

Age at first calving goal not realistic

WHILE there seems to be a general consensus that a good goal for age at first calving (AFC) for dairy heifers is 24 months, that has been somewhat problematic to achieve in practice.

Various National Animal Health Monitoring System reports have summarized AFC results by report year as follows: 25.8 months in 1991, 25.5 months in 1996, 25.4 months in 2002 and 25.2 months in 2007. Arguably, a decrease in AFC of 0.6 months from 1991 to 2007 is not much, if any, real progress. Some have even pushed that AFC goal to 22 months, but that may not be realistic for the entire population as an average.

Sure, some individual heifers will achieve that, and even at as young as 20 months of age, but that does not mean that is a wise and doable goal for the entire population, especially if that means simply breeding heifers earlier to achieve first calving at 22 months without full regard as to how well developed heifers will be at that first calving.

Unfortunately, there has been a dearth of data to assess this subject area. In a classic study, Keown and Everett (1986) used first post-calving Dairy Herd Improvement (DHI) milk production and taped bodyweights from Northeast U.S. records to assess this interrelationship.

They found that, within this database, as bodyweight increased from 900 lb. to about 1,350 lb., milk production increased by about 2,200 lb. There was some additional increase in milk production until about 1,450 lb. of bodyweight, but then it began to decrease as bodyweight increased to 1,500 lb.

The major limitation to this study was that it was a snapshot, and there has been no other comparable or large-scale study — until now.

The most recent study (Curran et al., 2013) did not measure bodyweights or

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heights, which would be in my ideal database. Kertz et al. (1997) did not have lifetime milk production measures that would have been un-confounded and would have been collected in only one herd.

The Curran et al. study used a 2005 DHI database of 69,145 Holstein cows from Ag Source in Verona, Wis. That database contained more than 90% complete (uncensored) lifetime production and longevity data from cows that remained in the herd through April 2011. Records from cows with AFC of less than 20 months or greater than 30 months were excluded due to low numbers or “lack of inference to modern dairy management,” respectively.

Other extensive cow and management practice data were also collected. Four categories of data were categorized

as milking frequency (2X or 3X) and rolling herd average (RHA) over a 12-month period for milk yield. There are considerable descriptions in the paper of what data were collected and how they were summarized and statistically analyzed.

Some of the data tended to go together, such as larger herds used 3X frequency and had greater RHA (26,023 lb.) than 2X herds (23,022 lb.).

The final dairy herd management criteria (HMC) groupings were: (1) 3X milking and RHA of 28,076 lb. (3X-H), (2) 3X milking and RHA of 24,773 lb. (3X-M), (3) 2X milking and RHA of 24,773 lb. (2X-M) and (4) 2X milking and RHA of 20,369 lb. (2X-L).

As HMC decreased (Table 1), milk production progressively decreased, as did pounds of fat and protein produced. There was a slight progressive increase of percentage fat and percentage protein as HMC decreased, but the increased milk production under greater HMC offset this, resulting in more pounds of fat and protein produced by cows producing more milk.

1. Effect of HMC on first-lactation milk, fat and protein production

HMC	Number	AFC	Milk, lb.	Fat, %	Fat, lb.	Protein, %	Protein, lb.
3X-H	14,692	24.0 ^a	24,176 ^a	3.59 ^a	850 ^a	2.97 ^a	711 ^a
3X-M	12,913	24.5 ^b	21,392 ^b	3.65 ^b	764 ^b	2.96 ^a	630 ^b
2X-M	20,037	25.1 ^c	21,020 ^b	3.74 ^a	768 ^b	3.03 ^b	634 ^b
2X-L	21,503	25.6 ^d	17,497 ^c	3.76 ^c	645 ^c	3.02 ^c	526 ^c

a,b,c,d Means with different superscripts within a column differ ($P < 0.001$).

2. Effect of AFC (in months) on first-lactation milk, fat and protein production

AFC	Number	Milk, lb.	Fat, %	Fat, lb.	Protein, %	Protein, lb.
20	413	19,660 ^a	3.71 ^b	716 ^a	3.03 ^a	592 ^a
21	1,751	20,287 ^a	3.68 ^b	725 ^a	3.00	606 ^a
22	6,194	20,734 ^a	3.65	744 ^a	3.00	619 ^a
23	11,569	21,089	3.64	755	3.00	628
24	13,466	21,100	3.65	757	2.99	628
25	11,168	21,150	3.66	762	2.99	628
26	8,481	21,192	3.68 ^a	766 ^a	3.00	633
27	6,132	20,910	3.70 ^a	757	2.99	621
28	4,387	20,934	3.70 ^a	757	2.98	621
29	3,150	20,873	3.74 ^a	764	2.99	623
30	2,434	20,956	3.74 ^a	768	2.99	625

a,b Means with different superscripts within a column differ from 24-month value; a denotes value less than 24 months, b denotes value greater than 24 months ($P < 0.001$).

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First-lactation milk yields were not different when AFC ranged from 23 months to 30 months of age (Table 2). However, as AFC dropped below 23 months, milk production did progressively decrease. A similar pattern was found for milk fat and milk protein yields, with only some minor differences among AFC on milk fat percentage and milk protein percentage.

Further analyses of these data found:

- AFC and HMC influenced these lifetime traits, primarily in interactions. However, those interactions were mainly associated with traits for AFC between 3X and 2X HMC.
- Post-calving herd life increased linearly with decreasing AFC between 3X and 2X. The maximum response was at 20 months AFC and yielded 53 and 77 more days in milk for 3X-H and 3X-M, respectively. That is only about two more months for about four months sooner calving versus 24 months AFC. A similar pattern was evident for days in milk.
- Lifetime milk yield increased linearly with decreasing AFC only for 3X-H and 3X-M herds, with 4,157 lb. and 3,988 lb. more milk compared to 24 months, respectively.
- As with a number of published studies cited in this publication, first-

lactation milk yield decreased by 366 lb., 813 lb. and 1,440 lb. for heifers calving at 22 months, 21 months and 20 months versus 24 months, respectively. This was independent of HMC.

However, this study did not support the hypothesis that lifetime days in milk and milk yield are improved by calving heifers at earlier ages. The researchers speculated that the lack of difference in this study may have been due to nuances. For example, production databases that are dominated by higher-producing herds milked 3X will provide positive effects, while lower-producing herds milked 2X will provide minimal or no effects.

- While observing an increasing response for 3X-H and 3X-M herds in improved lifetime milk, fat and protein production when AFC decreased below 24 months, they also observed the opposite effect in 2X-M and 2X-L herds. This disparity may be due to 3X herds also following other management practices that were not able to be collected in this study. Examples of such management practices could be the use of bovine somatotropin, total mixed rations and cow comfort factors such as freestall housing, cow cooling systems and sand bedding.

The Bottom Line

This observational study indicates that 24 months AFC may still be that happy-medium goal for most dairy herds as going lower or higher than that did not appreciably change lifetime milk, fat and protein production.

This may not be true for all herds since factors do differ among herds. However, for most herds, achieving a 24-month average AFC is challenging enough to accomplish well.

References

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