



Assessing the potential for interspecies transmission of *Clostridioides difficile* on dairy farms



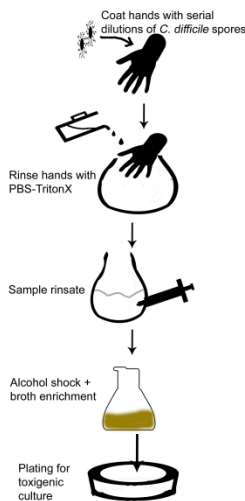
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BACKGROUND

It has been suggested that farm animals could be a reservoir for *Clostridioides difficile* (CD) and that farm workers could therefore be at increased risk of colonization and infection with CD. Pigs and swine farm workers have been colonized with identical clones of CD¹, and swine farmers were shown to be colonized with CD at higher rates than the general population (21% vs <5%)².

No such studies have been performed on dairy farms, where the prevalence of CD in dairy animals ranges from 6-56%³⁻⁵ and where workers are generally in closer contact with animals than swine farmers. In this study, to assess whether working on a dairy farm represents an occupational risk of CD colonization or infection, **we sought to determine whether dairy calves and farm workers harbor genetically similar isolates of CD.**

METHODS



First, we validated a **glove-juice protocol to detect CD spores on the hands** of farm workers. Briefly, volunteers' hands were inoculated with serially diluted suspensions of non-toxicogenic CD organisms, and hand rinsates underwent broth enrichment and anaerobic culture.

Then, we collected **hand rinsates from 38 farm workers** and **fecal samples from 5 farms workers** on 23 dairy farms.

We also collected **fecal samples from 5 randomly selected calves** (<7 d of age) on each of these 23 dairy farms.

All samples underwent alcohol shock and broth enrichment followed by toxigenic culture for CD. Isolates were confirmed to be CD by MALDI-TOF identification and inoculated into cooked meat broth to induce toxin production. The supernatant was tested for toxin production by enzyme immunoassay.

RESULTS

- Validation of the glove juice protocol showed that CD could be recovered successfully from all hand rinsate dilutions (up to 10⁻⁶).
- The glove juice protocol, when applied to farm workers, yielded CD in none of the hand rinsates (0%, 95% CI 0.0-92.2%).
- CD was also not detected in any of the human fecal samples.
- However, toxigenic CD was detected from calf fecal samples on 10 farms (43.5%, 95% CI 20.8%-80.0%).

CONCLUSION AND FUTURE DIRECTIONS

- While the zoonotic transmission of CD cannot be ruled out, our results suggest that contact with dairy animals is not likely to be associated with an increased risk of acquiring CD via the fecal-oral route.
- These results are consistent with the lack of CD colonization observed among beef farmers in a previous study⁶.
- The glove-juice protocol appears to be a useful tool for studying the epidemiology of CD in populations where obtaining fecal samples is difficult.
- It is unclear why the risk of colonization appears higher among swine workers compared to dairy workers; the nature of the interactions between animals and people or the environment where animals are housed may be different.
- Future studies involving larger numbers of farmers and longitudinal sampling are warranted.

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3. Houser, B.A., A.L. Hattel, and B.M. Jayarao, *Real-time multiplex polymerase chain reaction assay for rapid detection of Clostridium difficile toxin-encoding strains*. Foodborne Pathog Dis, 2010. **7**(6): p. 719-26.

4. Rodriguez-Palacios, A., et al., *Clostridium difficile PCR ribotypes in calves, Canada*. Emerg Infect Dis, 2006. **12**(11): p. 1730-6.

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