Optimization of BVD eradication in Switzerland

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Key words
BVD virus, genetics, heterogeneity, antigenicity, antibody detection, blood, milk, prenatal detection of infection

Aim of the study
(i)To obtain information on the genetic and antigenic spectrum of BVD viruses circulating in the Swiss cattle population; (ii) to compare BVDV antibody detection in blood and milk, (iii) to evaluate methods permitting detection of PI fetuses

Material and methods
Aim (i): phylogenetic analyses of various parts of the genomes of 234 BVDV strains were carried out. Aim (ii); BVD antibody detection in milk and blood was compared using Western blotting and a range of ELISAs. Aim (iii) recombinant antigens and antigen prepared from BVDV-infected cell cultures were used to detect antibodies in heifers infected with PI fetuses and in animals after transient infection with BVDV.

Results and significance
Aim (i): Sequencing and phylogenetic analyses showed that the subgroup affiliation of the BVDV strains analyzed was as follows: BVDV-1h: 47%; BVDV-1e: 34%; BVDV-1k: 11%; BVDV-1b: 8%. No BVDV-2 viruses were detected. Compared to previous studies, the proportion of BVDV-1h strains gained in prominence. This may be explained by a higher proportion of 1h in eastern Switzerland. Due to their high genetic similarity, molecular epidemiology investigations of BVDV 1h viruses should be based on more variable regions of the BVDV genome. Aim (ii): detection of antibodies to BVDV was more reliable in blood compared to milk. In addition, the generally higher titer of BVDV antibodies in blood makes testing of pools of blood samples possible. Due to unstable antibody titers, neither blood samples nor milk should be used for antibody testing during the periparturient period. Aim (iii): Detection of persistently infected (PI) fetuses through testing pregnant does would be highly desirable. We analyzed the antibody response to a range of recombinant BVDV proteins in does pregnant with PI fetuses. The only significant and consistent response was observed in SNT and in ELISAs to the NS23 protein. The antibody titer to NS23 protein was generally higher in the group of does pregnant with PI fetuses than in animals seropositive as a result of a transient infection. The difference between does pregnant with PI fetuses vs. animals seropositive as a result of transient infection was similar when using an in-house ELISA based on antigen prepared from BVDV-infected cell cultures vs. ELISA based on recombinant protein. This suggests that similar sensitivity and specificity may be reached with the more simple cell culture-derived antigen.

Publications, posters and presentations
Bachofen, C. (03.09.2009) BVET Informationsveranstaltung für Laborleiter
Bollinger, B. (5.10.2009) Internationales Doktorierenden Meeting Virologie , Schloss Münchenwiler
Bollinger, B. (04.11.2010) Internationales Doktorierenden Meeting Virologie , Schloss Münchenwiler
Bachofen, C.; Rümenapf, T.; Lingberg, A.; Peterhans, E. (27./28.02.2010) Grindelwald BVD Meeting

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