

Calf Notes.com

Calf Note #143 – Prevalence of FPT in the U.S.

Introduction

The August, 2009 issue of the Journal of Dairy Science contained an article from Beam and coworkers (Beam et al., 2009) that summarized a portion of the USDA Dairy 2007 survey conducted by the National Animal Health Monitor System (NAHMS) in major dairy producing states. The results of this study suggest some important changes (and improvements) in how producers feed colostrum to calves and the prevalence of failure of passive transfer (FPT) in newborn calves. The authors defined FPT as calves with a serum IgG concentration less than 10 g/L when a blood sample was collected from the calves at 1 to 7 days of age.

The research

Evaluation of serum IgG concentrations in newborn calves was conducted as part of the Dairy 2007 evaluation conducted by NAHMS. As part of this research, USDA and state personnel collected blood from heifer calves between 1 and 7 d of age that had received colostrum. Information about the calves (age at first feeding, quantity of colostrum fed, how the colostrum was fed (tube feeder, nipple feeder, etc.) was collected also. Blood samples were then shipped to a central lab where they were analyzed for IgG by radial immunodiffusion.

A total of 1,816 samples were evaluated. These samples came from 394 different operations in 17 states, and so represented a cross-section of dairy operations throughout the U.S. Most of the samples were collected from smaller herds (< 500 cows/herd) and 83% of the calves were on farms in the Eastern U.S. (IN, KY, MI, MN, MO, NY, VA, WI, OH, PA; 83%) vs. Western U.S. (West = CA, TX, NM, ID, WA; 17%).

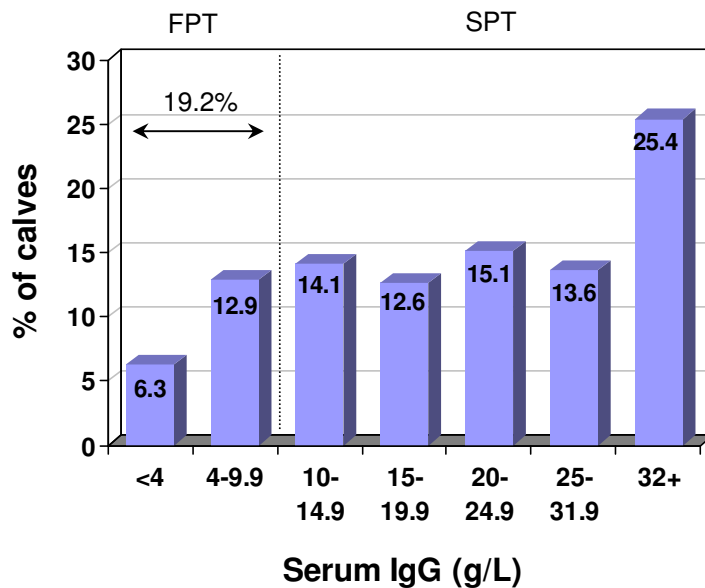


Figure 1. Proportion of calves attaining various concentration of serum IgG at 1 to 7 days after birth. From: Beam et al., 2009.

Percent of calves in the study, categorized by serum IgG concentration is presented in Figure 1. The percentage of calves with serum IgG <10 g/L (indicating FPT) was 19.2% and percent of calves with high levels of

serum IgG (arbitrarily categorized as >25 g/L) was 39%. Based on these data, it's clear that we're doing a pretty good job of feeding colostrum to our calves.

If we compare the 2007 data with other surveys of FPT in newborn calves, it appears that we have made significant progress in our colostrum feeding programs. For example, samples of serum were analyzed from 2,177 calves as part of the 1991 Dairy study conducted by NAHMS. In this study, it was reported that 41% of calves had FPT. A reduction from 41 to 19% FPT suggests that we've made great progress in colostrum feeding practices which reduced the national estimate of FPT.

But, wait. There was an important change in the populations of calves sampled in the two studies. The calves sampled in the 1991 NAHMS study was all calves present on the farm, **regardless of whether or not they had been fed colostrum**. On the other hand, the calves sampled in the 2007 study were **only heifer calves that had been fed colostrum and were healthy**. Clearly, there are important differences between the populations in these two studies, which affect the interpretation of the data.

The population of calves in the 1991 study was a wider population of calves than the population in the 2007 study. The 2007 study really was a subset of the 1991 study, which makes the comparison of the two studies very difficult. Consequently, it's not reasonable to compare the two studies and say that we've made any real progress in colostrum management over the past 16 years.

It's interesting that nearly 20% of calves that were healthy and were fed colostrum in the first 24 hours of life still had FPT. Why? This rate of FPT may be due to two problems. The first issue is variation in colostrum IgG concentration. Many research trials have shown wide variation in colostrum IgG concentration and some studies indicate that most (>50% of cows) produce colostrum with inadequate mass of IgG. This can increase the rate of FPT in the herd.

Secondly, calves that experience a difficult birth, are fed later in life or are fed colostrum contaminated with bacteria may not be able to absorb IgG from the intestine efficiently. This is called the apparent efficiency of IgG absorption and can vary widely from calf to calf.

Some other aspects of colostrum management from the 2007 NAHMS study have some important implications as to how we feed and manage colostrum for newborn calves.

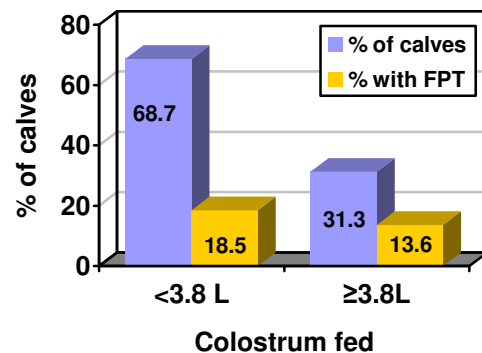


Figure 2. Proportion of calves fed less than or 3.8 L or more colostrum in the first feeding after birth and % of FPT in each population. From: Beam et al., 2009.

Figure 2 shows the % of calves fed < 3.8 L (1 gallon) of colostrum in the first feeding versus those calves fed 3.8 L or more. Most producers (68.7%) in the study feed calves less than 3.8 L. To reduce the risk of FPT, many dairy professionals recommend feeding 3.8 L of colostrum in the first feeding, when the calf's ability to absorb IgG is maximal. Calves fed 3.8 L or more were less likely to have FPT than calves fed less than 3.8 L in the first feeding.

Figure 3 shows the proportion of calves allowed to nurse the dam versus those calves fed by hand (nipple bottle or tube feeder). About 25% of calves are still allowed to suckle from the dam as the primary method of obtaining colostrum. This is a bad idea. Many research trials have shown conclusively that allowing the calf to nurse the dam results in greater rates of FPT and greater morbidity and mortality. The 2007 NAHMS study confirmed this – the highest % of FPT was reported in calves allowed to nurse the dam. Calves allowed to nurse the dam were much more likely to have FPT than calves hand fed colostrum.

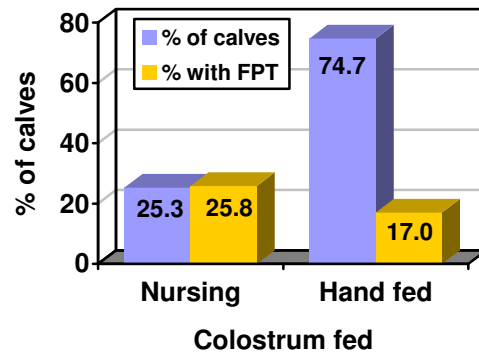


Figure 3. Proportion of calves allowed to nurse or hand fed (nipple bottle or tube) and % of FPT in each population. From: Beam et al., 2009.

Figure 4 shows the proportion of calves fed either by nipple bottle, tube feeder or some other method (or a combination of methods). Using an esophageal feeder did not result in a greater percentage of FPT compared to calves fed by nipple bottle. Most producers still feed calves by nipple bottle (82.5% of calves). Generally, larger operations with more calves are more likely to use an esophageal feeder to standardize procedures in colostrum feeding, feed as early as possible and minimize the time needed to feed large number of calves. Most operations in this study were smaller herds (>50% of herds in the survey were <100 cows) and these herds are less likely to use tube feeders as a standard operating procedure.

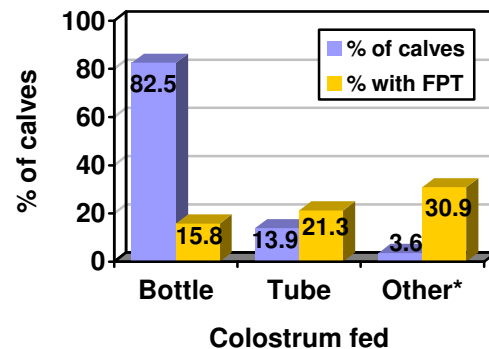


Figure 4. Proportion of calves fed by nipple bottle, tube feeder or other (*combination of methods or pails) and % of FPT in each population. From: Beam et al., 2009.

Some other management factors were associated with FPT in the study. Table 1 contains a summary of those factors. Notable was the increased risk of FPT when producers pooled colostrum (2.2 times more likely to have FPT), let the calf nurse the dam (increased odds of FPT = 2.42), or fed later than 4 hours of age (2.65 times more likely to have FPT). Also, the risk of FPT was increased when producers did not seek vet advice when cows had a difficult calving. This may be related to delayed calving, more calves pulled and reduced efficiency of absorption in these calves.

Summary

The Dairy 2007 study evaluated prevalence of FPT in heifer calves in the U.S. The population of calves used in this study was different than previous studies (i.e., only heifer calves that had consumed

Factor	Increased risk	Plevel
Doesn't monitor serum total protein	13.82	0.001
Doesn't seek vet help with hard calvings	2.62	0.017
Pools colostrum	2.20	0.007
Let's calf nurse the dam	2.42	0.001
Feeds later than 4 hours of age	2.65	0.001
Doesn't warm calves in cold weather	1.65	0.044

Table 1. Increased risk of FPT when dairy producers use various management strategies for feeding colostrum. From Beam et al., 2009.

colostrum and were healthy at the time of sampling), so we can't really compare results of this study with those of previous studies.

The proportion of calves with FPT has an important impact on health and mortality. Calf health can be defined as an absence of disease and is directly related to two factors – the calf's immunity and the amount of exposure to which the calf is exposed. When calves have FPT, their overall immunity is depressed and their ability of fight off infectious agents will be reduced. Therefore, they are more likely to become sick and are more likely to die.

Reference

Beam, A. L., J. E. Lombard, C. A. Koprak, L. P. Garber, A. L. Winter, J. A. Hicks, and J. L. Schlater. 2009. Prevalence of failure of passive transfer of immunity in newborn heifer calves and associated management practices on US dairy operations. *J. Dairy Sci.* 92 :3973–3980.

Written by Dr. Jim Quigley (29 August 2009)
© 2009 by Dr. Jim Quigley
Calf Notes.com (<http://www.calfnotes.com>)