An observational study of a 5-day CIDR synchrony in maiden dairy heifers

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Background

Clinical practitioners (pers comms) in NZ have been discussing for many years the modest rates of conception achieved with the incumbent 7-day Co-Synch program in maiden heifers. Our veterinary practice has a large volume of recorded outcomes from this program, with the average conception rate siting in the low 50%'s. We frequently find that those animals that do not initially conceive to the synchrony AI, have vastly higher pregnancy rates in the following return period (in the region of 60-70%). This would indicate that a greater potential for synchrony conception exists with an optimal synchrony program.

Extensive published trials, conducted in the Americas, have occurred since the first McDougall (2013) heifer synchrony study. In the ensuing 10 years there has been continuous refinement of these heifer synchrony programs (using controlled studies). There now exists some international agreement that the 5-day Co-Synch plus CIDR program outlined in the method below is the optimal Dairy Heifer GPG P4 protocol. This has been endorsed by Society of Theriogenology and the Dairy Cattle Reproduction Council.

It is thought that by using a shorter period of progesterone exposure in the 5-day program, the dominant follicle is recruited younger (smaller) and therefore has a longer proestrus period. By default, this extends the period of LH stimulation, which starts immediately after progesterone withdrawal. This increases the oestradiol production and measured serum oestradiol levels during oestrus and the follicular size at ovulation. These two effects results in higher conception rates in 5-day v 7-day Co-Synch CIDR programs (Kasimanickam *et al*. 2012, Bridges and Day 2013).

In the 2023/2024 season we applied for Animal Ethics Approval to do an uncontrolled observational study on four farms using the 5-day Heifer Co-Synch plus CIDR with a combination of heat detection and FTAI (Kaiawhina AEC 008/23).

Study aim

The study purpose was to get a better understanding and knowledge of:

- Timings of heat onset to enable better planning of workload and semen ordering for AI technicians and genetic companies over a two-day period of AI.
- Calculate the risk of falling pregnant if no overt oestrus was detected.
- Identify the distribution pattern in onset and/or presentation of oestrus, and its relationship to AI and conception, thereby identifying if there is an optimal timing period for AI.

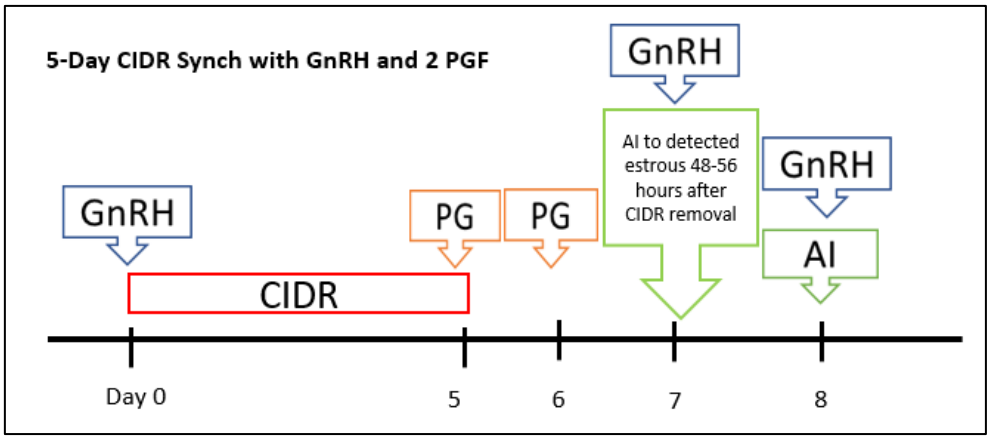
Method

Four lines of heifers from four herds were enrolled each containing between 123 and 132 heifers. The program started on day 0 with the heifers being heat detected and inseminated on day 7, and the residual animals fixed time AIed on day 8. The percentage of heifers that showed overt oestrus (measured by paint removal on the scratchie) was recorded at visits on day 7, 8 and 9. Bulls were introduced to the mob of heifers 24 hours after the insemination. All heifers were early aged pregnancy tested at day 60-70 post-insemination. Scanning at this stage of

pregnancy allowed for identification of the first and second rounds of pregnancy. The recheck animals were rescanned 40-50 days post bull removal.

The 5-Day CIDR Co-Synch protocol:

- **Day 0:** CIDR insertion (CIDR tails were trimmed so only 3-5cm were visible exterior to the vulva) plus 8µg Buserelin (CIDR B, Zoetis plus 2ml IM Receptal, MSD).
- **Day 5:** CIDR withdrawal plus 500ug Cloprostenol (2ml SQ, Ovuprost, Elanco).
- **Day 6:** 2nd dose 500µg Cloprostenol (2ml SQ, Ovuprost, Elanco) (within 24 hours of first injection) and apply heat detection aids (scratchies).
- **Day 7:** Heat detection and mate heifers with >90% of paint lost from scratchie at 48-56 hours after CIDR removal. Inject with 8µg Buserelin (2ml IM, Receptal, MSD) at time of AI.
- **Day 8:** Blanket AI remainder of non-mated heifers at 64-72 hours after CIDR removal plus 8µg of Buserelin (2ml IM, Receptal, MSD).



Results

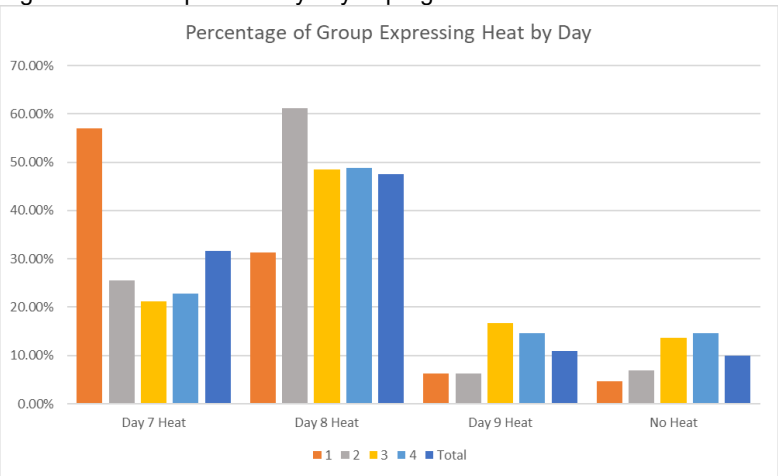
Of the 512 animals which were enrolled in the study there was only one CIDR that was not present on the removal day (day 5) between all four farms. Further to this only one animal was lost to follow-up at the second pregnancy testing visit.

The timings between CIDR pull on day 5 and Heat-detected insemination on day 7 ranged between 48 and 52 hours. The interval between start of insemination on day 7 and start of insemination on day 8 ranged between 18-21 hours. All fixed time inseminations were completed between 68 and 72 hours after CIDR removal.

Heat expression

The percentage of heifers that had expressed overt oestrus (as determined by paint removal from scratchie) at the time of visit on day 7, 8 and 9 are shown in Figure 1.

Figure 1. Heat expression by day of program



Farms 2, 3 and 4 had very similar patterns of heat expression with 21-25% showing overt oestrus at 47.5 to 51hrs after CIDR device removal on the day 7 visit. Farm 1 however, had 57% show overt oestrus at 47.75 hrs after removal on day 7 visit. The climatic conditions were very similar for Farms 2, 3 and 4 during the pro-oestrus period - that being overcast and cool, whereas conditions were warm and sunny during the pro-oestrus period for Farm 1. On day 9 there remained only 5-15% of heifers that had not expressed oestrus (mean 10%).

Conception rates to AI synchrony

The results have been recorded at a farm and overall level in Table 1. All heifers with more than 90% loss of paint of the scratchies on day 7 were inseminated. Of the remaining heifers which were Fixed Time Inseminated on day 8, these were either recorded as on heat or not (>80% loss of paint on scratchie = on heat). Those not recorded as on heat were revisited on day 9 and recorded as either having expressed a heat since day 8 (>70% loss of paint) or no heat expression by the end of the program.

Table 1. Conception rate by day of heat expression and insemination day

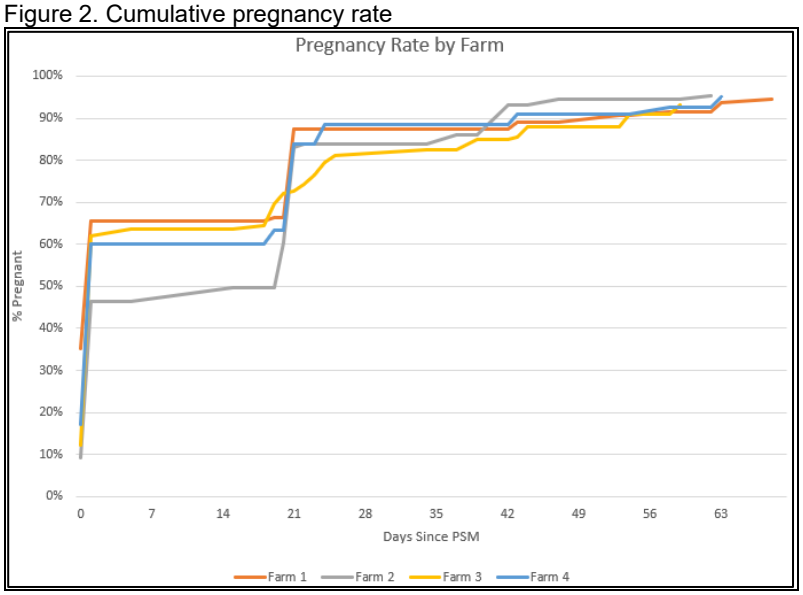
Farm/Day of heat Expression	Day 7	Day 8	Day 9	No Heat	Overall
Farm 1	63.0%	67.5%	75.0%	83.3%	65.6%
Farm 2	36.4%	46.8%	75.0%	55.6%	46.5%
Farm 3	57.1%	62.5%	63.6%	66.7%	62.1%
Farm 4	75.0%	65.0%	47.1%	33.3%	60.2%
Total	58.6%	58.9%	61.8%	54.9%	58.6%

Despite some within farm variation the overall conception rates measured in each of the four heat expression groups were remarkably similar. It was particularly interesting that heifers that had delayed heat expression or no heat expression had the best conception rates in three of the four farms (although involved smaller numbers).

Cumulative pregnancy rate

The four farms have a cumulative pregnancy rate illustrated in Figure 2. Farm 2 despite having a relatively lower 1st service conception rate had a sharp recovery in the second round. Pregnancy rates of the residual non-pregnant population were examined. These were 64%, 70%, 50% and 71% respectively in the second cycle. This indicates the high potential fertility in some of these lines.

Figure 2. Cumulative pregnancy rate



Discussion

Three of the four farms had what the author would consider a good 1st service conception rate. The cause of the lower performance in Farm 2 does not appear to be a result of the synchrony program, heifer fertility or the timing of AI. It is more likely be associated with the sire semen, semen handling or insemination technique. Five different bulls were used on Farm 2 and these all trended to have lower conception rates than bulls used on the other farms. The range of successful inseminations by bulls in the study ranged from 32% through to 85% (measured only in bulls that had 19 or more straws used).

It appears that the split insemination and use of a five-day program supports the superior results found in other parts of the world. Farmers and technicians alike both favoured the split insemination to reduce workload and throughput on any one day. It is possible that favourable weather in the pro-oestrus period encourages the earlier onset of oestrus, but we could predict that ~25-55% of heifers will be in visible oestrus on day 7 of a 5-day CIDR Co-Synch program.

The potential for first service conception rates could be as high as 70% if further refinements could be made to enhance the program but this may require more yardings and further expense.

References

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