programme.

MATERIALS AND METHODS

Calving records for the 1994 season in 26 herds in the Western Bay of Plenty region were analysed to determine what percentage of primiparous heifers produced calves which were progeny of genetically superior dairy sires. These calves were conceived to first inseminations made in each herd on one day when all the heifers in a herd were inseminated from 50 to 54 h after removal of a CIDR™-device. Some calves in 13 of these herds were also conceived to second inseminations made 23 and 24 days later, while another 13 herds only re-inseminated at a single time 23 days later. Angus, Hereford or Simmental bulls grazed with each herd of heifers between dates for first and second inseminations as well as for 6 to 9 weeks after these latter inseminations. This meant that calves conceived to matings by a beef bull were colour marked.

The Genermate™ Programme

The initial synchrony programme in each herd involved inserting a CIDR™ device with a CIDROL capsule containing 10 mg O into the vagina of each heifer. These animals were also tailpainted at this time. Six days later each animal was injected with PGF, using half of the normally recommended

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dose (1 ml Estrumate; 2.5 ml Lutalyse). Each device was withdrawn 10 days after initial insertion, and the paint strips raddled to improve the sensitivity of this technique for oestrous detection (Macmillan *et al.*, 1988). Inseminating commenced from 50 to 52 h later, with this task being completed within 3 h. Each herd contained from 26 to 130 animals.

Withdrawn devices were washed in clean warm water containing detergent and disinfectant then air dried, bagged and stored at air temperature and away from sunlight until reuse. The reinsertion procedure occurred 16 days after the date of the first inseminations; or 18 days after their initial withdrawal. This re-treatment period lasted 5 days. Tailpaint and raddle were reapplied to each animal at device reinsertion and removal, respectively. Every heifer which had been observed in standing oestrus by 48h after device removal, or which had lost raddle was presented for a second insemination in every herd. This process was repeated 24 h later in 13 herds. Bulls rejoined each herd of heifers 24 h after the last of these inseminations.

RESULTS

Records were available for 1617 heifers which had been included in Genermate™ Programmes completed in 26 herds. There were 62.0% of these heifers which produced calves conceived to the first set-time inseminations, with individual herds ranging from 53% to 74%. Second inseminations following re-synchrony were made on only one day in 13 herds and on two consecutive days in the remaining 13 herds. The re-synchrony procedure meant that 30% of heifers in these herds had a second insemination and 14.6% of the animals in each herd produced calves conceived to these inseminations. Calving date records indicated that some animals which had conceived and then calved to a first insemination, also received a second insemination.

Another 15.3% of all calves were conceived to natural service, mostly after the date(s) for the second inseminations. There were 7.5% of heifers which failed to calve, including 2.0% which aborted. The calving rate varied among herds from 72% to 100%.

DISCUSSION

The numbers of maiden heifers inseminated by the LIC has increased significantly with the widespread use of Genermate Programmes, but 1993 was the first season when single set-time inseminating and re-synchronising of returns to service were recommended and widely applied.

The only previous study in New Zealand on calving patterns in naturally mated or synchronised heifers was in 30 South Taranaki herds (Macmillan *et al.*, 1990). Heifers in 15 of these herds were synchronised with 2 injections of a PGF, or with a CIDR device and PGF at device removal. Whereas 62% of naturally mated heifers had calved by 3 weeks after

the date of their herd's planned start of calving (PSC), 64.7% of the synchronised heifers calved to first inseminations made following a detected oestrus during a 3-day period. Synchrony reduced the interval from the PSC to the mean calving date by 6.4 days. This study did not include details of heifers which failed to calve; whereas they were included in the present one. With this proviso, the single set-time insemination protocol following the current recommendations for the Genermate Programme achieved comparable results to those obtained in the previous study.

The re-synchrony process does reduce possible problems occurring when young bulls become sexually exhausted because too many heifers return to oestrus in a period of 3 days. The form of re-synchrony used in the Bay of Plenty herds usually involved one or two days of insemination on detection. There were 79.4% of heifers not calving to first insemination which had a second insemination. Finally, 76.6% of the 1617 heifers produced calves from first or second inseminations.

The average non-calving rate of 7.5% was similar to that recorded in a recent survey involving over 8000 heifers in 267 herds using natural mating (Macmillan 1994). However, 11 of the 26 herd owners reported that at least one animal in their herds had aborted with the highest incidence being 13 of 46 heifers.

The recognised benefits of synchrony programmes are equally due to reductions in anoestrous rates and subsequent induction rates, and to using fewer bulls for natural mating, as they are to genetic gains due to increased selection and reduced generation intervals. Semen processing technology which extends sperm survival time *in vivo* may allow synchrony protocols to be simplified so that any loss in synchrony precision is compensated for by prolonged *in vivo* sperm survival. Greater flexibility may also be possible in the interval from the end of the synchrony treatment to insemination.

The results of this field survey have shown that a Genermate Programme which depends on single set-time inseminating and with the additional option of re-synchronising returns-to-service can produce acceptable results in commercial herds of dairy heifers.

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