Recent trends in conception rates and return patterns in AB herds and their effects on calving patterns

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ABSTRACT

The average conception rate (CR) to first insemination in 1969-70 was 60.6% compared to 67.7% in 1982-83. CR declined with increasing herd size in the latter study (from 70.5% in herds of <101 cows to 66.0% in herds of >300 cows), but this trend was substantially less than in the former study (from 62.8% to 52.3%). The change in herd size effects was mainly due to improved accuracy in the detection of oestrus in larger herds probably associated with the use of tail paint.

On average, 50% of cows in 35 Waikato herds had calved by the end of a period of 18.3 d from the date of the planned start of calving. The next 25% of cows calved over a period of 17.5 d, and the last 25% calved over 36.3 d. Consequently, the average calving covered 71.9 d from the planned start compared to 46 d in the Ruakura No. 2 herd.

A comparison with results from a 1972 survey showed that calving patterns had become more concentrated because of improved breeding management and the use of induced calving.

Keywords Conception rate; herd size; artificial breeding; calving patterns

INTRODUCTION

If the widespread use of tail painting as an aid to oestrus detection (Macmillan and Curnow, 1977; Macmillan, 1980) has increased submission rates and conception rates (CR) to first insemination, then calving patterns should have become more concentrated. Induced calving has substantially reduced the length of the programme, but would be used only with cows which conceived to natural mating (Welch and Scott, 1979). The use of these techniques should have prevented any adverse trends in calving patterns associated with the increase in average herd size. Macmillan and Watson (1971) showed that CR's declined with increasing herd size because of the increased incidence of return-to-service intervals of less than 18 days.

Monitoring calving patterns is important, as calving date variation is the major factor influencing lactation length among cows within a herd (Macmillan *et al.*, 1981). Each day's increase in the lactation length should increase yield by 0.7 to 0.9 kg milkfat/cow/d (Macmillan, 1979).

Two studies were completed using records from the 1982-83 season. The first study was to quantify changes in CR to first insemination in relation to herd size. The second survey evaluated a simple procedure which should allow herd calving patterns to be compared. It also provided a comparison with herd calving patterns from a comparable survey made before the widespread use of induced calving and tail painting.

CONCEPTION RATE TRENDS

Material and Methods

Records from first inseminations made in 2338 herds using an insemination service provided by the Auckland Livestock Improvement Association (LIA) in the 1982-83 season were divided into 6 herd-size categories. Comparisons were made between the proportional distribution of cows which either returned to service from 1 to 17 d (short return intervals), 18 to 24 d (normal return intervals) and 24 to 49 d (long return intervals), or were reported as conceiving to first insemination. Trends were compared with those previously reported by Macmillan and Watson (1971).

Results and Discussion

Average CR in 1982 was 67.7% compared to 60.6% in 1969 (Table 1). This increase was associated with proportional reductions in all 3 categories of return intervals. Normal return intervals declined from 24.4% to 20.0% (Table 1).

Although CR did decline with increasing herd size in 1982, the extent of the decline was less than in 1969 (Table 1). Consequently, the greatest increases in CR occurred in herds of >250 cows. This was mainly because the incidence of short return intervals has been almost halved. This would be attributable to the use of tail paint reducing the incidence of errors in the diagnosis of oestrus.

TABLE 1 Herd size effects on conception rate to first insemination and on return intervals in 1969 and 1982.

Herd size (No. cows)	CR[a] '69[b]	CR '82	% Return intervals from: 1-17 d '69	1-17 d '82	18-24 d '69	18-24 d '82	25-49 d '69	25-49 d '82
<101	62.8	70.5	6.0	4.1	24.2	19.4	7.0	5.9
101-150	60.2	68.3	7.5	5.4	24.8	20.5	7.4	5.8
151-200	57.4	68.5	10.4	5.2	24.3	20.2	7.9	6.0
201-250	57.4	66.4	11.9	7.4	23.1	20.4	7.8	6.0
251-300	52.3	66.5	14.0	7.0	24.6	20.2	9.1	6.3
>300		66.0		8.9		19.1		6.0
Av.	60.6	67.7	7.7	6.5	24.4	20.0	7.4	6.0

[a] conception rate to 1st insemination.
[b] from Macmillan and Watson (1971).

CALVING PATTERNS IN SEASONAL DAIRY HERDS

Material and Methods

Calving records from 35 herds in the Matamata area were analysed to compare herd calving patterns for the 1982 season. Each herd owner provided the date on which his insemination programme commenced in his herd in 1981 and the number of each cow treated to induce premature parturition in 1982.

Records for first-calving heifers were analysed separately because their calving pattern did not reflect effects of herd breeding management.

The date for the planned start of calving (PS) for each herd was calculated as being 282 d after the date on which the 1981 insemination programme commenced. A herd's 1982 calving programme ended on the date after which no additional cows calved for at least 10 d. Although the mean calving date was calculated for each herd, most comparisons were based on 3 intervals. These were; (1) the interval from PS until 50% of the cows had calved (PS to median); (2) the interval over which the next 25% of cows calved; and (3) the interval over which the last 25% of cows calved. Comparisons were made with the calving pattern recorded in the Ruakura No. 2 herd in 1982.

Results and Discussion

The average number of cows in the 35 herds was 135 (range 78 to 218) and the average interval from PS to the median calving date was 18.3 d (SD = ±3.5) (Table 2). This was 4.7 days less than the interval to the mean calving date. However, calving dates for cows within a herd were not normally distributed about the mean. Whereas 50% of cows had calved by 18.3 d from PS, the next 25% calved over an interval of 17.5 d (±4.0), and the last 25% over an interval of 36.3 d (±17.4). Cows were induced to calve prematurely in 32 of the 35 herds (91.4%) and the average proportion of the herd induced when the technique was used was 11.4% (range 1.2% to 26.1%). Most induced cows calved from 6 to 9 weeks after PS.

Dividing a herd's calving pattern into the 3 selected intervals can allow different aspects of that herd's management to be assessed. The interval from PS to median will be a reflection of the success of the herd's insemination programme in the previous season. Intervals of 15 d or less will usually be achieved with a high submission rate and a satisfactory CR to first insemination. The second interval (median to 75%) will be influenced by the conception rate and the efficiency of oestrus detection after the second 3 weeks of mating. The third interval will be influenced by the overall length of the previous season's breeding programme and by the way in which induced calving was used in the current season.

TABLE 2 Calving pattern intervals in 35 Matamata herds and Ruakura No. 2 herd in 1982.

Interval	Mean	±SD	Range	Ruakura
PS[1]	5 Aug	7.1	23 Jul-18 Aug	15 Jul
PS to median (d)	18.3	3.5	12-25	15
Median to 75% (d)	17.5	4.0	8-28	12
Last 25% (d)	36.3	17.4	12-72	19
Total calving (d)	71.9	17.0	45-107	46

[1] Planned starting date of calving.

The results in Table 2 show the extent of the variation in the calving patterns in the 35 Matamata herds. They also highlight the fact that besides being an 'early calving' herd, the Ruakura No. 2 herd had a concentrated calving pattern. Although 15.8% of cows in the Ruakura No. 2 herd were induced to calve prematurely, treatment was applied earlier within the calving programme than in most of the Matamata herds. This meant that calving was completed in 46 d from PS compared to an average of 71.9 days for the 35 herds (Table 2).

CHANGES IN CALVING PATTERNS

Increases in CR similar to those shown in Table 1 and the widespread use of induced calving (Welch and Scott, 1979) should have substantially altered calving patterns in seasonal dairy herds. The extent of these changes can be estimated by comparing the calving pattern of the 35 Matamata herds with that reported in a comparable study completed in 43 Manawatu herds in 1972 (Macmillan and Curnow, 1976). None of the herds in the latter study induced cows to calve prematurely. The current potential for further concentrating the calving pattern can be estimated by comparing the results of both surveys with the Ruakura No. 2 Herd (Table 3).

Factors associated with the increase in CR (Table

TABLE 3 Average calving patterns in seasonal dairy herds in 1972 (Manawatu), in 1982 (Matamata), and in the Ruakura No. 2 herd.

			% calving at selected weekly intervals after planned starting date			
Herd	No. of herds	Cows	1-4	5-7	8-10	>10
Manawatu	43	4939	60	20	13	7
Matamata	35	4816	68	23	8	1
No. 2	1	152	77	23	-	-

1) have increased the proportion of cows calving in the first 4 weeks from the PS from 60% in 1972 to 68% in 1982 (Table 3). The use of induced calving would have been the major factor reducing the proportion of cows calving after the seventh week from 20% in 1972 to 9% in 1982 (Table 3). These changes could potentially increase average lactation length by 7 d, or allow the start of mating to be delayed for 7 d without altering lactation length. However, if the results of current trials at Ruakura No. 2 Dairy are applicable to commercial dairy herds, then delaying the start of mating to compensate for a more concentrated calving pattern may not be necessary if appropriate emphasis is placed on pasture management during the late autumn and winter. Although significant changes in calving patterns have occurred in commercial herds, further changes in the date for the start of calving and in further concentrating the calving pattern could be expected to potentially increase lactation lengths by at least another 7 d.

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REFERENCES

Macmillan K. L. 1979. Calving patterns and herd production in seasonal dairy herds. *Proceedings of the New Zealand Society of Animal Production* **39:** 168-174.

Macmillan K. L. 1980. Some factors which influenced knowledge and use of tailpainting—a study in extension. *Proceedings of the New Zealand Society of Animal Production* **40:** 118-123.

Macmillan K. L.; Curnow R. J. 1976. The application of oestrus synchronization in New Zealand dairy herds. *Proceedings of the New Zealand Society of Animal Production* **36:** 50-57.

Macmillan K. L.; Curnow R. J. 1977. Tailpainting— a simple form of oestrus detection in New Zealand dairy herds. *New Zealand journal of experimental agriculture* **5:** 357-361.

Macmillan K. L.; Duganzich D. M.; Bryant A. M. 1981. Production differences between Jersey and Friesian × Jersey cows in commercial dairy herds. *Proceedings of the New Zealand Society of Animal Production* **41:** 48-52.

Macmillan K. L.; Watson J. D. 1971. Short oestrus cycles in New Zealand dairy cattle. *Journal of dairy science* **54:** 1526-1529.

Welch R. A. S.; Scott M. E. 1979. Getting more from induced calving. *Proceedings of the Ruakura farmers' conference* **30:** 154-158.