

Alliance

Research: Beat the odds of calf morbidity and mortality with successful passive transfer of immunity

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Getting calves off to a good start with sound colostrum management can contribute to their success of passive transfer of immunity and reduce their odds of morbidity and mortality in the first four months of life, a University of Guelph study has found.

The study involved 2,204 newborn heifer and bull calves 1 to 7 days of age from 16 farms in southwestern Ontario. To assess failure of passive transfer of immunity (FPT) levels in the study, serum total protein (serum TP) was measured in blood samples from all the study calves.

Serum TP values ranged from 3.6 to 9.7g/ dL, with a mean of 5.71 g/dL (SD 0.68). The distribution of values is shown in Figure 1. Success of passive transfer was considered anything above 5.2 g/dL. Using this cut-off point, 446 calves (20.2%) had FPT - meaning that this group of calves did not receive adequate transfer of nutrients and maternal immunoglobulins via colostrum to protect against disease-causing pathogens. Furthermore, these calves with FPT were 1.78 times more likely to be treated at least once and 1.77 times more likely to die before four months of age when compared with the calves having successful transfer of immunity.

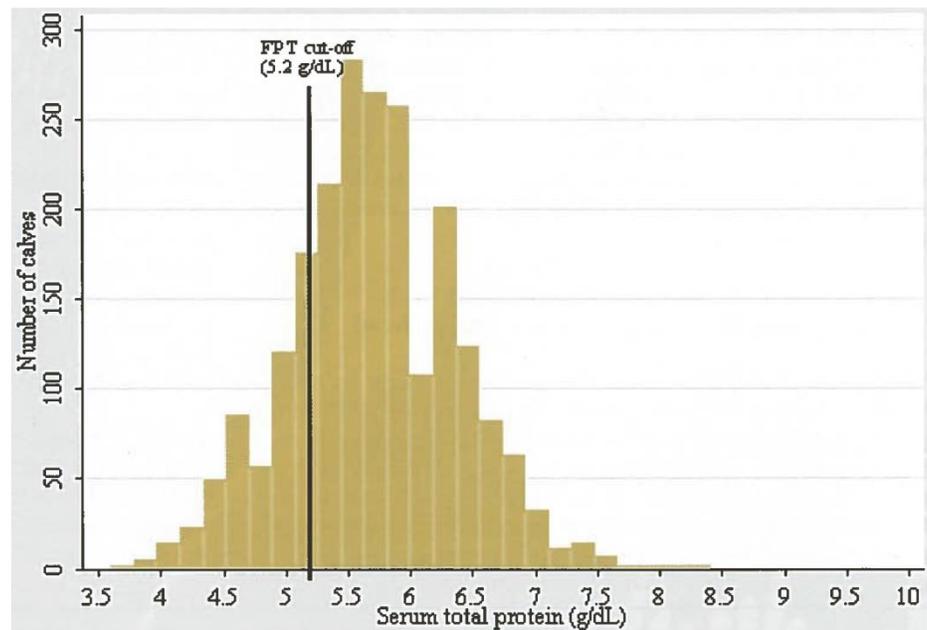


Figure 1. Serum total protein concentrations in 2,204 calves 1 to 7 d of age on 16 dairy farms in southwestern Ontario.

Analysis of serum TP levels revealed that FPT rates varied significantly by farm of origin, with a range from 0 to 60.0% of calves on farm with FPT (see Figure 2). Also, heifer calves were more likely to have higher serum TP concentrations and less likely to have FPT than bull calves. To begin to understand what

might be influencing these differences by farm and gender, various statistical models were run. The models showed that passive transfer was associated with first and total colostrum volumes, season of birth and assistance at birth.

More specifically, calves that were offered more colostrum at first feeding and more total colostrum in the first 24 hours of life had higher serum TP concentrations and reduced odds of FPT. On average, calves in this study were offered 4.0 L (SD 1.2) at the first colostrum feeding and 6.1 L (SD 1.3) total volume in the first 24 hours of life. Colostrum was most commonly offered twice in the first 24 hours (45.4% of calves); while 36.3% of calves were offered colostrum once, and 18.0% had it offered three or more times. Heifers were offered on average 0.3 L more colostrum than bulls at first feeding (4.2 L, SD 1.2 vs. 3.8 L, SD 1.1). Most calves received pooled (65.1% of calves) and fresh (67.2%) colostrum. An esophageal feeder was the most common route of colostrum delivery (63.1%), followed by bottle feeding (47.5%), or a combination of the two methods (12.2%).

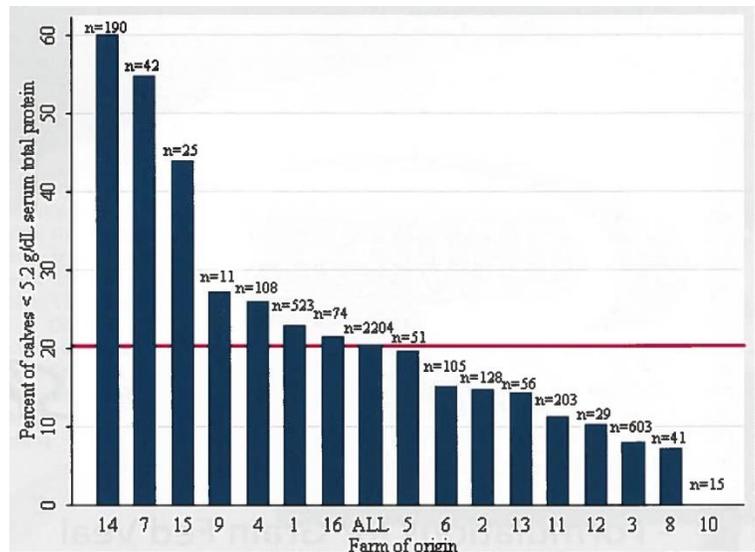


Figure 2. Percent of calves in whole population and by farm of origin with serum total protein concentrations < 5.2 g/dL, indicating failure of passive transfer, as measured in calves 1 to 7 d of age enrolled in the study from January 2008 to December 2008 (N = calves with FPT/total calves enrolled).

Calves born in the spring months were found to have the lowest serum TP values, whereas calves born in the fall months had the highest values and lowest odds of FPT. Also, calves that were observed but unassisted at birth tended to have higher serum TP levels than calves that were unobserved. However, calves that were delivered as a hard pull, by surgery or had malpresentation tended to have the lowest serum TP values and highest odds of FPT.

Newborn calves were enrolled in this study during weekly farm visits that occurred between January and December 2008. A variety of information was collected for each calf including details about the delivery circumstances, calving environment, colostrum practices, shoulder height and girth measurements and any treatment and death occurrences. Blood samples were also collected for analysis. Bull calves were sampled by the research technicians, only at the initial enrollment visit (1 to 7 d of age), while heifer calves were sampled at three additional periods until four months of age.

The farms selected to participate in this study represented a range of calf management practices commonly found on Ontario farms. The study farms were compared against other provincial farms reported in the 2008 Progress Report by CanWest DHI. The comparison revealed that farms included in this study tended to rank above average for management and production values.