

Research Summaries 2

A novel approach to bovine viral diarrhea virus surveillance

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Introduction

Bovine viral diarrhea virus (BVDV) causes significant economic loss in both the beef and dairy cattle industries. A major factor in the perpetuation of the virus in a herd of cattle is the presence of persistently infected (PI) animals. They continuously shed virus and often go unnoticed. Control measures currently advise testing of all animals in a herd for the presence of BVDV. While ear notching can accurately detect a PI animal, it is labor intensive and costly. For this reason the development of a non-invasive, cost-saving method to detect the virus within a group of cattle would be beneficial to the industry.

Materials and Methods

Ten calves seronegative for antibodies against, and had negative results for, BVDV were commingled with 2 PI animals for 3 days. The animals shared 2 common feed troughs. Both feed troughs (i.e., consumption surfaces) were swabbed with 3 dacron-tipped swabs and 3 synthetic-fiber scour pads daily at 20 minutes and 2, 6, and 23.5 hours after feeding. To evaluate the effect of sampling handling on the assay, samples were processed by 1 of 3 methods (refrigerated at 39.2°F [4°C] for 1 to 3 days, refrigerated for 7 to 10 days, or frozen at -9.4°F [-23°C] for 7 to 10 days). Temperature, incidence of precipitation, and humidity were recorded at the time of consumption surface sampling. All samples were assayed by RT-nPCR.

Following 3 days of commingling with the PI animals, the 10 exposed calves and the 2 PI calves were separated into 2 different pens to determine the effect of acute versus persistent infection on the assay. Consumption surface samples were collected from both the PI and exposed calf groups as described above on days 6, 7, 8,

9, and 10. Additionally, virus isolation was performed on blood and nasal samples to confirm viral exposure and subsequent acute infection of exposed cattle. With this information in hand the surveillance assay was applied in field situations, which included varying trough surfaces and group size.

Results

All seronegative calves became acutely infected with BVDV. Viral RNA was detected from 82 of 96 dacron-tipped swab samples and 90 of 96 woven fibrous pad samples. Consumption surface samples that were obtained within 6 hours after feeding from groups containing a PI animal were consistently positive for BVDV following refrigeration for up to 10 days. All samples that were obtained > 6 hours after feeding or that were frozen before analysis yielded negative results for viral RNA. Viral RNA was not detected in samples of the consumption surface used only by the calves acutely infected with BVDV. Temperature, precipitation, and humidity at time of sample collection had no effect on the detection of BVDV from those samples.

Significance

Analysis of consumption surface swabs that were obtained within 6 hours after feeding with a RT-nPCR assay is a sensitive and non-invasive method to determine whether PI animals are present in a group of cattle. Swab samples can be refrigerated up to 10 days prior to testing, which makes ease of collection and cost acceptable to dairy and beef producers. Consumption surface swabbing is a valuable surveillance tool for BVDV in the field that has multiple applications in many herd situations and can be used as a research tool in viral exposure protocols.