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Development and validation of a high-performance Erns DAS antigen ELISA for BVDV detection in routine diagnostic

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Introduction :
Bovine Viral Diarrhea (BVD), caused by the BVD pestivirus (BVDV), is one of the most important infectious cattle diseases worldwide. Symptoms of initial infection by the BVDV include fever, general depression and diarrhea. In infected pregnant cows, the ability of the BVDV to cross the placenta causes prenatal infection of the calf and leads in most cases to abortion. But in utero infection in the first trimester of pregnancy results in the birth of an immunotolerant, persistently infected (PI) animal. PI animals permanently shed the virus, pass the pestivirus onto their unborn calves, and can contaminate all the other animals in the herd, but are seronegative all their lives.
As the major source of contamination, PI identification is a key to control BVD in herds. Eradication plans are commonly based on both serological testing and viral detection, either by real-time PCR or by antigen capture ELISA. Erns-glycoprotein (Erns, E0) detection by Double Antibody Sandwich (DAS) antigen ELISA is an effecient and cost-effective method for BVDV diagnosis and PI identification. This study describes test performance of a new DAS antigen ELISA, the ID Screen® BVD E0 Antigen Capture, designed to detect Erns in serum, plasma, ear notch tissues and whole blood samples.
Methods :
The test expresses results with respect to a positive reference control in order to guarantee the standardisation of results, which are expressed as S/P ratios, between runs and batches.
Diagnostic specificity was evaluated on 298 sera and 46 ear notch samples from >6 month-old bovine from BVDV-free herds (European countries), tested negative by PCR (ID Gene BVDV 2.0 PCR, IDvet).
Diagnostic sensitivity was assessed using 50 sera and 46 ear notch samples from >6 month-old PI or transient animals, collected in infected herds in France, and previsouly tested PCR positive.
Inclusivity was evaluated using 7 and 2 isolates for BVDV type 1 and BVDV type 2 respectively.
2 serum samples from >6 month-old PI animals were serially diluted and tested in parallel with the ID Screen® ELISA and another commercially available Erns capture ELISA (Kit A).
Results :
Measured specificity was 100% (CI95%: 98.7% - 100.0%, n=298) and 100% (92.3% - 100.0%, n=46) for serum and ear notch samples respectively.
Measured sensitivity was 100% (92.9% - 100.0%, n=50) and 100% (92.3% - 100.0%, n=46) for serum and ear notch samples respectively.
All tested isolates for BVDV type 1 and type 2 were found positive with the ID Screen® ELISA.
The two serum samples were found positive until dilution 1:160, with both ELISAs.
Conclusions :
The ID Screen® BVD E0 Antigen Capture ELISA shows excellent specificity for both serum and ear notch samples. The kit efficiently detects BVD Erns using both matrices either in PI or transient animals. The ID Screen® ELISA offers a high analytical sensitivity, delivering similar results as Kit A, and excellent inclusivity allowing detection of BVDV type 1 as well as type 2.
The ID Screen® BVD E0 Antigen Capture ELISA is a reliable tool for BVDV detection in routine diagnostic.