Effect of implementing a novel calf vitality scoring system and early intervention program on pain management in newborn dairy calves

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Introduction

Pain management in newborn calves after dystocia and assisted calving is still not addressed by most producers or veterinarians. The calf VIGOR scoring system, developed at the University of Guelph, was designed to be applied within minutes after birth to assesses Visual appearance, Initiation of movement, General responsiveness, Oxygenation, and heart and respiration Rates in calves. The VIGOR scoring system was designed to identify high risk/low vigor calves for the purpose of applying interventions to improve vigor and survivability. In different studies conducted at the University of Guelph it was reported that providing pain management with a non-steroidal anti-inflammatory (meloxicam), shortly after birth, may improve calf vitality, health and performance outcomes, particularly in calves experiencing dystocia. The objective of this study was to conduct a randomized controlled trial to evaluate the effect of implementing a novel program that includes assessment of newborns using the VIGOR scoring system followed by provision of meloxicam to calves with low vigor scores, on outcomes reflecting calf well-being and health.

Materials and Methods

The study was conducted in summer 2017 on a 5,000 cow MN dairy. Live-born calves underwent enrollment within 3 h of birth (T0), including recording of weight, collection of a venous blood sample, vitality assessment using the VIGOR System, and colostrum feeding. The calf was then randomly assigned to either the treatment (TX) or control (CON) program. Within the TX program, calves with a low VIGOR score (< 21) were administered a gel capsule per os containing meloxicam (MX; approx. 1 mg/kg). Between 24 and 36 h post-enrollment (T24) calves were reassessed using the VIGOR system, and a second blood sample collected. Paired (T0 and T24) plasma samples from 300 randomly selected calves were submitted for determination of plasma prostaglandin E2 (PGE2, pg/ml) and cortisol (ng/ml) concentrations. Although bull calves were lost to follow-up after 24 h (sold), heifer calves were monitored until weaning: Study technicians health scored all calves at approximately 7 d, producer-reported treatment and death events were recorded, and calves were weighed at 1 and 7 wk of age. Linear and logistic regression was used (as appropriate) to evaluate the impact of treatment of low VIGOR calves with MX on indicators of inflammation/pain and VIGOR score at 24 h in all calves, and on health and growth during the preweaning period for heifer calves. Significance was set at $P < 0.05$.

Results

Of 1,483 calves enrolled (CON = 760; TX = 723), 68% and 32%, respectively, achieved a high (≥ 21) or low (<21) VIGOR score at T0. At T0, calves with low VIGOR scores were heavier, were from calvings with higher dystocia scores (DS; 0 to 5), and had increased plasma PGE2 concentrations (BWt = 40.2 kg; DS = 0.50; log10PGE2 = 1.63) as compared to calves with high VIGOR scores (BWt = 39.4 kg; DS = 0.37; log10PGE2 = 1.53) (P<0.05). Treatment of low VIGOR calves with MX at T0 resulted in a larger reduction and lower plasma PGE2 concentrations by T24 (log10PGE2 = 0.76), as compared to untreated low VIGOR calves (log10PGE2 = 0.99). However, treatment of low VIGOR calves with MX at birth had no effect on VIGOR score at T24 (CON = 22.8(0.08); MX = 22.8(0.08); P=0.55), on preweaning weight measures including ADG at 7 days (CON = 0.64 (0.03); MX = 0.60(0.03) kg/day; P=0.38) and ADG at 7 weeks (CON = 0.69(0.01); MX = 0.67(0.01) kg/day; P=0.12), or on preweaning health measures including odds for treatment for disease by the producer (CON = 12.6%; MX = 11.8%; Odds Ratio (CON) = 1.08(0.63,1.84); P =0.79) or odds for dying (CON = 1.2%; MX = 1.4%; Odds Ratio (CON) = 0.85(0.17,4.31); P =0.85).

Significance

Newborn calves with a low VIGOR score experienced increased inflammation and associated pain as compared to calves with a high VIGOR score at birth. The calf VIGOR scoring system may be used shortly after birth to identify low VIGOR calves for the purpose of treating with MX in order to reduce inflammation and associated pain, thereby improving calf well-being.