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Calf management risk factors on dairy farms associated with male calf mortality on veal farms

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ABSTRACT

The objective of this cross-sectional herd-level study was to assess the association of calf management practices on source dairy farms with mortality risk on veal farms. From April to October 2016, 52 source dairy farms supplying male calves to 2 veal operations were visited once. A questionnaire was administered that covered all areas of calf management, calves between 1 and 10 d of age were examined using a standardized health scoring system, and blood was taken to evaluate passive transfer of immunoglobulins. The mortality risk for calves from each dairy farm was calculated based on the number of male calves sold from the dairy farm and that died during 2016 at the veal operations. The mean mortality risk was calculated for both veal farms and, based on the veal facility-adjusted mortality risk, dairy farms were classified as high- or low-mortality source farms. Using the information gathered at the 52 source dairy farms, a logistic regression model was used to assess factors associated with being a high-mortality source farm. Suppliers to veal farm 1 had a mean mortality risk of 9.6% and suppliers to veal farm 2 had a mean mortality risk of 4.2%. The lower mortality risk at veal farm 2 was partially influenced by a shorter period of observation. Of the 182 calves examined during the single visit to the source dairy farms, 41% of male calves and 29% of female calves had at least one identifiable health abnormality. The risk of failure of passive transfer on source dairy farms was low, with only 13% of calves tested having <10 mg of IgG/mL of serum. The subset of calves examined at the source dairy farm was not followed prospectively to the veal farms. Using a tube feeder or pail to feed colostrum, bedding male calves on wood shavings or chopped straw at the source dairy farm, and the herd veterinarian not routinely and actively inquiring about the health and performance of calves during regular herd visits were significantly associated with the farm being classified as a high-mortality source dairy farm. Checking the calving pen at an interval of every 3 h or more during the day was associated with a lower probability of being classified as a high-mortality source dairy farm. The results of this study suggest that there are management practices on the source farm that contribute to the risk of mortality on veal farms.

Key words: mortality, veal farm, dairy, management practices

INTRODUCTION

Management of the newborn dairy calf is essential to its survival and productivity. Calving management, colostrum management, feeding, housing, and timely treatment on dairy farms are critical to the calf, including male calves. Male calves transferred to veal farms often face disease challenges resulting from transportation stress (Mormede et al., 1982), commingling with calves from multiple sources (van der Fels-Klerx et al., 2000), placement into a new housing facility, and adapting to a new diet, all within the first 2 wk of life. Currently, high levels of mortality (Bähler et al., 2012; Pardon et al., 2012a), morbidity (Pardon et al., 2012a), antimicrobial use (Pardon et al., 2012b; Bos et al., 2013), and antimicrobial resistance (Catry et al., 2016) are challenges faced in the veal industry. With an increased focus on improving animal welfare and increased pressure to reduce antimicrobial use (Pardon et al., 2014), emphasis needs to be placed on prevention of disease. Many areas could be explored for disease prevention but as most mortality occurs in the first 21 d on the veal farm (Bähler et al., 2012; Pardon et al., 2012a; Winder et al., 2016), calf management on the source dairy farm may play a role. Currently, there is a lack of peer-reviewed literature identifying management factors on dairy farms that affect calf health at veal farms even though many veal producers are empirically able to identify high-mortality source dairy farms.

Because male calves are more likely to experience dystocia (Olson et al., 2009) and with approximately 10% of calvings resulting in dystocia (Mee, 2008), it is imperative to have appropriate timing and methods of intervention through regular surveillance (Mee, 2004) to reduce many of the effects associated with dystocia.

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Successful passive transfer of immunity is essential for calves in the prevention of disease (Postema and Mol, 1984; Pardon et al., 2015). To achieve adequate passive transfer of immunoglobulins, it is necessary to provide an adequate quantity of high-quality colostrum quickly after birth while minimizing bacterial contamination (Godden, 2008). Despite its known importance, failure of passive transfer is estimated to affect 41 to 43% of male dairy calves (Wilson et al., 2000; Pardon et al., 2015). A few studies have described some discrimination against male calves in regard to colostrum management, with male calves being more likely to be fed colostrum contaminated with bacteria (Fecteau et al., 2002), receive a smaller volume of colostrum, have delayed colostrum feeding, or be left with the dam as a mechanism to feed colostrum (Shively et al., 2016). Given the role that colostrum management has been demonstrated to play in disease prevention (Wells et al., 1996; Donovan et al., 1998; Windeyer et al., 2014) but also in improved rate of gain and feed efficiency in female dairy calves (Robison et al., 1988; Faber et al., 2005), reasons for this discriminatory behavior and its effect on male calf mortality need to be described.

Several studies have shown the importance of early life nutrition. Nutritional programs providing higher volumes of milk have shown increased weight gain and may aid in improving disease resistance (Khan et al., 2007; Ollivett et al., 2012; Todd et al., 2017). As a lower weight at arrival at a veal facility has been associated with greater risk of mortality (Brscic et al., 2012; Winder et al., 2016), nutrition might be an important factor in prevention of morbidity and mortality in male calves.

Housing style (Waltner-Toews et al., 1986), ventilation (Windeyer et al., 2014), and bedding type (Lago et al., 2006) have been shown to be associated with female dairy calf mortality. The effect of housing for male calves on the source farm on health in veal operations is largely unknown.

The objective of this cross-sectional herd-level study was to assess the association of calf management practices on source dairy farms with mortality risk on veal farms. A secondary objective was to identify management differences between male and female dairy calves at the source dairy farms.

MATERIALS AND METHODS

Experimental Design

A cross-sectional study was conducted from April to October 2016 to collect data on calf management practices at source dairy farms supplying calves to 2 veal facilities in Ontario, Canada. The 2 veal operations were selected due to their proximity to the University of Guelph and willingness to participate in this study. Veal farm 1 is a milk-fed veal facility that uses group and individual to group housing. This farm ships calves to slaughter for white veal after a production period of approximately 20 wk and had a mean hot carcass weight of 280 lb (127 kg) for all calves slaughtered in 2016. Veal farm 2 is a grain-fed veal facility that uses individual to group housing for all calves reared. After 11 wk at veal farm 2, the calves are shipped to a group housing facility and are slaughtered after an additional 20 wk for red veal. The mean hot carcass weight was 380 lb (172 kg) for all calves slaughtered in 2016 from veal farm 2. Both veal facilities maintained housing facilities at a minimum of 15°C in the initial portion of the growing period and housed the calves on a slatted floor.

The source dairy farms were visited once and each visit involved the completion of a questionnaire, examination of calves between 1 and 10 d of age using a standardized health scoring system, and collection of blood to evaluate passive transfer. The questionnaire (Supplemental Data; https://doi.org/10.3168/jds.2017-13578) comprised 75 questions addressing herd demographics, calving management, newborn calf care, colostrum management, calf housing and feeding, dry cow management, and veterinary assistance. The questionnaire was developed through a literature review of the main factors affecting calf health and based on questions developed by Vasseur et al. (2010). All questions were asked verbally of each participating dairy producer and their responses were entered into an online platform (Qualtrics; https://www.qualtrics.com/) by one of the investigators during the visit. The questionnaire specifically inquired about differences in male and female calf management. The standardized health screening was completed using the Calf Health Scorer application developed by the University of Wisconsin (https://www.vetmed.wisc.edu/dms/fapm/apps/chs.htm). This application uses validated methods for fecal scoring (McGuirk, 2008), respiratory screening (McGuirk and Peek, 2014), and navel inflammation (adapted from Fecteau et al., 1997). Following the health examination, approximately 10 mL of whole blood was collected from the jugular vein into a sterile blood collection tube without an anticoagulant (BD Vacutainer; Becton, Dickinson and Co., Franklin Lakes, NJ). Blood samples were allowed to clot and then centrifuged at 1,500 × *g* for 15 min at approximately 20°C. Serum was separated and stored at −20°C until submission to the Saskatoon Colostrum Company (Saskatoon, SK, Canada) for analysis of serum IgG by radial immunodiffusion as described by Chelack et al. (1993). Calves were classified as having failure of pas-