Summary of BVDV-PI Testing at the South Dakota State University Animal Disease Research and Diagnostic Laboratory, July 2005-June 2010

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Cattle persistently infected with Bovine Viral Diarrhea Virus (BVDV) are considered the reservoir for BVDV within the cattle population. Within individual herds, identifying these persistently infected (BVDV-PI) animals through individual animal testing has allowed for the removal of these animals or for the prevention of BVDV-PI animals from entering the herd, making testing a valuable procedure for maintaining cattle health.

Several different methods are available for BVDV testing at the South Dakota State University (SDSU) Animal Disease Research and Diagnostic Laboratory (ADRDL), the most popular of which are the individual ear notch ELISA and the pooled PCR test. For ELISA testing, an individual ear notch is collected from the patient, shipped in individual tubes to the ADRDL, suspended in saline solution at the lab, agitated, and an antigen-capture ELISA procedure performed on the fluid. The pooled PCR procedure also utilizes individual ear notches, which are also suspended in saline solution and agitated. Aliquots of fluid from each sample are then pooled and subjected to PCR for BVDV. If positive pools are identified, then individual antigen-capture ELISAs are performed on the samples that comprised the pool. At the SDSU ADRDL, pools of up to 50 ear notches are accepted.

To confirm true BVDV-PI status, a follow-up sample from the positive animal is recommended to be collected roughly 4-6 weeks later. If ear notches were used in the initial diagnosis, a blood sample is recommended for follow-up confirmation, for either virus isolation or PCR, to differentiate animals that are transiently infected from BVDV-PI animals.

The results below reflect testing performed on cases submitted to the SDSU ADRDL. Almost assuredly they do not represent infection rates in the cattle population in general, as submissions reflect many different scenarios: testing within known-BVDV-positive herds, screening incoming purchased animals, etc.

Differences exist among some of the positive sample rates for the various testing methodologies performed at the ADRDL. For example, the positive case rates for individual ear notch ELISA testing and immunohistochemistry are higher than for pooled PCR testing. Internal laboratory validation has confirmed the sensitivity of the pooled PCR testing on ear notches, so significant sensitivity differences between tests should not exist. What does differ, however, is the type of operation and diagnostic scenario under which samples are submitted to be tested under the various methods. Pooled PCR procedures are popular with large beef cattle populations testing entire large herds (2005-10 average samples per case = 108), while individual ELISA tests and immunohistochemistry tests are more often used by veterinarians when smaller populations or individual animals need to be tested

(2005-10 average samples per case = 21). Oftentimes, these smaller populations or individuals are animals more likely to have been identified with BVDV infection or immunosuppression. In contrast, but in a similar fashion to pooled PCR, serum ACE and outgrowth ELISA (which was discontinued by this laboratory after FY 2009) procedures are often used to screen larger populations of animals, often in anticipation of export.

Total numbers of tests performed have decreased over the past few years. On a positive note, this could be due to more herds being "cleaned up" and moving from disease diagnosis to biosecurity/surveillance with BVDV testing. On the other hand, it's also possible that producers and veterinarians may be becoming more complacent about the disease. Regardless, BVDV infections continue to affect cow-calf, feedlot, and dairy operations in South Dakota and the region, and BVDV-PI testing remains an essential part of control.

FY 2010 BVD Testing Summary, SDSU ADRDL

Test	No. cases	No. samples	No. positive samples	No. positive cases	Pos. sample rate	Pos. case rate
Ear Notch ELISA	343	7108	16	7	0.23%	2.04%
Pooled PCR with ELISA to ID indiv's*	175	14823	11	8	0.07%	4.57%
Immunohistochemistry	81	453	0	0	0.00%	0.00%
Serum ACE	88	1425	4	3	0.28%	3.41%
TOTALS 2010	**687**	**23809**	**31**	**18**	**0.13%**	**2.62%**

FY 2006-2010 BVD Testing Summary, SDSU ADRDL

Test	No. cases	No. samples	No. positives	No. pos cases	Pos. sample rate	Pos. case rate
Ear Notch ELISA	2879	72674	390	230	0.54%	7.99%
Pooled PCR + ELISA to ID indiv's*	734	79136	74	49	0.09%	6.68%
Immunohistochemistry	1011	9452	67	42	0.71%	4.15%
Serum ACE	191	3034	5	4	0.16%	2.09%
Outgrowth ELISA	735	14884	7	7	0.05%	0.95%
TOTALS FY 2006-10	**5550**	**179180**	**543**	**332**	**0.30%**	**5.98%**

* Pooled PCR with ELISA to ID indiv's: This row includes numbers of individual ear notches tested using the pooled PCR procedure plus the ELISA tests necessary to identify individual BVDV-positive animals within the pool.