

Application of Sentinel Serology in a BVDV Eradication Program

E.M. Corbett¹, DVM; D.L. Grooms¹, DVM, PhD; S.R. Bolin², DVM, PhD; B. Bartlett³, DVM, MS

¹*Department of Large Animal Clinical Sciences, Michigan State University, East Lansing, MI 48824*

²*Department of Pathobiology and Diagnostic Investigation, Michigan State University, East Lansing, MI 48824*

³*MSU Extension, Michigan State University, East Lansing, MI 48824*

Introduction

In 2007, the Michigan Upper Peninsula BVDV Eradication Program was launched. The purpose of this project is to eradicate bovine viral diarrhoea virus (BVDV) from a geographic area and, in doing so, identify benefits derived from and obstacles encountered during the eradication program. An important goal of the project was to develop a feasible model that may be adopted by other parts of the US. Key components of the program include identification and removal of cattle persistently infected with BVDV, institution of a planned biosecurity program, and appropriate BVDV vaccination. Whole-herd testing to identify cattle persistently infected with BVDV is a major investment of both time and money for producers. Therefore, development of more efficient herd-testing strategies would be beneficial. Serological evaluation of small groups of young, non-vaccinated calves has been proposed as an alternative method for identifying herds with cattle persistently infected (PI) with BVDV. The objective of the study reported here was to evaluate the application of sentinel serology as an ongoing herd monitoring tool to detect entry of BVDV into a herd. The goal of sentinel testing is to provide an effective herd screening tool that can be used in follow-up surveillance in an eradication program.

Materials and Methods

Herds enrolled in the Michigan Upper Peninsula BVDV Eradication Program that had completed whole-herd BVDV testing in 2008 were asked to voluntarily participate in a sentinel animal testing program during 2009. Skin specimens were collected from the ears of all accessible calves shortly after birth or at weaning and serum samples were obtained from five unvaccinated calves ≥ 6 months old in each herd. If a herd had multiple management groups, five calves were sampled from each group. Ear notch specimens were pooled in batches of 10 and then tested for BVDV using reverse transcriptase polymerase chain reaction (RT-PCR). Serum samples were tested for virus neutralizing (VN) antibodies against both types 1 and 2 BVDV using standard assay

procedures. A management group was considered to be BVDV-positive based on the following criteria: 1) if VN antibody titers in two of five calves were ≥ 128 for either type 1 or 2 BVDV, or 2) if any animal was found to be positive for BVDV by RT-PCR on skin samples. Data was evaluated using descriptive statistics. Information collected included number of management groups, herd history, and previous testing results. Results were tabulated in a 2 x 2 contingency table based on RT-PCR results and serology results. Correlation between the two herd-based tests was calculated using the κ test statistic.

Results

Forty-seven management groups from 36 herds were included in the study. Skin samples from 2,206 cattle and 395 serum samples were collected in the summer and fall of 2009. All serum samples were collected from calves that were non-vaccinated and at least six months old at the time of sampling. Two skin samples from one management group were positive for BVDV, as determined by RT-PCR. The same group had VN titers of ≥ 128 in three of five sentinel calves. The other 46 management groups tested did not contain BVDV based on RT-PCR and VN results. The results of VN tests from non-vaccinated sentinel calves from each management group were compared with the results for herd RT-PCR. Using the established criteria, the sentinel serology strategy correlated 100% with the calf ear notch strategy ($k=1.0$ (95% CI 1.0 to 1.0)).

Significance

Results from this study suggest that sentinel animal testing using serological evaluation of non-vaccinated calves can be utilized as a screening tool for herds enrolled in an eradication program. This strategy could serve as an accurate and economically efficient surveillance tool to evaluate herds in a BVDV eradication program. Although results from this study showed a high sensitivity and specificity, care must be taken when extrapolating these findings to other geographical locations and cattle management systems.