

Earlier first calving makes money

Age at first calving is the most important benchmark for achieving the highest economic return from a replacement program

By *Mike Lormore*

Replacements often represent 15 to 20% of the total cost of milk production, second only to dairy feed. The likelihood of a positive payoff on those investments improves dramatically when a dairy's management generates quality heifers. These are animals that successfully calve and enter the lactating herd with a strong likelihood of contributing to a dairy's profitability.

Components of a quality dairy replacement program include goal setting and monitoring systems for:

- Nutrition, focused on achieving growth milestones.
- Health management to minimize disease and address biosecurity.
- Reproduction to ensure timely insemination.
- Calving management, focused on getting live calves from undamaged cows.

All-important AFC

For the last 20 years, quality replacement programs have correctly focused on the need to reduce age at first calving (AFC) as a way to improve herd profitability. Obviously, an earlier AFC cuts down on rearing expenses. But there are other returns. Dairies have begun to look at the lost income opportunity from not having milk in the tank sooner and the time value associated with those cash flows.

In 2002, researcher Normand St.Pierre estimated that the economically optimal AFC was between 20.6 and 22.4 months and the optimal pre-puberty average daily gain (ADG) was between 1.98 and 2.42 pounds.

In a system that reduces AFC considerably below the industry average of 26 months, it's critical to get heifers to an adequate body

weight. Research has shown that inadequate body weight is highly correlated to health, reproductive and survival problems.

According to research, the optimal postpartum body weight to maximize first lactation milk yield is approximately 1,210 pounds. Reaching this by 22 months appears to be a realistic goal. While attainable, the goal isn't often met.

Milk or money?

When evaluating your heifer program and considering changes to it that lower AFC, you need to look at two factors: milk production and economic return. Current data indicates that first lactation milk yields for groups calving at 21.9 months might lag those calving at 24.7 month by 4.8% (Meyer et al., 2004).

Researchers Ettema and Santos reported that animals calving at 23.7 months (medium) and 25.9 months (late) derived adjusted incomes of \$119.73 and \$9.08, respectively, over a group of animals calving at 22.3 months (early), after considering income from 310-day lactation milk, newborn calves, cow salvage income, and costs associated with stillbirths, diseases, days open, cow mortality, labor and rearing expenses. These researchers did not consider the opportunity cost of milk from animals that calved earlier, the time

value of money and the capital needed to maintain a larger heifer inventory.

There was a clear shift in profitability when Ettema and Santos' research was reassessed looking solely at the net present value of milk income over feed costs (IOFC) at 22 months of age. (Table 1, page 60) By the beginning of the 26th month, the group calving at 22.3 months had an estimated

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This issue of "The Manager," the special section prepared six times a year for *Northeast DairyBusiness* by the PRO-DAIRY program, presents some of the latest research on heifer raising. The six articles are excerpts from papers presented at the January NRAES conference, Dairy Calves and Heifers: Integrating Biology and Management.

For a copy of the conference proceedings with the full text of the articles in *The Manager* and other conference presentations, contact Natural Resource, Agriculture and Engineering Service (NRAES) at P.O. Box 4557, Ithaca, NY 14852-4557. E-mail: NRAES@cornell.edu. Website: www.nraes.org

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For reprints of PRO-DAIRY's *The Manager*, contact Robin Huzinga, 272 Morrison Hall, Cornell University, Ithaca, NY 14853.

Phone:
(607) 255-4478

Email:
rmh14@cornell.edu

Table 1. 310-day milk yields and discounted income over feed costs (IOFC)

AFC Group	310-day milk yield	Discounted IOFC		
		End Low AFC lact.	End of 310-day lact.	At 38 month age
Low (22.3)	22,779	\$1,801	\$1,801	\$2,590
Medium (23.7)	23,461	\$1,466	\$1,804	\$2,151
High (25.9)	23,665	\$1,183	\$1,724	\$1,838

Source: Estimated from Ettema and Santos (2004)

cumulative discounted IOFC of \$662 per cow vs. \$186 and -\$109 for the 23.7- and 25.9-month groups, respectively.

By the time heifers in the 22.3-month calving group completed their lactations at 310 days in milk (DIM), their IOFC was \$1,801 compared to \$1,466 for the medium AFC group and \$1,184 for the late one.

At the end of the lactation for the late group, its IOFC stood at \$1,724. But when second lactation productivity for the early and medium AFC groups is modeled, assuming 25,000 pounds of milk per 310-day lactation, with a 60-day dry period and a feed cost of \$1 per day, those stalls would generate \$2,211 and \$1,772, respectively.

Those incomes would increase to \$2,590 for the early AFC group, \$2,151 for the medium and \$1,839 for the late AFC group by the end of the 38th month, 17 months after the first group originally calved, and about one month after the late AFC group calved for the second time.

This model likely overestimates the true differences that may exist, particularly because it doesn't account for the cost associated with cow removal or variable reproductive performance. But it clearly demonstrates that getting milk early is a significant financial advantage over any slight productivity advantage per cow per day in milk that delaying AFC, even just two months, might yield.

Bottom line

Low AFC is the single most important benchmark for achieving the highest economic return from a replacement program. Every month that AFC is delayed beyond the 22-month target costs producers approximately \$100 per animal, primarily because of lost milk production opportunity and the lower number of days in an animal's productive life.

Based on our understanding of growth biology, it appears that good management can attain post-calving body weights exceeding 1,210 pounds under conditions that should allow many groups to calve at 22 months of age. Due to the negative relationship between inadequate body weight and calving-associated morbidity and mortality, it's critical that bodyweight milestones be established, monitored, managed and achieved. ■

FYI

- Mike Lormore, DVM, is the Regional Technical Services Manager, Western U.S., for Monsanto Dairy Business.
- Dr. Lormore's paper "The Case for a Quality Dairy Replacement Program" was excerpted with his permission

Calculating inventory costs

Inventory control is an important economic aspect of quality heifer management. Herds with later AFC require more heifers in inventory than herds with earlier AFC. PRO-DAIRY's Jason Karszes quantified this. (See Table 2.)

If every additional heifer requires, on average, \$650 in capital expenditure at any time that it isn't simultaneously generating revenue, a 1,000-cow dairy with a 26-month AFC and a 36% removal rate will require an additional investment of over \$80,000 compared to a similar herd with a 22-month AFC. The opportunity cost of using those funds elsewhere compounds the situation.

Table 2. Number of heifers, all ages, for various calving ages and replacement rates

Calving Age, Months	Dairy Replacement Rate, Percentage								
	20	23	26	29	33	36	39	42	45
18	313	360	407	454	517	563	610	657	704
20	348	400	452	504	574	626	678	730	783
22	383	440	497	555	631	689	746	803	861
24	417	480	543	605	689	751	814	877	939
26	452	520	588	656	746	814	882	950	1017
28	487	560	633	706	803	877	950	1023	1096
30	522	600	678	757	861	939	1017	1096	1174
32	557	640	723	807	918	1002	1085	1169	1252

Source: Jason Karszes. Average herd size, 1,000 milking and dry cows. Non-completion rate — % of heifers that start but don't enter the dairy herd, 8%

For more info

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and from "Dairy Calves and Heifers: Integrating Biology and Management" (NRAES-175). 2005. Natural Resource, Agriculture, and Engineering Service, Ithaca, NY. Tel: (607) 255-7654. Website: www.nraes.org