Epidemiological model to compare different surveillance strategies to maintain BVD free status following the eradication programme conducted in Switzerland

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With an antibody prevalence of about 70% and approximately 1% persistently infected (PI) animals in the year 2000, BVD was widespread in Switzerland, causing serious economic losses. To eradicate the disease, the whole Swiss cattle population was tested for virus in a short period of time between January 2008 and January 2009. Antigen-positive animals identified by ELISA or rRT-PCR methods were slaughtered, and movement restrictions were applied to avoid new herd infections. In total, 1.7 Millions animals were tested and 14'000 PI animals identified and slaughtered. Beginning in 2009, all new-born calves will be systematically tested.

In 2010 a national surveillance program will start in order to control and maintain the BVD free status. This surveillance program should allow an early detection of infected animals, to avoid a new spread of the BVDV. Different surveillance strategies will be compared using a stochastic model developed using the language and environment for statistical computing R. Besides testing for antigen in all newborn calves, additional methods in consideration are blood testing of young calves for antibodies starting in 2010; milk testing of young heifer for antibodies starting in 2011; combination of both approaches; integration of risk factors associated with the herd, the sampling period, or the sampling location, to target sampling to animals at higher risk.

Based on the data from 2000 and 2008, the epidemiological model has been developed to study the dynamic of the spread of the BVDV within and between herds. In addition to the model developed by Viet et al. (2004), the model takes into account the complex structure of animal movement, as well as the common summer pasturing concerning about 25% of the livestock and having a high impact on the spread of the disease. The model's outputs are the evolution of the PI prevalence as well as the antibody prevalence in the population. The effect of the different surveillance and control strategies can be evaluated observing the evolution of those prevalences. In addition to the quantification of the power of detection and the effect of each strategy, a cost analysis will be undertaken, which considers the gain and loss inherent to the disease as well as the costs of the program.

This model will help decision makers to better allocate resources to maintain the presence of BVDV at a negligible level in the Swiss livestock.

The structure of the model will be presented, as well as first results of the comparison of the different surveillance strategies.