Tech Seminars

Tech Seminar #02 – New Recommendations on Passive Immunity

Introduction

Hello and welcome to Calf Notes. My name is Dr. Jim Quigley, author and webmaster of CalfNotes.com. Thanks for stopping by, and I hope you'll find this Calf Note to be informative. This is Calf Note number 217, entitled **"New Recommendations on Passive Immunity."** In this video, I'll review a recent manuscript soon to be published in the *Journal of Dairy Science* that outlines new recommendations for monitoring passive immunity in dairy calves. The application of this information on the farm should help improve the health and welfare of many young calves. Let's get started.

Background and Manuscript Overview

The information we'll discuss today comes from a manuscript entitled:

"Consensus Recommendations on Calf- and Herd-Level Passive Immunity in Dairy Calves in the United States."

I was honored to serve on the expert panel that included many of the most distinguished calf researchers and practitioners in North America. The project was an excellent collaboration, and we're very pleased with the result. Before we get too far into the details, let's define a few important concepts.

Key Definitions

Failure of Passive Transfer (FPT)

Failure of passive transfer occurs when a calf's serum IgG concentration is **less than 10 grams per liter**, measured after 24 hours of age.

Successful Passive Transfer (SPT)

Successful passive transfer occurs when serum IgG is **greater than or equal to 10 grams per liter**, measured after 24 hours of age.

Calf-Level Immunity

This refers to the serum IgG concentration of an individual calf. For example, we might say, “This calf has a serum IgG of 14 grams per liter.”

Herd-Level Immunity

This refers to the immune status of a group of calves and is usually expressed as a percentage. For example, “40% of my calves have an IgG concentration greater than 25 grams per liter.”

Gut Closure

Gut closure occurs when the calf can no longer absorb immunoglobulins from the intestine into the bloodstream. Closure is not due solely to turnover of intestinal cells; it is multifactorial and not completely understood. The timing of closure differs slightly among immunoglobulin classes—IgG, IgM, and IgA—but generally occurs by about 24 hours of age. After gut closure, the calf can no longer absorb immunoglobulins into the bloodstream. This is why we measure passive immunity after 24 hours of age, preferably between 24 and 72 hours. The serum IgG concentration at 24 to 48 hours is used as an indicator of the calf’s disease resistance.

Passive Immunity and Mortality

For many years, we’ve known that passive immunity is closely related to preweaning death loss. Research has consistently shown that calves with serum IgG concentrations less than 10 g/L are more likely to become sick and die. For this reason, the 10 g/L threshold became the defining line between FPT and SPT.

The 1993 USDA NAHMS study clearly demonstrated differences in survival between calves with less than 10 g/L and those with greater than 10 g/L. That study cemented the concept of FPT and SPT and formed the basis for decades of research and on-farm management programs focused on colostrum quality, quantity, and timing.

Calf-Level vs. Herd-Level Thinking

Traditionally, we divided calves into two categories:

- FPT (<10 g/L)
- SPT (≥10 g/L)

For example, if 8 out of 10 calves had IgG ≥10 g/L, we would say the herd had 80% successful passive transfer. But this approach raises important questions. Is a calf with 11 g/L dramatically safer than one with 9 g/L? Does a simple “yes/no” cutoff truly reflect differences in risk? Perhaps a more refined grouping could better reflect relative risk of disease and mortality.

NAHMS Data Over Time

Subsequent NAHMS studies have shown a gradual and significant decline in calf mortality since 1991. This likely reflects improvements in colostrum management and producer education. However, calf morbidity has not declined to the same extent.

While scours may have decreased somewhat, respiratory disease and other conditions have not shown the same improvement. Overall calf morbidity has changed relatively little. This suggested that while the FPT/SPT approach helped reduce mortality, it may not have been sufficient to reduce disease incidence. A different approach was needed.

Reanalysis of NAHMS 2014

Under the leadership of Dr. Jason Lombard, the expert panel reanalyzed data from the 2014 NAHMS study. We evaluated numerous IgG groupings and examined:

- The percentage of calves in each category
- Associated morbidity rates
- Associated mortality rates

After extensive discussion and analysis, we identified groupings that better reflected biological risk and practical application.

New Recommended Categories

The panel recommends the following herd-level targets:

- **40% of calves** with serum IgG **≥ 25 g/L**
- **30% of calves** with IgG **18–24.9 g/L**
- **20% of calves** with IgG **10–17.9 g/L**
- **10% or fewer** with IgG **< 10 g/L**

These targets are somewhat aspirational. They are intended to challenge producers and advisors to improve colostrum management beyond simply avoiding FPT.

As calves move into higher IgG categories:

- Mortality declines
- Morbidity declines—often in a linear fashion

While mortality differences above 18 g/L are modest, morbidity continues to decrease as IgG increases. Higher immunity means healthier calves.

Achieving These Goals

To reach these targets, producers must focus on:

- Feeding more colostrum
- Ensuring high colostrum quality
- Feeding colostrum earlier after birth

The benefits—improved health, reduced treatment costs, and better performance—make the effort worthwhile.

Implementing a Blood Sampling Program

To monitor herd-level immunity, producers should implement a regular blood sampling program. Monthly sampling of a representative subset of calves can provide valuable information.

Work with your veterinarian or dairy advisor to:

- Establish a consistent sampling routine
- Monitor percentages in each IgG category
- Identify sources of variation over time

With attention to detail and consistent monitoring, producers can improve both serum IgG levels and calf health outcomes.

Measuring IgG in Practice

Most farms do not measure serum IgG directly. Instead, we measure **serum Brix percentage** and convert Brix values to estimated IgG concentration. I've posted a conversion resource on CalfNotes.com to help with these calculations.

Final Thoughts

These new recommendations move us beyond a simple "pass/fail" model and toward a more refined understanding of risk at both the calf and herd level. By improving colostrum management and monitoring progress, we can continue to improve the health and welfare of young calves. Thank you for watching this Calf Note. I hope you found it helpful.