Dairy Research Summary

DRECA
Dairy Research and Extension Consortium of Alberta

Return to Cyclicity and Subsequent Fertility After Calving Differs Based on Parity

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Why is this important?

The transition from late gestation to early postpartum is challenging for high producing dairy cows as they require high amounts of energy and nutrients to adapt to the demands of lactation. How well cows adapt to this transition period is critical for a timely return to normal ovarian cycling after calving. Heifers and mature cows may adapt differently during the transition period, and little is known about the influence of parity on ovarian cyclicity and its effect on fertility to first AI.

What did we do?

We assessed concentrations of progesterone, a hormone whose concentration after calving can be used to identify ovulation and ovarian cyclicity, approximately every 2 d using an in-line milk analysis system (Herd Navigator, DeLaval). Milk progesterone measurements occurred from 21 DIM until the outcome of first AI was determined (that is, either pregnant or not pregnant) in 350 heifers and 398 mature Holstein cows. Based on the postpartum progesterone profiles, we determined the interval from calving to return to cyclicity, the occurrence of abnormal (short or prolonged) ovarian cycles, and the number of cycles prior to first AI. Pregnancy at first AI (P/1stAI; % of pregnant cows among those inseminated) was determined when progesterone concentrations increased after AI and remained high, with no interruption, until 55 d after AI.
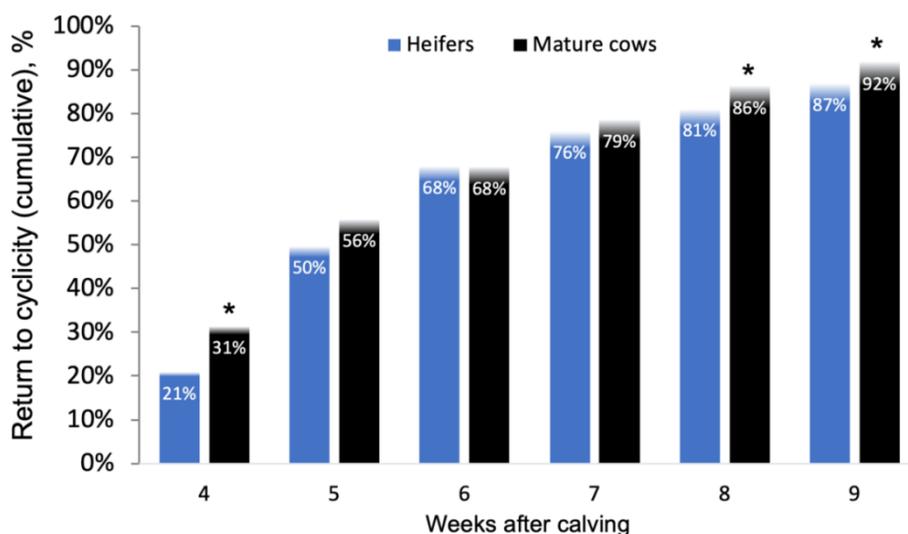

Figure 1. Cumulative proportion of heifers and cows returning to cyclicity by week 4 to 9 after calving.
* Indicates a significant difference in the proportion of heifers vs. mature cows.
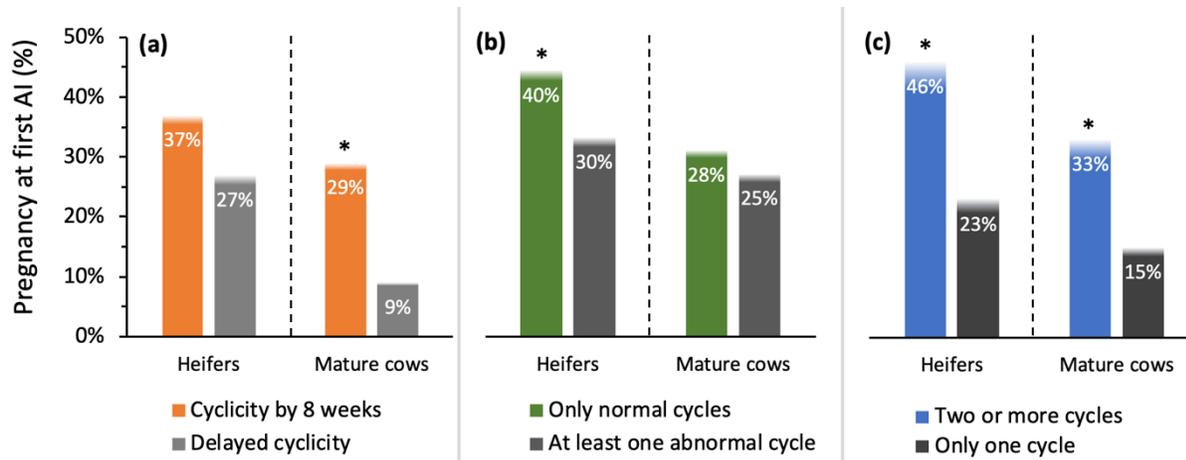
Figure 2. Pregnancy at first AI based on (a) cyclicity by 8 weeks postpartum (b) occurrence of abnormal cycles, and (c) regular cyclicity (2 or more cycles) before AI.
* Pregnancy at first AI of heifers or mature cows were significantly different between the two categories of ovarian cyclicity.

What did we find?

Return to cyclicity: Fewer heifers returned to cyclicity (first ovulation) by 4 weeks (21%) and by 9 weeks (87%) after calving than mature cows (31% by 4 weeks and 92% by 9 weeks; Figure 1). This could be due to increased energy requirements for body growth in heifers or increased uterine disease in heifers compared to mature cows. Delayed cyclicity did not influence P/1stAI in heifers, but it negatively affected P/1stAI in mature cows. Mature cows with delayed return to cyclicity had much lower P/1stAI (7%) than those with an early cyclicity by 8 weeks postpartum (29%; Figure 2a).

Ovarian cycles prior to first AI: More mature cows (54%) had an abnormal (short or prolonged) cycle before first AI than heifers (47%). This could be due to higher milk yield and higher feed intake in mature cows than lactating heifers. Heifers that had at least one abnormal cycle had lower P/1stAI (30%) than those with only normal cycles (40%), but such relationship was not evident in mature cows (Figure 2b). For both heifers and mature cows, P/1stAI was higher in those that had two or more cycles (46% in heifers and 33% in mature cows) compared to those that had only one cycle prior to first AI (23% in heifers and 15% in mature cows) [Figure 2c].

What does this mean?

These findings show that a high proportion of Holstein cows have abnormal reproductive cyclicity (delayed return to cyclicity or short or prolonged cycles) prior to first AI. Early return to cyclicity after calving influences fertility differently in heifers than in mature cows. However, having at least two ovarian cycles before first AI was an important factor for improved fertility at first AI for both heifers and cows. This information can be used to decide when to start inseminating cows in herds monitoring in-line milk progesterone profiles for reproductive management.

Summary Points
- A better understanding of the effect of parity on fertility is needed for reproductive management
- A delay in first ovulation after calving reduced pregnancy at 1st AI in cows but not heifers
- Having 2 or more cycles before AI increased pregnancy to first AI in both heifers and cows

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