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Association between management practices and within-herd prevalence of *Cryptosporidium parvum* shedding on dairy farms in southern Ontario

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Abstract

To identify management practices associated with an increased within-herd prevalence of *Cryptosporidium parvum* shedding on dairy farms in southern Ontario, fecal samples were taken from 1089 calves aged 7–28 days, from 119 herds. Information on management practices was obtained by administering a questionnaire compiled using a modified Delphi technique. Data were analyzed using univariable and multivariable negative binomial regression. Overall, 30% of the calves in the study were shedding *C. parvum* oocysts, with at least one positive calf detected in 77% of herds. Within-herd prevalence ranged from 0 to 80%. Predictors significantly associated with an increased prevalence of shedding in multivariable modelling were the use of calf scour prophylaxis in cows (risk ratio [RR] 1.70, $P < 0.01$) and calves (RR 1.38, $P = 0.02$) and the feeding of milk replacer in the first week of life (RR 1.40, $P = 0.02$). In contrast, the presence of concrete flooring in calf

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housing areas (RR 0.59, $P < 0.01$) and the use of soap or detergent when washing calf feeding utensils (RR 0.61, $P < 0.01$) appeared to be protective.

Keywords: *Cryptosporidium parvum*; Dairy calves; Risk factors; Ontario

1. Introduction

Cryptosporidium parvum infection, and the diarrhea it causes, produces losses to the dairy industry in terms of increased labour and veterinary costs associated with calf morbidity and, occasionally, mortality (de Graaf et al., 1999). On dairy farms, disease associated with *C. parvum* infection occurs primarily in young calves. Infection spreads from animal to animal by the fecal–oral route, and large numbers of infective and resistant oocysts may be shed in the feces of infected calves (Nydam et al., 2001). In addition, *C. parvum* is a zoonosis, and cattle have been implicated as a potential source of human infection via contamination of drinking water sources by oocysts shed in the feces of infected animals (Sischo et al., 2000).

The results of several studies have revealed that *C. parvum* is very common among dairy calves. Sischo et al. (2000) found that 15% of 198 dairy calves under 3 weeks of age on 11 farms in the northeastern United States were shedding *Cryptosporidium* oocysts, with oocysts detected on 10 of the 11 farms. In a larger study, 59% of 7369 pre-weaned dairy calves on 1103 farms in 28 states shed *Cryptosporidium* oocysts, with a prevalence of 48% among 1607 calves aged 1–3 weeks old (Garber et al., 1994). In Canada, *C. parvum* oocysts were detected in the feces of 59% of 386 calves under 6 months old on 16 of 20 British Columbia dairies (Olson et al., 1997), while in Québec, infected calves were found on 89% of 505 dairy farms (Ruest et al., 1998). In 2002, the within-herd prevalence of *C. parvum* shedding by calves 7–21 days of age on 51 southwestern Ontario dairies ranged from 0 to 70% (Trotz-Williams et al., 2005a). In 2003, a within-herd prevalence of 35% to 100% was found in a sample of calves under 1 month old on 11 dairy herds in the same region (Trotz-Williams et al., submitted for publication). Most chemotherapeutic agents and disinfectants are ineffective against this parasite (Korich et al., 1990; Weir et al., 2002). Prevention of infection is, therefore, the most viable option for reducing the incidence and impact of infection in dairy calves.

Various studies have investigated the association between farm management practices and the occurrence of *C. parvum* on dairy farms. Potential risk factors for shedding identified by such studies have included large herd size, use of multi-cow maternity facilities, and a long calving season (Garber et al., 1994; Atwill et al., 1999). However, factors associated with the prevalence of *C. parvum* infection and disease on farms may vary depending on geographical region. A calf-level study carried out on 11 dairies in southwestern Ontario identified the type of facilities (individual vs. multi-cow calving pens) in which calves were born as a factor significantly associated with the risk of *C. parvum* shedding. In that study, most of the variation in the risk of shedding occurred between herds, as opposed to within herds (intra-class correlation coefficient = 0.4; Trotz-Williams et al., submitted for publication). Similarly, in 51 herds in southwestern