

# Multiattribute Evaluation of Two Simple Tests for the Detection of *Cryptosporidium parvum* Oocysts in Calf Feces

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## Introduction

*Cryptosporidium parvum* is increasingly recognized as an important pathogen in neonatal dairy calves. As a result, there is a need for simple, inexpensive and quick methods for the detection of *C. parvum* infection in calf feces. Most diagnostic and screening methods for this parasite that are currently in common use, such as concentration and staining methods and immunofluorescence (Kváč *et al*, 2003), are expensive and time-consuming, and as such are unsuitable for the screening of large numbers of fecal samples in veterinary practice or research. At the Ontario Veterinary College (OVC), a simple sucrose wet mount method without centrifugation has been in use for some time. However, to the authors' knowledge, there are no published reports that have evaluated the performance and utility of this method when used for the detection of *C. parvum* oocysts in calf feces. In this study, the OVC sucrose wet mount method and a lateral immunochromatography test for detection of *C. parvum* antigen in feces (BioX Diagnostics, Jemelle, Belgium) were evaluated using polymerase chain reaction-restriction fragment length polymorphism (PCR-RFLP) with gel electrophoresis as a gold standard.

## Materials and Methods

A total of 199 fecal samples from dairy calves on Ontario dairy farms under 21 days of age were tested by the OVC sucrose wet mount method, by lateral immunochromatography, and by PCR-RFLP targeting the cryptosporidium oocyst wall protein (COWP). All analyses were carried out in a blinded manner. The sucrose wet mount and lateral immunochromatography tests were evaluated in terms of agreement, epidemiological sensitivity and specificity, cost and utility.

## Results

Cohen's kappa statistic of agreement ( $\kappa$ ) between the OVC sucrose wet mount test and COWP PCR-RFLP was 0.82, showing good agreement, and the sensitivity and specificity of the OVC sucrose wet mount test were 88.6 and 93.8%, respectively. The sensitivity and specificity of the lateral immunochromatography test were 78.3 and 93.3%, respectively, and agreement between this test and PCR-RFLP was also good ( $\kappa = 0.73$ ). There was substantial agreement between the OVC sucrose wet mount test and the lateral immunochromatography test ( $\kappa = 0.84$ ). Both tests were inexpensive and easy to use; however, the lateral immunochromatography test was faster and simpler to perform than the sucrose wet mount test, and was generally more user-friendly. These tests provide practitioners and researchers with cheap, quick and accurate methods of detecting *C. parvum* infection in young calves.

## Significance

Cryptosporidiosis has become a very prevalent calf health problem in the dairy industry, with significant zoonotic implications. It is important for veterinarians to be able to determine the presence of *Cryptosporidium parvum* infection. Traditionally, laboratory detection of *C. parvum* oocysts has been laborious and costly. This paper reports on the evaluation of two easy, straightforward and relatively inexpensive tests for *C. parvum* in calf feces. The results indicate that these tests are promising methods for the diagnosis of cryptosporidiosis in calves.