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Many factors affect calf survival after weaning

Bottom Line

with
AL KERTZ*

SOME of my previous columns have covered calf mortality from stillbirths to weaning.

As one column I wrote in 2006 indicated (*Feedstuffs*, March 13, 2006), it is a sorry state for calf morbidity and mortality with stillbirth rates ranging anywhere from 6.5% to 20% and preweaned deaths accounting for another 8-10%.

The more that is known about factors related to these deaths and morbidity, the more likely it is that management decisions will be made to minimize them.

Gaining more information entails using larger databases to have more confidence in the meaning of the data analyses.

Another dimension was added to the equation in looking at genetic components of calf and heifer survival (Henderson et al., 2011).

At any given time, approximately 4,000 calves may be located at the facility described in the Henderson et al. paper.

Data accessed were of 14,629 heifer calves from 38 herds sired by 502 bulls during the period from December 1998 to June 2008. After restricting the data for reasons such as having at least 10 daughters from a sire and having a minimum of five calves from a dairy operation raised at the facility, the Henderson et al. analysis used 7,372 calf records from 36 herds sired by 264 bulls.

At arrival, two- to three-day-old calves were weighed and measured, and serum total protein (TP) was determined.

Interestingly, the protocol of this operation states that calves with a TP of $\leq$ 5.3 mg/mL have no guarantee of survival for the first 12 days there; for calves with a TP of 5.4-6.0 mg/mL, both the facility and dairy of origin share the costs of treatments or deaths, and for calves with a TP of $\geq$ 6.0 mg/mL, the facility refunds all fees and medication for any calf that dies.

Calves in this database were reared in individual pens in barns of 48 calves and were weaned at approximately seven weeks using a step-down method. After weaning, calves were moved to the weaning barn on Monday of each week and grouped for the first time. Heifers were then raised on the facility until about one month before calving, when they were sent back to the original dairy.

Of the 7,372 heifer calves in the database, 2.7% died before weaning, and 8.7% died after weaning. These statistics were the reverse of data such as from the National Animal Health Monitoring System (2007).

Henderson et al. attributed the lower preweaning death rate to calves being kept individually and being very closely monitored, and higher postweaning death losses were attributed to those calves that struggled with health issues before weaning, which caused them to succumb postweaning.

Important fixed effects in the statistical analyses of predicted survival from arrival to exit were calving ease score, arrival weight, weaning weight and disease incidence class. Those came as no real surprises.

However, maybe somewhat surprising was that serum TP and season of birth were lesser factors but still influenced survival.

Weaning weight class had the greatest influence on mortality incidence, as seen in part D of the Figure. Furthermore, calves with greater weaning weights were more likely to survive to maturity than heifers of average or below-average weaning weights. Henderson et al. surmised that this could be due to less disease occurrence as well as possibly calves having genes for increased growth and general disease resistance.

If the calves survived beyond weaning, being in good shape and having little or no disease occurrence before weaning may have put them in even better shape postweaning.

In an epidemiological study with 25 New York herds, Warnick et al. (1995) found that if calves had a respiratory problem, they were essentially impaired for life, as demonstrated by slower growth, having a first calf at an older age than cohorts, having more calving difficulties and being culled earlier.

Heifers that experienced greater calving difficulties when they were born — as measured by calving ease score — were more likely to die (Figure, part A). This is consistent with the literature, part of which I addressed in my column from July 9, 2007.

Henderson et al. cited the same study I reviewed in 2007, as well as this Warnick et al. study, as providing evidence that calving difficulties influence survival beyond just the first 30 days of life, regardless of whether or in what shape they reach heifer maturity.

Part B of the Figure illustrates that a calf arrival weight of greater than 103 lb. or less than 81 lb. was associated with greater mortality, while the weight range of 84-90 lb. had the lowest risk ratio for mortality. Larger heifer calves may also have had more birth difficulties that may have also contributed to this greater mortality risk.

Calves that had two, three or more disease occurrences (Figure, part F) were found to have the greatest risk of death before leaving the facility near calving.

The disease severity, how quickly it was treated and how quickly the calf or heifer recovered all are factors that can determine how much the animal was impaired.

Bach et al. (2007) found — based on data from in a large, well-run Spanish calf/heifer ranch — that increasing incidences of scours before weaning decreased ($P < 0.02$) average daily gain, but not in the first group after weaning.

Pneumonia episodes also decreased ($P < 0.001$) average daily gain but did so after weaning, not before weaning. This may be because scours is primarily an issue before calves are weaned, whereas pneumonia incidence is more likely to occur after weaning (National Animal Health Monitoring System, 2007).

Two factors that had less of an effect on risk of mortality were serum TP and season of birth (Figure, parts C and E).

Season of birth had little variation in its effect on deaths, but spring calves fared

*Dr. Al Kertz is a board-certified, dairy field technical service and research consultant with Milk Specialties Global Animal Nutrition based out of St. Louis, Mo. To expedite answers to questions concerning this article, please direct inquiries to *Feedstuffs*, Bottom Line of Nutrition, 12400 Whitewater Dr., Suite 160, Minnetonka, Minn. 55343, or e-mail comments@feedstuffs.com.

somewhat better than calves born in other seasons.

As serum TP increased, there was a linear decrease in risk ratio of mortality. However, the risk may have been lower in this study than in other studies because of the incentive program this facility had with its dairy customers based on greater serum TP. Also, if colostrum is dirty, the serum TP may not tell the whole story (Godden, 2007).

The more than 200 bioactive compounds found in colostrum may also contribute to having a higher number of healthy calves (Blum and Baumrucker 2002). When either four quarts or two quarts of colostrum were fed at the very first feeding, the calves fed four quarts had half the veterinary costs, grew faster and produced 11% more milk in the first lactation, followed by 17% more milk in the second lactation (Faber et al., 2005). So, there appears to be more to colostrum than just the antibody part of the story.

The Bottom Line

Although not addressed in this column, genetic variability was sufficient for calf selection to be implemented if survival records before the first lactation were available on a large number of animals.

Other measures in this study, such as calving score ease, arrival weight, serum TP, weaning weight, season of birth and incidence of disease, also affected calf survival to varying degrees.

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Genetic analysis of calf survival

Risk ratio of removal (mortality and culling) for: **A.** calving ease score, **B.** arrival weight class (kg), **C.** total protein (g/liter) class, **D.** weaning weight (kg) class, **E.** season of birth and **F.** disease group class