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Seroprevalence of *Cryptosporidium parvum* and *Neospora caninum* in cattle in the southern Kyushu region of Japan

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ABSTRACT

Cryptosporidium parvum and *Neospora caninum* are common parasites in domesticated cattle worldwide, including in Japan. We carried out a serological survey to detect *C. parvum* and *N. caninum* infection among cattle in the southern Kyushu region of Japan—including the small islands—by indirect enzyme-linked immunosorbent assay based on recombinant antigens. We found that total seropositivity in 570 Japanese black cattle was 96.3% for *C. parvum* and 18.4% for *N. caninum*. Although seroprevalence was correlated with cattle age, differences in the seroprevalence of *C. parvum* among age groups were not statistically significant. On the other hand, *N. caninum* seroprevalence increased with age, suggesting horizontal transmission through ingestion of food or water contaminated with oocysts. These findings underscore the importance of monitoring *C. parvum* and *N. caninum* in cattle and implementing measures to prevent the spread of infection to other livestock and to humans.

1. Introduction

The bovine protozoan diseases cryptosporidiosis and neosporosis are ubiquitous in domestic cattle worldwide; both diseases have been surveyed and reported in Japan [1–9], and cause significant economic damage to the livestock industry. Cryptosporidiosis is gastrointestinal disease caused by *Cryptosporidium* spp., which are apicomplexan protozoan parasites. *Cryptosporidium parvum* is a common and clinically significant species causing watery diarrhea in a variety of vertebrate hosts, particularly neonatal domestic ruminants [10, 11]. Infected calves shed large numbers of infective oocysts in their feces, resulting in environmental parasite loading [12]. *Cryptosporidium parvum* infection is also an important zoonosis that causes similar clinical symptoms in humans and is more likely to be acquired by immunosuppressed individuals such as acquired immune deficiency syndrome patients [13]. Neosporosis is a disease caused by the obligate intracellular Apicomplexan protozoan parasite *Neospora caninum*. Infection mainly occurs in cattle and dogs, and less frequently in other animals such as goat, sheep, horse, and deer [14, 15]. *Neospora caninum* is closely related to *Toxoplasma gondii*; however, while felids are the definitive host of *T. gondii*, canids such as dogs and coyotes are the definitive hosts of *N. caninum* [16, 17]. Food or water contaminated with *N. caninum* oocysts is the main route of infection in cattle [15, 18, 19]. Neosporosis causes neuromuscular paralysis in canines [20] and fetal abortion and neonatal mortality in bovines [21]. Neosporosis can have a major economic impact on the livestock industry through losses in milk and beef production [22].

Kyushu is the most southwesterly of the four main islands of Japan (Fig. 1A). The southern areas of Kyushu—especially Kagoshima and Miyazaki Prefectures—have a thriving Japanese black beef cattle industry and many pastures. Additionally, some small islands in Kagoshima and Okinawa Prefectures have cow farms. Obtaining accurate data on the prevalence of parasites is important for developing effective strategies to control cryptosporidiosis and neosporosis in cattle [23, 24]; however, such information is lacking for cattle populations in southern Kyushu.

To this end, we used an enzyme-linked immunosorbent assay (ELISA) with recombinant antigens derived from *C. parvum* and *N.*

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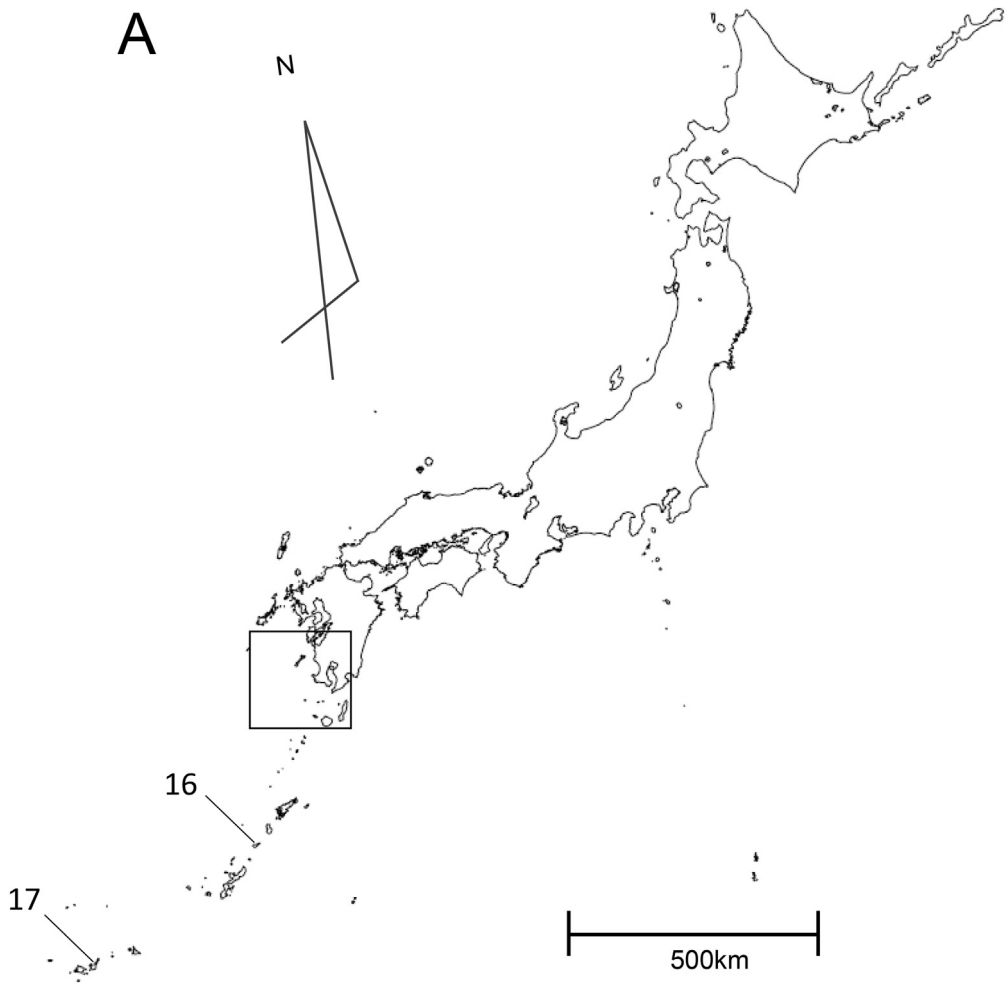

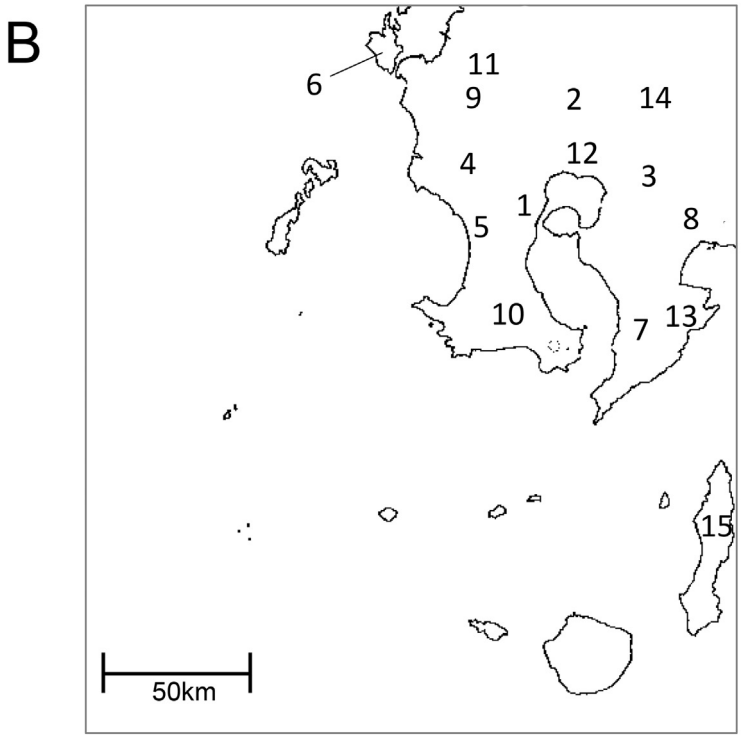

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