Evaluation of the ImmunoCardSTAT Rotavirus Assay For On-site Detection of Bovine Rotavirus

Roger Maes[1,2]; Dan Grooms[3]; Valerie Ciesicki[2]; Cunqin Han[2]; Annabel Wise[2]
[1]Animal Health Diagnostic Lab
[2]Department of Microbiology
[3]Department of Large Animal Clinical Sciences
Michigan State University, Lansing, MI

Introduction

Diarrhea is the most important disease in neonatal dairy and beef calves. Significant economic loss occurs due to increased morbidity and mortality, treatment costs and reduced growth rates. Rotaviruses usually cause diarrhea during the first three weeks of life. Clinical signs can be quite variable and are similar to those caused by other neonatal bovine enteropathogens such as corona virus and *Eschericia coli*.

Diagnosis of rotavirus in calves is based on the identification of viral particles, antigens or nucleic acids in feces. Tests include direct or immune electron microscopy, immunofluorescence, antigen capture enzyme-linked immunosorbant assay (ELISA), latex agglutination and polymerase chain reaction (RT-PCR). All of these tests are useful for diagnosing rotavirus infections, but in general are relegated to use by diagnostic laboratories. Development of an on-site diagnostic assay for bovine rotavirus would be a useful tool for veterinarians and cattle producers in making management decisions regarding neonatal bovine diarrhea.

The ImmunoCardSTAT Rotavirus (ICS-RV) Assay (Meridian Diagnostics, Cincinnati, OH) is a patient-side assay designed to detect group A rotavirus in humans. This assay is based upon rapid immunomigration (RIM) technology. This technology allows for packaging of all reagents into a single-step assay that can then be used patient-side (similar to a "home pregnancy test"). The objective of this study was to evaluate the ICS-RV assay's usefulness as an on-site diagnostic test for bovine rotavirus.

Materials and Methods

Initially, a reference strain of bovine rotavirus with a known viral titer was obtained from NVSL. Serial dilutions were tested by an antigen-detection ELISA (Pathfinder, Sanofi Diagnostics, Redmond, WA) and the ICS-RV assay. The reference test used was a RT-PCR assay, which amplifies a 294 bp fragment of the VP6 gene of type A rotavirus. Detection limits of both assays were similar, but 10-fold lower than RT-PCR. Subsequently, the same assays were applied to a collection of bovine fecal samples submitted to the Virology Section of the Animal Health Diagnostic Laboratory at Michigan State University. The results of this comparison are shown below.

Conclusion

Based on this study, the ICS-RV appears to be an excellent assay for detecting group A bovine rotaviruses. This assay may be very useful as an on-site diagnostic test for practicing veterinarians to aid in the management of bovine neonatal diarrhea.

Test Evaluation

	Sensitivity	Specificity	NPV*	PPV**	Accuracy	Kappa
ELISA vs RT-PCR	92.2	79.5	73.8	94.3	82.2	.69
ICS-RV vs RT-PCR	95.0	97.4	95.0	97.4	95.9	.99

*Negative predictive value** Positive predictive value