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Prevalence of *Cryptosporidium* infection in dairy calves in western Washington

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SUMMARY

The prevalence and intensity of *Cryptosporidium* infection were examined in 445 Holstein calves at 10 dairy farms in western Washington, near Seattle. Fifty-one percent (176) of calves in the 7- to 21-day-old age group (n = 342) were positive for oocysts in the feces by carbolfuchsin staining. Prevalence and intensity of infection were highest in calves 8 to 14 days old; prevalence was 60% in this group, and 48% of the *Cryptosporidium*-positive calves had oocyst shedding at a 4+ level. A seasonal pattern in prevalence was not evident.

Cryptosporidium is a protozoan parasite of worldwide distribution, with infection reported in over 40 domestic and wild species including mammals, birds, reptiles and fish.[1] Since the initial finding of infection in a calf in 1971,[2] infection has been reported in dairy and beef calves in many parts of the world.[3-15] Infection in calves often results in clinical signs after a 5- to 7-day incubation period. Clinical signs reported in experimentally infected calves have included watery diarrhea (scours), resulting in dehydration, weight loss, and depression.[4] Infections without clinical signs, however, seem to be common.[5,6,11,16] The typical course of infection lasts 5 to 10 days, with recovery occurring without treatment.[4,9,10,17] Recurrence of oocyst shedding after a 1- to 3-week lapse has been reported.[7] Acute infection develops typically in calves 1 to 3 weeks old; however, cases have been reported in cattle as young as 3 days and as old as 2 years.[8]

The purpose of the study reported here was to document the presence of *Cryptosporidium* in dairy cattle herds in western Washington and to provide some information on prevalence, age distribution, and seasonal variation of infection in these herds.

Materials and Methods

Between January 1985 and October 1987, fresh fecal samples were collected from 445 calves on 10 dairy farms. The farms were located in areas adjacent to the Skykomish, Snoqualmie, and Snohomish Rivers, approximately 30 miles northeast of Seattle, Wash. Farms ranged in size from approximately 25 to 200 Holstein milking head, and having at any time between 2 and 60 calves < 2 months old during the sampling period. One of the 10 dairies was sampled more intensely (24 of 36 total samplings) because of its relatively large size, complete calf records, and maintenance of calves individually in stalls.

On sampling dates, fresh fecal samples were collected from all calves in the 7- to 21-day range at each of the farms visited. Occasionally, older and younger calves were also examined. Samples were collected in plastic containers, returned to the laboratory within 4 hours of collection, and immediately screened for oocyst presence and relative concentrations. Fecal smears were prepared on glass slides, using a wooden applicator, and were air dried. In all samples, oocysts were identified by use of the dimethyl sulfoxide carbolfuchsin procedure of Bronsdon,[18] modified by extending the carbolfuchsin staining from 2 to 5 minutes and extending the counterstain period to 2 minutes. Slides were examined at 400× under bright field illumination. Oocyst concentration was reported as 1+ to 4+ according to the scale: < 1/field = 1+; 1 to 5/field = 2+; 6 to 20/field = 3+; > 20/field = 4+. Counts were based on examination of 5 to 20 randomly selected fields covering the smear area. Using the acid-fast stain, oocysts appear as nearly round, pink-to-red objects of approximately 4 μm diameter against a blue background of density varying from light blue to nearly black. Most calves (96%) from which samples were collected were heifers, because bull calves at the dairies are typically sold within a few days of birth. The ages of calves were obtained from barn records. Ages were not obtained for 27 of the calves. Seventy-seven percent (342) of the calves from which samples were collected were between 7 and 21 days old.

Results

Among the samples examined from 445 calves, 40.7% (181) contained *Cryptosporidium* oocysts. The prevalence of oocyst shedding varied with calf age. Fifty-one percent (176) of calves between the age of 7 and 21 days (inclusive) were positive for *Cryptosporidium*. Only 1 of 46 calves younger than 7 days was positive (2%), and all calves older than 21 days (30 calves) were negative for oocysts. Five of the calves of undetermined age were positive. Of the 10 farms from which samples were collected, all farms from which samples were collected more than once (7) had oocyst-shedding calves in at least 1 sampling. One farm had positive calves in each of 24 samplings over the 34-month study period.

Prevalence of infection peaked in calves of the 8- to 14-day-old group (60%; Fig 1); intensity of infection was also highest in this group, in which 48% of the calves that were positive for *Cryptosporidium* were of 4+ oocyst-shedding level, compared with 14% in the 15- to 21-day age range.

The farm from which samples were collected most often was examined for possible seasonal variations in preva-

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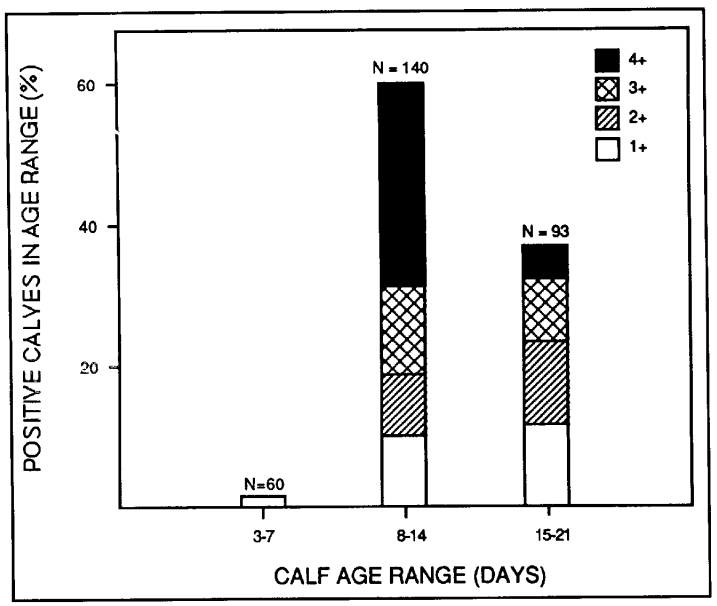

Fig 1—Prevalence and intensity of *Cryptosporidium* infection (based on oocysts in feces) among 3 age groups of the first 293 calves from which samples were collected between 1984 and 1986.

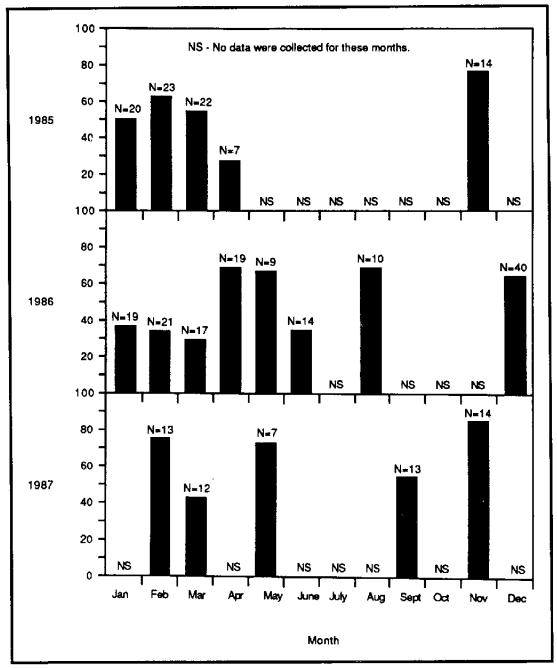

Fig 2—Percentage of *Cryptosporidium*-positive calves in the 7- to 21-day age range at 1 selected dairy farm, by month, 1985 to 1987.

lence of infection among the 7- to 21-day-old calves. There was no discernible seasonal pattern in the monthly variations in prevalence (Fig 2). The overall prevalence of infection among calves in this age group at this farm was 53.9% (152/282 calves).

Discussion

To our knowledge, this is the first published report of *Cryptosporidium* in cattle in the state of Washington. The overall prevalence rate of infection in 1- to 3-week-old calves reported here (51%) is comparable with the 64.3% prevalence found among 12-day-old dairy calves at 41 *Cryptosporidium*-positive farms in Idaho.[10]

Ability to identify *Cryptosporidium* infection in a herd would seem to depend on the number of calves in th 8- to 21-day age range. For large-scale sampling, the predominance of oocyst shedding by calves in the 8- to 14-day age range supports the effectiveness of sampling according to calf age.[8,9,14,15]

Prevalence of *Cryptosporidium* infection in a herd might also depend on the time of year. Cryptosporidial infections in cattle and human beings have been reported to show seasonal variations in prevalence.[8,12,13,19,20] In Bangladesh, a higher prevalence of cattle and human infection was associated with the rainy season.[12] Our data, however, suggest that prevalence of infection in dairy cattle in western Washington is not related to the season.

The finding of *Cryptosporidium* in dairy cattle herds in Washington provides further evidence of the widespread distribution of this parasite in cattle in North America.

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