

New recommendations on passive immunity in dairy calves

By [Ellan Dufour, M.S., Dairy Research Nutritionist, Hubbard Feeds](#)

Passive immunity in dairy calves is evaluated by measuring the serum total protein (STP) within the first 1 to 7 days of life. This measurement offers us information directly correlated to an individual calf's immune status, their likeliness of morbidity and mortality, and the effectiveness of the colostrum management programs in place. Within the last few months, new recommendations on passive immunity standards have been released with the goal of maximizing calf health and reducing morbidity and mortality in young calves.

Where we've been

The current standard for categorizing calves as having either successful or failed passive transfer is based on serum IgG concentrations of ≥ 10 g/L (pass) and < 10 g/L (fail), which directly correlate to STP levels of ≥ 5.2 g/dL and < 5.2 g/dL, respectively. Based on recent NAHMS studies, the incidence of FPT in U.S. dairy calves was 41% in 1991, 19.2% in 2007 and 13.7% in 2014. Although calf death rates have decreased since 1991, the percentage of calves that experience a morbidity event has remained constant.

This information begs several questions: Are we accurately measuring calf immunity? Can we change the standards to improve calf health and further reduce calf mortality? Is there a way to identify at-risk calves more confidently?

What we know

Research has shown, time and time again, that healthier calves have improved rates of gain and feed efficiency, which, in turn, results in earlier breeding, reduced age at first calving, and improved first- and second-lactation milk production. Since calf health is so heavily dependent on colostrum, we can make the argument that dairymen will be paid back many times over in terms of short- and long-term benefits if colostrum management is done right.

Where we're going

An in-depth study published within the last few months details new goals for passive immunity in dairy calves that focuses on both calf- and herd-level standards, as shown in Table 1. Instead of categorizing passive immunity as a dichotomized "pass/fail" system, these new standards recommend an "excellent/good/fair/poor" classification system based on the statistical morbidity and mortality differences between the four classifications. To determine and monitor herd-level passive immunity, sampling at least 12 clinically normal calves is recommended.

Table 1. New goals for monitoring levels of passive immunity in dairy calves in the United States.

Categories	IgG levels	Serum total protein levels	Brix levels	Calves in each category
Excellent	≥ 25.0 g/L	≥ 6.2 g/dL	$\geq 9.4\%$	$> 40\%$
Good	18.0–24.9 g/L	5.8–6.1 g/dL	8.9–9.3%	$\approx 30\%$
Fair	10–17.9 g/L	5.1–5.7 g/dL	8.1–8.8%	$\approx 20\%$
Poor	< 10.0 g/L	< 5.1 g/dL	$< 8.1\%$	$< 10\%$

CALF SUCCESS

Morbidity probability

Morbidity differences between these categories in the first 60 days of life offer dairymen the ability to identify at-risk calves early and accurately. While there are only slight morbidity differences between “fair” and “good” calves, “poor” calves are at a significantly increased risk of contracting disease, especially after 10 days of age, while “excellent” calves are at a significantly reduced disease risk.

Mortality probability

Based on the research presented, minimal mortality differences exist between “excellent” and “good” calves, and a higher percentage of calves in the “fair” and “poor” categories are more likely to die in the first 60 days of life.

SETTING CALVES UP FOR SUCCESS

Step 1 – Colostrum

Colostrum is the starting point to successfully raising calves that will one day join the milking herd as healthy, productive animals. When assessing your colostrum program, don't forget the basics:

1. Quality: $\geq 23\%$ Brix reading

- If maternal colostrum quality is $< 23\%$ on the Brix scale, supplement by adding half a pack (250 g) of [OptiPrime](#) or [OptiPrime Plus](#) colostrum replacer powder into 1 gallon of maternal colostrum.

For any maternal colostrum $\leq 18\%$ Brix, consider supplementing with a half to a full dose of OptiPrime or OptiPrime Plus to ensure successful passive transfer.

2. Quantity: 4 quarts, or 10–12% of body weight

3. Quickness: Feed within the first two hours of life. Colostrum must be fed within the first 24 hours of life.

4. Cleanliness: $< 100,000$ cfu/mL TPC and $< 10,000$ cfu/mL TCC

- Discard maternal colostrum that does not meet cleanliness standards and feed a full dose of OptiPrime or OptiPrime Plus colostrum replacer.

Step 2 and beyond

Even if your colostrum program is top-notch, a solid foundation in all of the following areas is necessary to keep calves healthy and to ensure lifetime performance:

- Offer high-quality nutrition: [Elite 18 Calf Starter](#) and [Blueprint Milk Replacer](#)
- Minimize stressors, including heat, cold and weaning stress
- Housing: Includes adequate bedding management, proper ventilation and effective sanitation
- Update vaccination protocols as needed

As the research illustrates, setting and meeting standards for attaining successful passive immunity are important in helping calf raisers and dairymen establish their colostrum management goals. Contact your Hubbard Feeds calf specialist if you have questions regarding your colostrum management program or if you need assistance with benchmarking your herd's passive immunity.

References:

- DeNise, S. K., J. D. Robison, G. H. Stott, and D. V. Armstrong. 1989. Effects of passive immunity on subsequent production in dairy heifers. *J. Dairy Sci.* 72:552-554.
- Faber, S. N., N. E. Faber, T. C. McCauley, and R. L. Ax. 2005. Effects of colostrum ingestion on lactational performance. *Prof. Anim. Sci.* 21:420-425.
- Fowler, M. A., 1999. What is it worth to know a calf's IgG level? In *Proc. Annu. Prof. Dairy Heifer Growers Assoc. Conf.*, Savoy, IL, 3:31-38. *Prof. Dairy Heifer Grwers Assoc.*, Savoy, IL.
- Godden, S.M., J. E. Lombard, and A. R. Woolums. 2019. Colostrum management for dairy calves. *Vet. Clin. North Am. Food Anim. Pract.* 35:535-556.
- Lombard, J. E., N. Urie, F. Garry, S. Godden, J. Quigley, T. Earleywine, S. McGuirk, D. Moore, M. Branan, M. Chamorro, G. Smith, C. Shivley, D. Catherman, D. Haines, A. J. Heinrichs, R. James, J. Maas, and K. Sterner. 2020. Consensus recommendations on calf- and herd-level passive immunity in dairy calves in the United States. *J. of Dairy Sci.* 103:7611-7624.
- Nocek, J. E., D. G. Braund, and R. G. Warner. 1984. Influence of neonatal colostrum administration, immunoglobulin, and continued feeding of colostrum on calf gain, health, and serum protein. *J. Dairy Sci.* 67:319-333.
- Robison, J.D., G. H. Stott, and S. K. DeNise. 1988. Effects of passive immunity on growth and survival in the dairy heifer. *J. Dairy Sci.* 71:1283-1287.