

# Calf Notes.com

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## *Calf Note #154 – Factors affecting calf mortality on a NY calf ranch*

### **Introduction**

Lots of factors can affect calf mortality. We also know that young calf mortality is too high and finding ways to improve practices to reduce morbidity and mortality is important. So, the recent research report in the January, 2001 issue of the Journal of Dairy Science by Henderson and coworkers (Henderson et al., 2011) is particularly timely. These researchers wanted to identify typical management factors that can be commonly monitored on dairies or calf ranches that directly influence health, or are signposts to indicate an effect on health. Also, the researchers wanted to know what effect (if any) that genetics had on calf health. In other words, are calves from particular sires more or less likely to have health problems?

### **The research**

A heifer calf ranch in Western New York provided DairyComp 305 data for the study. The study recorded data between December 1998 to June 2008 and were records from 14,629 heifer calves from 38 herds sired by 502 bulls. After editing the dataset for incomplete records, there were a total of 7,372 calf records used. Calves arrived at the farm at 2-3 d of age, were weighed and blood was sampled for measurement to serum total protein. Incentives were provided to the dairy if total proteins were greater than 5.3 g/dl. Thus, most calves were fed adequate amounts of colostrum in the first 24 hours of life. Calves were housed in individual pens to weaning at about 7 wk of age, then in groups thereafter. Health and survival records were maintained through weaning and until the calves left the calf ranch, usually at one month prior to calving.

### **The results**

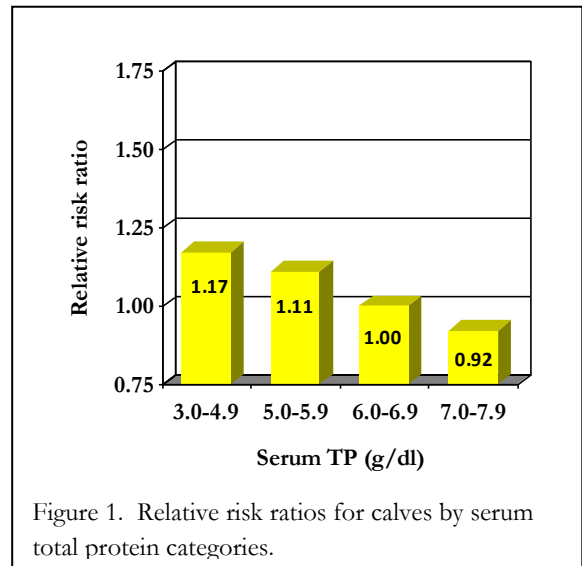
The researchers evaluated effects of several different factors on calf survival to weaning and when they left the farm. In addition to normal management factors, the researchers looked at genetic variance associated with bulls used by the dairies. This Calf Note will address only the management factors associated with survival.

The average pre-weaning mortality was very low – only 2.7%. This was probably due to the high percent of calves that received colostrum at birth (average serum total protein was 6 g/dl) and the aggressive antibiotic therapy used by the calf ranch for calves that showed disease. Death loss of calves from weaning to leaving was much higher – 8.7%.

So, what factors affected the overall death loss of calves to weaning and returning to the dairy? Six factors were important – serum total protein on arrival, calving ease score, calf BW on arrival, BW at weaning, season of birth and number of treatments.

The researchers evaluated the effects of these factors by calculating a “relative risk ratio”. These indicate the relative risk of mortality when comparing groups of calves in different categories. An example can show how risk ratios work.

*Serum total protein.* All calf raisers know (or should know!) the importance of colostrum feeding on calf health. Serum total protein risk categories corroborate this. Figure 1 shows the risk ratios for four serum TP categories. Calves with serum TP between 6.0 and 6.9 were the “standard risk” category. Calves with serum TP of 5.0 to 5.9 were 1.11 times more likely to die than calves with serum TP of 6.0 to 6.9. Calves with serum TP >7.0 were 0.92 times more likely to die (so, they were less likely to die) than calves with serum TP of 6.0 to 6.9. Calves with low TP (<4.9) were 1.17 times more likely to die than calves with “normal” TP of 6.0 to 6.9 g/dl.



These risk ratios seem lower than some others have reported in the scientific literature. This may be because the calf ranch gave incentives to dairies to provide calves that had received colostrum and also were aggressive in treating calves when they showed a sign of illness. Thus, the preweaning calf mortality was quite low (less than 3%). This also suggests that at least some of the protective effect of serum TP carried on after weaning, an observation also made by other researchers.

*Calving ease score.* Another common cause of calf mortality is difficult calving. The researchers also found that difficult calvings (calving ease scores >1) contributed to increased mortality. In this study, calves with scores of 3 or 4 were about 1.6 times more likely to die than calves with a score of 1.0 (Figure 2). Calving ease scores were recorded as 1 = no pull; 2 = easy pull; 3 = hard pull; 4 = excess force or surgery.

For calf raisers who manage calves, information about calving score would be most useful to identify those calves at greatest risk. Simply marking calves on the forehead with chalk or grease pen to indicate a difficult calving would provide important information to the calf raiser.

*Arrival BW.* Figure 3 shows the relative risk ratios of calves arriving at the calf ranch in five body weight categories. The “average” Holstein heifer calf on arrival at a few days of age will weigh about 40 kg; moving away from this category (of 38-41 kg) increases the risk of mortality. Increased risk was much greater for really big calves (47 kg or greater; 103 lb or greater) – these calves were 1.49 times more likely to die than calves in the average category. This is probably because heavier calves likely suffered more calving difficulties.

Small calves also had increased risk of death loss and this risk seemed to increase as calves were smaller (Figure 3). Perhaps very small calves were not as well developed; were twins or were born early. Each of these factors could contribute to increased risk of mortality.

*Weaning BW.* An interesting observation in this study was the effect of BW at weaning on mortality. As you can see in Figure 4, risk of mortality decreased as calves were heavier at weaning. The single biggest risk in this study (and related to this specific farm!) was when calves were weaned light (34-50 kg; 75-110 lbs). These calves were more than three times more likely to die than calves weighing 60-68 kg. And, risk decreased linearly as weaning BW decreased. Clearly, lighter calves had a much more difficult time dealing with the stress of weaning and grouping than heavier calves.

It’s important to remember that this farm experienced low preweaning mortality (2.7%) and high postweaning mortality (8.7%), so it makes sense that one or more factors related to the calf’s ability to handle the stress of weaning would be important in the results.

Calves on this farm were weaned about seven weeks of age; it’s possible that the lightest calves also were sick prior to weaning, hadn’t grown as well and were less able to compete in groups after weaning. Their immune systems may have been less robust due to slower growth prior to weaning, also. In any event, being very light at weaning was a real risk factor. This information could help the manager of the farm to determine a minimum weight for calves to move into groups, irrespective of the age of the calf. Of course, holding calves back in the hutches until

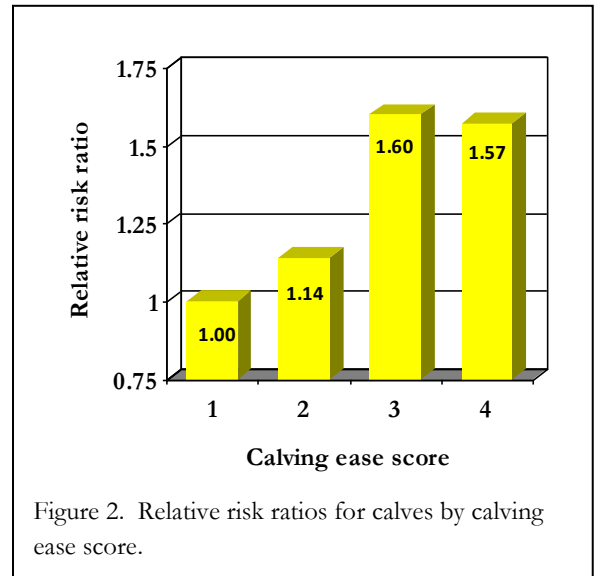


Figure 2. Relative risk ratios for calves by calving ease score.

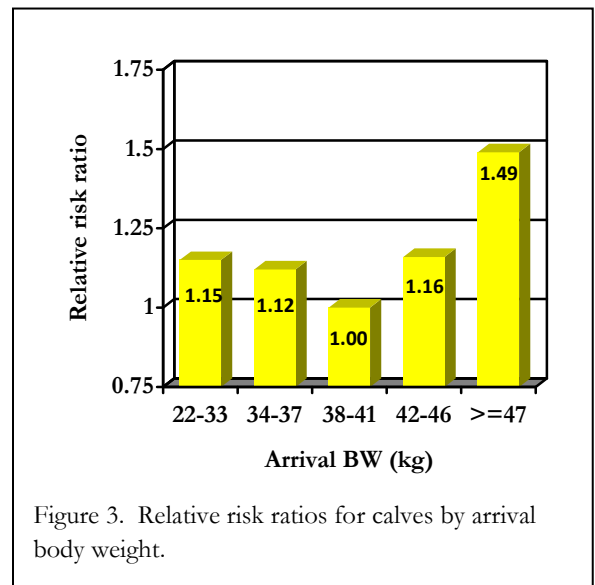
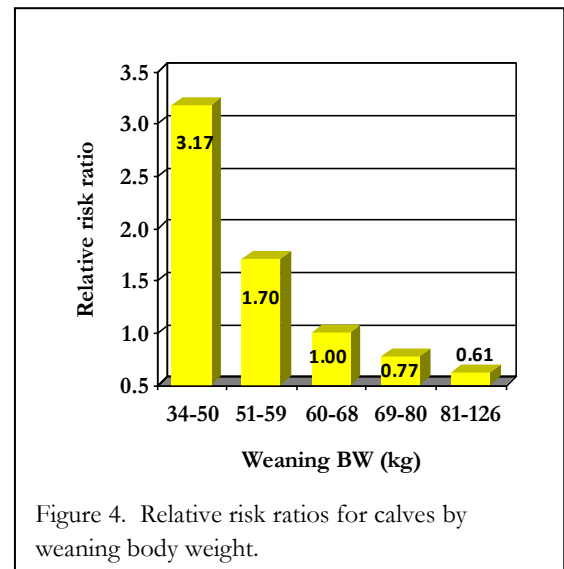


Figure 3. Relative risk ratios for calves by arrival body weight.

they reach a specific body weight requires enough hutches. Alternatively, a separate, smaller weaning area could be set up for lighter calves, to give them a chance to become adjusted to smaller groups before moving into the standard weaning pens.

Rumen development and preparation for weaning is a function of solid feed intake, and not age *per se*. Thus, if calves hadn't eaten much starter (and, thus, grown heavier), their rumens wouldn't be ready for weaning and they would be at a great disadvantage when moved out of the hutches.

*Other factors.* The two other factors that affected mortality were season of the year and disease group. Calves born in spring (April to June) and fall (October to December) were less likely to die than other calves. Providing nutrients and shelter for calves in inclement weather can improve their survival, health and growth.



Disease group referred to the number of times calves were treated prior to weaning. Generally, increasing number of treatments increased risk of mortality. Calves treated once were slightly less likely to die than calves not treated at all; perhaps the pre-emptive protocol used on this farm was slightly protective to the diseases experienced on the farm.

## Summary

Several factors affected calf mortality in this study. Because the farm experienced greater postweaning mortality than preweaning mortality, the most important factor was body weight at weaning. Other factors – commonly shown to be related to calf mortality – included serum total protein, calving ease, arrival (birth) body weight and season of the year. Using this information can help calf raisers establish protocols to measure and monitor these important factors on their farms.

## Reference

L. Henderson, F. Miglior, A. Sewalem, D. Kelton, A. Robinson, and K. E. Leslie. 2011. Estimation of genetic parameters for measures of calf survival in a population of Holstein heifer calves from a heifer-raising facility in New York State. *J. Dairy Sci.* 94:461–470.

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