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Resynchronising returns-to-service in anoestrous cows in Victorian dairy herds.

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ABSTRACT

Many cows treated for anovulatory anoestrus in Victorian herds which fail to conceive to first insemination also fail to return-to-service 18 to 24 days later. A trial in 16 herds in the Maffra district determined whether treatments to re-synchronise returns-to-service could also increase submission rates for a second insemination in these cows. The 810 Holstein cows initially treated for anovulatory anoestrus provided 691 for inclusion in the study. A previously used CIDR™ device was re-inserted 12 to 14 days after first insemination with injected oestradiol benzoate (1mg ODB), and was removed 7 days later. Some cows received no further treatment (Group 1; n=357); the remainder were each injected with 0.5mg ODB 24h after device removal (Group 2; n=334). Conception rates were similar for the two Groups (1st insem: 29% vs. 32%; 2nd insem: 44.5% vs. 46.4%). The higher submission rate for synchronised second inseminations in Group 2 (40% vs. 65%; p<0.01) meant that the median interval from first insemination to conception was reduced from 42 days (Group 1) to 23 days (Group 2; p<0.01); pregnancy rates after 6 weeks of AI were increased from 51.5% to 59.6%, respectively (p<0.01). The injection of ODB given after device removal for resynchrony improved the efficacy of treating anoestrous cows in these Victorian herds.

Keywords: anovulatory anoestrus; dairy cows; synchronisation; submission rate.

INTRODUCTION

Dairy herds in Victoria have experienced an increase in the prevalence of postpartum anoestrus. This anovulatory syndrome was originally described among cows in dairy herds in New Zealand (Fielden et al., 1973) and has been associated with delayed conception, mainly because there was an extended interval to first insemination (26 vs 10 days; Macmillan, 1997). Studies by McDougall et al. (1993; 1999) showed that the incidence of anoestrus was influenced by age, breed and body condition score (BCS) at calving. Anoestrous animals typically had small sized ovaries (Fielden et al., 1973), but wave-like patterns of ovarian follicle development were still re-initiated early in the postpartum and a large dominant follicle (>9mm diameter) could be identified by 10.3 ± 0.7 days after calving (McDougall et al., 1995). Its maximum size increased progressively with each wave, with ovulation usually occurring once the diameter was >15mm (McDougall et al., 1995). A 5-day period of “priming” with progesterone (P4) was sufficient for some follicles to acquire an ovulatory potential, and to form a corpus luteum (CL) with a normal lifespan, especially if the P4 priming period was followed by an injection of oestradiol benzoate (ODB, McDougall et al., 1992).

The most common protocol for the treatment of anoestrous cows in New Zealand and Victoria involves insertion of a progesterone-releasing device (CIDR™) for 6 days. It is followed by an injection of 1mg ODB either 24 hr or 48 hr after device removal (Rhodes et al., 1998; Macmillan et al., 1999; Hanlon et al., 2000). About 88% of treated anoestrous cows in New Zealand herds are inseminated within 6 or 7 days of the ODB injection (Rhodes et al., 1998; Hanlon et al., 2000), with this response being affected by herd and sometimes by age, BCS and postpartum interval (Hanlon et al., 2000). Conception rates (CR) to first insemination have been less in treated anoestrous cows than in cycling herdmates. They have ranged from 36% (Xu & Burton, 1997) to 52% (Hanlon et al., 2000) in anoestrous cows, with this percentage being influenced by postpartum interval (Rhodes et al., 1998; Hanlon et al., 2000). These submission rate (SR) and conception rate components have produced mean or median intervals from the scheduled mating start date (MSD) to conception of 19.7 to 22 days (Rhodes et al. 1998, 1999; Hanlon et al., 2000, Xu & Burton, 1997); figures similar to those reported in cycling herdmates (Xu & Burton, 1997; Macmillan, 1997).

Results with the same treatment have not been as satisfactory in Victorian herds. The SR achieved in the 10 days following treatment have not equalled those obtained in 5 days in the New Zealand studies (85% vs 88%; Malmo et al., 2000; Hanlon et al., 2000); and CRs have been only 30% (Malmo et al., 2000). The interval from MSD to conception has averaged 42.7 days, mainly because a 35-day interval from first service to conception (Macmillan et al., 1999) has been associated with extended inter-service intervals (Cavalieri et al., 2000). Some of these cows have been diagnosed by ultrasonography or palpation as not pregnant to first insemination, even though their milk progesterone concentrations 3 weeks after that insemination were similar to those measured in milk samples from pregnant herdmates (Eagles, 2001). They have been described as phantom cows (Cavalieri et al., 2000), but may also include anoestrous cows that were in oestrus but did not ovulate in response to treatment (Rhodes et al., 1999) and then failed to recommence cycling (Rhodes et al., 1998). Initial Victorian studies indicated that low SRs for second inseminations could be improved if returns-to-service in cows that had not conceived to first insemination could be resynchronised (Macmillan et al., 1999). However, this treatment response has been shown to be variable (Cavalieri et al., 2000) and of dubious effectiveness (McDougall, 2000).

The hypothesis tested in this field trial was: that a resynchrony treatment in anoestrous cows which included injections of ODB (re-insertion and following the removal of an intravaginal progesterone device), would be more effective than a treatment with only the first injection of
ODB when used in herds where previous responses had been characterised by extended intervals from first insemination to conception.

MATERIALS AND METHODS
The 16 herds were in the Macalister region of Victoria. They had had seasonally concentrated (late-Winter) calving patterns in 1998 and were serviced by the Maffra Veterinary Centre. The owners had participated in a similar field trial in 1997. Cows were monitored for oestrus from calving, with tail paint being applied at least 4 weeks before MSD. The cows that had failed to display any symptoms of behavioural oestrus by 8 days before MSD were presented for a veterinary examination. The reproductive tract of each of these cows was palpated, and those with no evidence of a postpartum ovulation, of uterine pathology or of lameness were enrolled for treatment as anoestrous cows. Cows calving after Day –28 (MSD= Day 0) were also excluded. The treatment was initiated on Day -8 by inserting a CIDR™ device (CIDR™, Genetics Australia, Bacchus Marsh) containing 1.9g progesterone. The device was withdrawn on Day -2 and 1mg ODB (CIDIROL; Genetic Australia, Bacchus Marsh) injected on Day –1. A treated cow was presented for an insemination after first being detected in oestrus from Day 0. Most cows were expected to be inseminated on Days 0, 1 or 2.

The trial hypothesis was tested by re-synchronising oestrus in those cows inseminated on Days 0 to 2. The enrolled cows each received a previously used CIDR™ device on Day 14 (i.e., 13 ± 1 days after first insemination) and an injection of 1mg ODB. This device was removed 7 days later (Day 21). Cows were allocated randomly to Group 1 or Group 2 based on day of first insemination, post-calving interval, age and BCS. Those in Group 1 received no further treatment; those in Group 2 were each injected with 0.5mg ODB on Day 22. Second inseminations were made once daily after cows had been detected in oestrus from Day 23 onwards. Resynchrony involved inseminations on Days 23 to 26. AI was used exclusively in each herd at least until Day 41, from which time bulls were grazed with the herd. The total length of the breeding program was at least 21 weeks (Morton, 2000). Every treated anoestrous cow was pregnancy tested from 6 to 9 weeks (January, 1999) following the conclusion of a herd’s AI program, and again at a similar interval after bulls had been withdrawn from the herd. Cows not present on the second occasion were categorised on the result of the first pregnancy test so that final PR would have been underestimated in some herds.

Statistical analyses for selected intervals from MSD, or from the date of second insemination were conducted using analyses of variance for categorical data in SPSS version 10 for Windows taking account of herd, post-partum interval, age and BCS.

RESULTS
The average incidence of anoestrus was 22.8% (810 of 3556 cows) and varied between herds from 9.5% to 53.8% (P<0.01). These 810 cows were 65 days post-partum, had an average BCS of 4.5 at Day-8, and had 2.6 previous lactations. Most inseminations (93.3%) were made on Day 0 (73.7%), Day 1 (18.5%) or Day 2 (1.1%) so that the average interval from MSD to first insemination was 0.42 ± 0.05 days. Another 2.9% of inseminations were made on Days 3 to 10.

Relevant data were available for 357 cows allocated to Group 1 and for 334 cows to Group 2. The Group CR for first and second inseminations were similar (Table 1). The SR for second inseminations was substantially higher among cows in Group 2 (40% vs. 65%; Table 1), but the median interval from MSD to conception was less (42 vs. 23 days; Table 1) and PR higher at Days 25, 42 and 147 (Table 1).

The pattern of inseminations on Days 23 to 26 was also more concentrated for cows in Group 2. Whereas 71% and 25% of synchronised second inseminations were made on Days 23 and 24, only 43% and 38% were made on these 2 days in Group 1 (Fig. 1).

The cumulative PR for cows in each Group are shown in Fig. 2. The PR difference established in Group 2 by Day 25 (55% - 43% = 12%; Table 1) was steadily reduced because there were more conceptions after Day 25 in Group 1 (40% vs. 32%; P<0.05). These later conceptions in Group 1 mainly occurred from Days 41 to 48 (9.0% vs 4.5%) and from Days 60 to 70 (8.7% vs 5.7%; Fig. 2). The average intervals from MSD to conception were 34 and 31 days for the cows in Groups 1 and 2 respectively (P>0.05).

DISCUSSION
The results showed that a resynchrony treatment which included an injection of ODB on Day 22 (24 hr after withdrawal of a re-used CIDR™ device) produced a relatively precise onset of oestrus (Fig. 1) in a higher proportion of cows (Table 1) that had failed to conceive to their first inseminations on Days 0 to 2. Consequently, more of the cows that received this treatment (Group 2)
had conceived by Day 25 (Table 1; Fig. 2). This initial PR advantage was reduced from 12% (55% - 43%) to 4% (87% - 83%) by Day 147, and particularly from Days 41 to 48 and Days 60 to 70 (Fig. 2). Previous studies had shown that an injection of ODB after a progesterone pre-treatment in anoestrous cows increased the incidence of ovulation with oestrous and reduced incidences of ovulation without oestrous, as well as failure to express oestrous or to ovulate (Macmillan et al., 1994, 1995; McDougall et al., 1994). A similar situation may prevail among treated anoestrous cows that ovulate but fail to conceive to a first insemination before undergoing luteolysis spontaneously about Days 15 to 20. Rhodes et al. (1999) showed that when treated anoestrous cows which were not inseminated at the post-treatment oestrous were then injected with a luteolytic dose of prostaglandin F (PGF) on the equivalent of Day 10, only 61.8% would be detected in oestrus, compared to 77.5% after the initial anoestrous treatment. The lower incidence of oestrous after the PGF injection was associated with high incidences of ovulation without oestrous (12.5%) and failure to express oestrous or to ovulate (25.7%). If a similar prevalence of non-oestrous responses occurred among treated anoestrous animals that had failed to conceive to first inseminations, then a resynchrony treatment based on P4 and ODB could be expected to be beneficial. Failure to inject ODB after device removal for resynchrony could be expected to be associated with more cows being detected in oestrus and conceiving about 3 and 6 weeks after the resynchrony treatment. This response pattern following resynchrony was reflected by cows in Group 1 (Fig. 2).

The ODB injection administered at device re-insertion on Day 14 should have affected cows in both Groups in a similar manner. The use of ODB at 13 ± 1 days after a first insemination in cycling cows has been shown to have no affect on the CR of preceding first inseminations and may potentially improve CR to following second inseminations (Macmillan et al., 1997). Similar responses were not demonstrated among anoestrous cows included in a recent New Zealand trial (McDougall, 2000).

Differences in the severity or form of anoestrous may exist between the larger, grain-supplemented Holsteins in the Maffra herds and the smaller Friesian and Friesian X Jersey cows in New Zealand herds that do not receive any grain supplements. The previous Maffra trial conducted in 1997 with anoestrous cows in the same herds as the resynchrony trial, did not involve any form of resynchrony, but did use the same initial treatment. The CR to first inseminations in the 1997 study was 29.6%, the average MSD to conception interval was longer in 1997 than in 1998. This would suggest that the resynchrony treatment used with cows in Group 1 did not reduce the efficacy of the response to the initial anoestrous treatment, at least among anoestrous cows in the herds used in the trials conducted in these 2 years.

Although the resynchrony treatment used with cows in Group 2 was an improvement over that used in Group 1, there were still 35% of cows subsequently not confirmed pregnant to first insemination, which were not successfully re-synchronised. The cumulative PR for cows in Group 2, shows a sudden increase in PR associated with resynchrony (Fig. 2), but no subsequent period when a large group of cows conceived over a brief period. A companion study by Eagles (2000) found that a resynchrony treatment, similar to that used with cows in Group 2, successfully synchronised oestrus in every one of 19 cows that had plasma progesterone concentrations of <0.2 mg/ml by 24 hr after CIDR™ device removal. None of the 23 herdmates with plasma progesterone concentrations ranging from 1.4 to 6.8 mg/ml was detected in oestrus after resynchrony treatment even though 4 of these 23 cows (17%) were not confirmed pregnant by ultrasonography at about Day 35, or by rectal palpation at about Day 65. The non-pregnant cows in Group 2 not successfully re-synchronised represented 24% of all the cows in that Group. Further trials are required to identify cows most likely to comprise these non-responsive groups. They are not restricted to treated anoestrous cows (Nation et al. 2001). Morton (2000) also reported that herds included in the ‘InCalf Survey’ typically had a lower SR in the second 3-week period of 6-week AI programs.

In conclusion, the results of this trial have shown that resynchrony can be used to improve the efficacy of anoestrous treatments used with cows in some Victorian herds. The resynchrony treatments should include an injection of ODB about 24 hr following removal of an intravaginal P4 device. In spite of these improvements, a significant proportion of treated anoestrous cows not confirmed pregnant to first insemination, were not successfully re-synchronised. The prevalence of this latter problem will need to be resolved if further improvements in treatment efficacy are to be achieved.

REFERENCES


