

Early calf growth has significant impact on first-lactation milk yield

It was 10 years ago when I first visited with Mike Van Amburgh at Cornell University and discovered the “gold mine” database he had on calf performance collected over a 10-year period (*Feedstuffs*, March 12, 2012).

Analysis of that database resulted in a seminal publication about the impact of calf growth on first-lactation milk yield (Soberon et al., 2012). That study used data from the Cornell University herd and also from a commercial herd in New York. A meta-analysis of similar studies, but with fewer calves per study, found an even greater response (Soberon and Van Amburgh 2013).

However, not all studies have shown a similar response (*Feedstuffs*, March 9, 2015; Kiezebrink et al., 2015). There are so many variables in calf growth, high variability in responses, fewer calves per treatment and, thus, difficulty in finding statistically significant differences (Kertz and Chester-Jones, 2007).

Consequently, it is always better to have more calf data, and maybe the more disparate the database, the better it is for sorting through factors.

In that light, another large database of calf growth and first-lactation milk yield was welcomed news (Chester-Jones et al., 2017).

Data for this report were from the University of Minnesota-Waseca West Central Research & Outreach Center. This center raises calves from three area dairy farms for use in university research. One benefit of this arrangement is that they often use the same protocol with different milk replacer and/or starter treatments, which minimizes variability simply due to different feeding protocols.

The data were from 2,880 Holstein calves born between 2004 and 2012 that were used in 37 different calf research trials. Calves were housed in individual pens with curtain sidewalls in a naturally ventilated barn. Pens were bedded primarily with straw in winter months and with wood shavings in summer months.

Milk replacers fed were typically 20% protein and 20% fat (20/20), but about 10% of calves were fed moderate or intensive milk replacer programs. Daily

Bottom Line

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intakes of milk replacer and starter were recorded, along with bodyweights at two-week intervals. Calves were weaned at the end of six weeks but were kept in the same pen for another two weeks before being moved to another barn with groups of six to eight calves.

Data were analyzed at six- and eight-week points for daily gain categories of less than 0.50, 0.50-0.75, 0.75-1.00, 1.00-1.25, 1.25-1.50, 1.50-1.75 and greater than 1.75 lb. for effects on first-lactation 305-day milk, fat and protein yields. Data were analyzed within each farm and overall as well (Table).

It is natural to compare or contrast these data with those of Soberon et al. (2012), which the authors did in their discussion. Some key points follow.

The Waseca data were from calves sourced from three dairy farms, whereas the other data were from the Cornell University herd and a commercial New York dairy farm.

Milk replacer feeding programs were quite different. At Waseca, a more traditional milk replacer (20/20) was fed at a lower level, whereas the Cornell and New York dairy herds primarily fed a 28/15 milk replacer and at a higher level befitting an intensive program.

Average daily gain in Waseca was 1.17 lb. at six weeks (weaning) and 1.39 lb. at eight weeks, while it was 1.8 lb. per day at the seven-week weaning age for Cornell and 1.32 lb. preweaning for the commercial New York herd. The range

in daily gain at weaning was about 0.3-2.0 lb. for Waseca and 0.2-3.5 lb. for the Cornell herd.

Within the range of six-week daily gains, a 1 lb. difference/increase resulted in 456 lb. more milk in the first lactation for Waseca.

There was a significant relationship between six- and eight-week bodyweights. Bodyweight had a more reliable positive effect on first-lactation production than daily gain, but I think this may be due more to bodyweight being a much larger number than daily gain and a less variable relationship than daily gain.

These Waseca data compare to the Cornell data, where for every additional pound of daily gain preweaning, heifers produced 850 lb. more milk during their first lactation and 2,280 lb. more during their first three lactations. The New York commercial herd had about 30% greater response than the Cornell herd. The meta-analysis (Soberon and Van Amburgh, 2013) yielded a relationship whereby each extra pound of daily gain preweaning resulted in 1,550 lb. more milk in the first lactation.

The Waseca studies measured starter intake, while the other studies did not. For each additional 1 lb. of starter dry matter intake at eight weeks, the Waseca study found an impact of 8.2 lb. more first-lactation milk yield.

The Waseca data showed that while calves born in the summer had lower daily gains, they produced 608 lb. more milk in the first lactation than those born in the fall and winter. Calves born in the winter at Cornell did the poorest because no feeding adjustment was made during colder weather. Apparently, the indoor facility at Waseca and its feeding

Data summary from Chester-Jones et al., 2017

	Mean	Std. deviation
Birth weight, lb.	88.7	8.3
6-week weight, lb.	137.4	15.0
8-week weight, lb.	166.8	18.5
6-week milk replacer intake, lb.	47.3	4.8
6-week starter intake, lb.	38.1	16.1
8-week starter intake, lb.	97.8	26.4
6-week daily gain, lb.	1.17	0.24
8-week daily gain, lb.	1.39	0.26
Birth height, in.	31.6	5.7
8-week height, in.	35.5	1.06
Age at first calving, days	715	46
305-day milk, lb.	24,132	1,160
305-day fat, lb.	876	141
305-day protein, lb.	738	92

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protocol negated the negative winter effect seen at Cornell.

This study and the others cited illustrate a very basic fact that is the bane of all calf studies: great variability! That is why large numbers of calves — whether in a single study or from a number of pooled studies — are often required to pick up significant relationships for calves.

Nevertheless, I recall that the late Bob Everett, a noted Cornell geneticist, was astonished that daily gain during a calf's first two months of life had the largest single impact on that calf's first-lactation milk yield — more than any other factor he had studied.

The Bottom Line

A large University of Minnesota-Waseca

database from calf studies encompassing 2,880 Holstein animals found that a 1 lb. difference in daily gain during the first two months resulted in 456 lb. more milk in the first lactation. This was less than in a Cornell study, but milk replacers and feeding programs were also different and resulted in lower daily gains at Waseca.

Great variability within calf studies often precludes picking up significant differences unless accumulated in large databases. On the other hand, while the number may vary, it is increasingly seen, as in this report, that early calf growth has a major effect on milk yield — at least in the first lactation, if not subsequent lactations, too.

References

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