

Development of a newborn calf vigor scoring system

C.F. Murray-Kerr,¹ BS, PhD; K.E. Leslie,¹ MS, DVM; S.M. Godden,² BS, DVM, PhD; W.A. Knauer,² VMD, PhD; S.M. McGuirk,³ DVM, PhD

¹ Department of Population Medicine, University of Guelph, 50 Stone Road E, Guelph, Ontario, N1G 2W1, Canada

² Department of Veterinary Population Medicine, College of Veterinary Medicine, University of Minnesota, 1365 Gortner Ave., St. Paul, MN 55108

³ Department of Medical Sciences, University of Wisconsin, School of Veterinary Medicine, 2015 Linden Drive, Madison, WI 53706

Introduction

Dystocia is a significant issue in Holstein cattle. Injury, pain, inflammation, acidosis, and low overall vitality are common effects seen in calves that survive. In humans, a standard vigor scoring system has been used for over 60 years. This score is based on Appearance, Pulse, Grimace, Activity, and Respiration (Apgar Score). A validated method of assessment of newborn calf vitality has not been developed. Also, pain management in newborn calves after dystocia is not often addressed by veterinarians or producers. It was the overall objective of this research to identify the various effects of calving difficulty on newborn dairy calves, and to relate these effects to easily measurable signs of reduced vigor. These signs were quantified into a VIGOR Scoring System. Also, methods to reduce pain, inflammation, and acidosis resulting from dystocia were investigated.

Materials and Methods

At the outset, a comprehensive literature review on the effects of dystocia on newborn calf vitality was completed. From this review, several measurements were significantly associated with reduced vitality. Subsequently, an intensive, observational study was conducted to gather further evidence of associations between readily measurable parameters and outcomes of vitality and well-being. From the results of these 2 efforts, a newborn calf VIGOR on-farm assessment tool was developed. The final tool included 10 separate measures, under 5 categories. Visual appearance included measures of meconium staining and tongue/head swelling. Initiation of movement focused on time to sternal recumbency and standing. General responsiveness was assessed through 4 measures, including suckling reflex, the straw tickle test, tongue pinch, and eye reflex. Oxygenation was classified by mucous membrane color. Finally, the rates of heart beats and respiration per minute were scored in 3 broad categories. As a conclusion, 2 formal controlled clinical trials were conducted to evaluate the effects of pain management with meloxicam, shortly after birth, on calf vitality, health and performance. These trials also provided a useful opportunity to assess the VIGOR Scoring System. In these studies, and the

observational experiment, data were entered in Microsoft Excel and exported into Stata-IC 10.1 for variable screening and statistical modeling. Significance was determined at $P \leq 0.05$.

Results

From the results of the literature review and prospective experiments, a calf VIGOR Scoring System was created. Using the VIGOR Score, calving assistance was highly associated with decreasing newborn calf vitality. Calves born from a difficult calving had lower blood pH, weaker suckling response, and took longer to achieve sternal recumbency and attempt to stand. Increased time with a longer recovery interval between birth and VIGOR assessment, significantly improved the score. Associations of meconium staining and eye reflex with assistance at calving were not consistent and should be re-evaluated. In the controlled field trials, there was considerable evidence that providing pain control with meloxicam, shortly after birth, may improve calf vitality, health and performance outcomes, particularly in calves that experienced dystocia.

Significance

Results from this research program demonstrate that newborn calf vitality can be readily completed on-farm, using the VIGOR Scoring System. Calves with low vitality showed potential benefits from NSAID (meloxicam) therapy following birth, as evidenced by improvements in calf vitality, milk intakes, weight gain, and overall health. In conclusion, the proposed VIGOR Scoring System is ready for dissemination to veterinarians and producers for inclusion into maternity management protocols, particularly in herds experiencing issues with dystocia. This new scoring tool should be assessed in a large-scale clinical research project to determine its usefulness for on-farm decision making. Finally, an iPad app, called the Calf VIGOR Scorer has been developed at the University of Wisconsin. This iPad app allows for convenient collection, storage and analysis of calf VIGOR data. It is now available from the iTunes app store.