Veterinary Microbiology 216 (2018) 212–217

Contents lists available at ScienceDirect

Veterinary Microbiology

journal homepage: www.elsevier.com/locate/vetmic

Short communication

Factors associated with the bovine viral diarrhoea (BVD) status in cattle herds in Northwest Germany

Silke Amelung[a,*], Maria Hartmann[b], Ludwig Haas[c], Lothar Kreienbrock[b]

[a] Institute for Animal Health, LUFA Nord-West, Oldenburg, Germany
[b] Institute for Biometry, Epidemiology and Information Processing, WHO Collaborating Centre for Research and Training for Health at the Human-Animal-Environment Interface, University for Veterinary Medicine, Hannover, Germany
[c] Institute for Virology, University for Veterinary Medicine Hannover, Germany

ARTICLE INFO

Keywords:
Monitoring programme
Epidemiological study
Eradication
Ear notch
Pestivirus
Dairy

ABSTRACT

In Germany, all calves are tested for the presence of bovine viral diarrhoea/mucosal disease virus (BVDV) virus since January 1, 2011. The basis for this compulsory investigation is the BVDV Federal Regulation (BVDVV), which demands testing of calves before the age of six months and according to the new regulation of June 2016 within four weeks or before entering another stock. In 2012, a questionnaire was sent to 7250 Lower Saxony cattle farmers to identify potential factors associated with the presence of BVDV. Completed questionnaires were received from 2542 farms for further analysis. For BVD status determination of these farms, the diagnostic results of 425,911 ear notch samples of calves as part of the BVD eradication period from June 2010 to December 2013 were used.

For the analysis of the completed questionnaires, a univariable analysis was performed by the chi-square or Wilcoxon test for each variable studied. In addition, a multivariable logistic model was performed. Four potential risk factors remained after a backward selection in the final logistic regression model: the dairy production compared to the suckling and other types of production, the herd size, the purchase of animals and the location in western region in comparison with the central and eastern regions. In summary, according to the results of this study, the farm with the highest probability of a BVDV infection in Lower Saxony is a large dairy farm that purchases cattle and is located in a cattle-dense region. When the complete eradication of the virus will be achieved, the results of the present study may help to conduct a risk-oriented monitoring programme.

1. Introduction

Bovine viral diarrhoea (BVD; caused by the bovine viral diarrhoea virus, BVDV) may take an inapparent course or lead to different clinical symptoms such as fever, diarrhoea, transient immunosuppression, decrease in milk yield, respiratory symptoms, and reproductive disease (Houe, 1994; Houe, 2003; Moennig and Liess, 1995; Moennig and Liess, 2010; Schirrmeier, 2014). If seronegative female animals get infected with the non-cytopathogenic (ncp) biotype in early pregnancy, from day 30 to about 120 day p.c., this may lead to the birth of persistently infected (PI) calves (Brownlie, 1990; Lanyon et al., 2014; Meyling et al., 1990). PI animals shed the virus throughout their lifetime in large quantities in all secretions and excretions (Meyling et al., 1990; Houe, 1995) and are considered as viral reservoirs and the main sources of infection (Houe, 1999). Thus, it is important to identify these PI calves as early as possible and to remove them from the stock (Lindberg and Alenius, 1999). In Scandinavia, the BVD virus has been virtually eradicated. Switzerland and Austria are in the final stages of eradication (Bachofen et al., 2013a,b; Stalder et al., 2016; Schweizer and Peterhans, 2014). In Ireland, Scotland and Belgium, mandatory programmes have also been introduced or are about to be implemented (Clegg et al., 2016; Lanyon et al., 2014; Moennig and Becher, 2015; Stahl and Alenius, 2012; Schirrmeier, 2014).

In 2011, the “Regulation on the protection of cattle from infection with the bovine viral diarrhoea virus (BVDVV)" was established as a control programme in Germany and aimed at the eradication of the virus. From the start of this programme, a continuously decreasing prevalence of PI animals demonstrated its effectiveness (Amelung et al., 2014; Gethmann et al., 2014). It is mandatory to test each calf up to the age of six months for the presence of BVD viral infection, and since the enforcement of new BVD regulation in June 2016 this test should be done within four weeks. The test results are entered into the nationwide database of Herkunftssicherungs- und Informationssystem für Tiere’le are registered. The entire German cattle population comprises

* Corresponding author at: Silke Amelung, Institut für Tiergesundheit, LUFA Nord-West, Ammerländer Heerstr.123, 26129, Oldenburg, Germany.
E-mail address: silke.amelung@lufa-nord-west.de (S. Amelung).

https://doi.org/10.1016/j.vetmic.2018.01.018
Received 12 June 2017; Received in revised form 15 January 2018; Accepted 30 January 2018

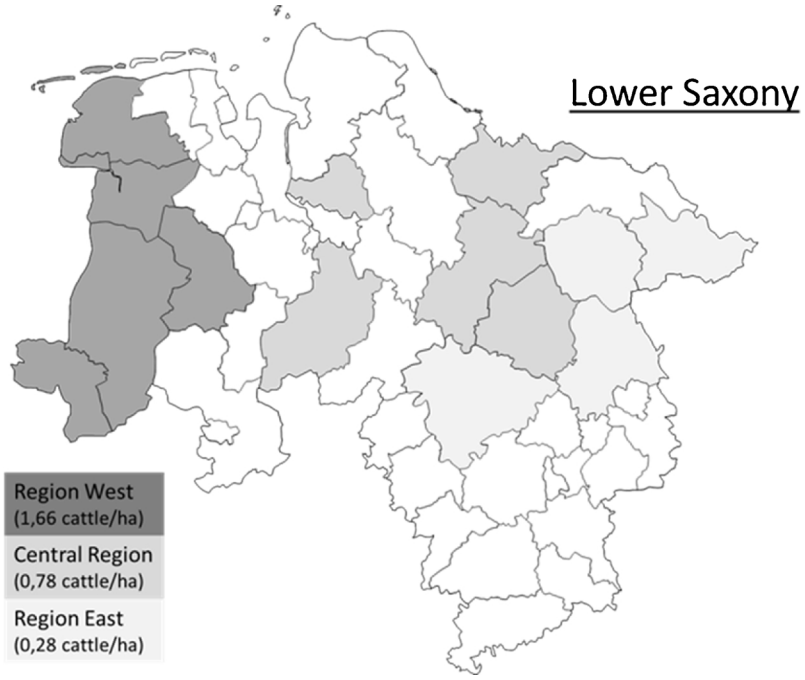

Fig. 1. Participating districts in Lower Saxony (Figures of the Lower Saxony Agricultural Chamber; Status 2011).

approximately 12.5 million animals on about 160,000 farms (Status: December 31, 2012; Schirrmeier, 2014). The federal state of Lower Saxony, located in the northwest of Germany, hosts a population of approximately 2.7 million cattle in about 22,600 cattle and dairy farms. Here, cattle farmers are obliged to test all newborn calves within the first seven days of life. Therefore, ear tissue samples are used, and the viral antigen is detected by an enzyme-linked immunosorbent assay (ELISA). BVD-positive calves are considered as PI animals and have to be removed as soon as possible. In Lower Saxony, the ear notch samples are tested by four different institutions, depending on the origin district. The study presented here is based on the results of LUFA Nord-West, where the ear notches of all calves from 16 rural districts and independent cities of Lower Saxony are examined (see Fig. 1). From 2010 until the end of 2014, in Lower Saxony, an annual decrease of individual animal prevalence, which is based on the number of births, was observed. In the evaluation period from June to December 2010, the prevalence decreased from 0.68% to 0.44% in 2011. In the following years, there was a further reduction to 0.15% in 2012, 0.09% in 2013 and 0.04% in 2014. Throughout Germany, the prevalence decreased on a comparable scale from 0.36% in 2011 to 0.21% in 2012, 0.14% in 2013 (Gethmann et al., 2014) and 0.06% in 2014.

To completely eradicate the virus or to obtain a negative farm status, it is important to identify the epidemiological factors associated with the BVDV status of farms. To assess these factors, a questionnaire was sent to all cattle farms in the study area. The results of the monitoring from the years 2010 to 2013 were taken as the basis of the present study.

2. Material and methods

2.1. Study population

The 16 districts included in this investigation comprise about 10,600 cattle farms with about 1.1 million cattle and approximately 290,000 calves per year. The study region was split up into three major regions due to the livestock density in these areas (Fig. 1). Among all cattle farms, 7250 sent ear notches of their calves to the Institute for Animal Health of LUFA Nord-West. The remaining farms are beef fattening farms or farms that hold only feeders or rearing calves. In the analysis period from June 2010 to December 2013, 1,045,637 ear notch samples from the study region were tested.

In May 2012, study questionnaires were sent to 7250 cattle farm holders. Up to January 2013, 2542 evaluable questionnaires were returned. This is a return rate of 35.10%. These 2542 farms sent 425,911 ear notch samples since the Lower Saxony regulation was enforced in June 2010 and comprise the study population of this investigation. In the western region containing 4072 farms, the response rate was 34.06%. The central region with 2163 farms and the eastern region with 1060 farms had response rates of 36.71% and 34.06%.

The cattle farmers were asked for written consent to support this study by granting access to the official cattle register HI-Tier. Data access was authorised by the Ministry of Food, Agriculture, Consumer Protection and Regional Development of Lower Saxony (July 21, 2011) according to the data protection law of the federal state.

2.2. Questionnaire

The questionnaire surveyed the main types of production of the farms, which include dairy production, fattening calves, fattening bulls, suckler and hobby keeping. At dairy farms, the milk yield was additionally inquired. Further questions concerned herd size, the breed, holding of other animal species, pasture and the possibility of contact with cattle in other holdings or with other species. Other questions referred to the livestock housing, the presence of calving boxes, the calf housing and the possibility of contact of the calves with pregnant heifers. Furthermore, information regarding the trading forms, the insemination method and the rate of abortions/stillbirths or malformations was retrieved. The current BVDV status was requested together with the vaccination schedule. Finally, the satisfaction with the ear notch sample-based diagnostic system was inquired. The original German version of the questionnaire is available at http://www.tiho-hannover.de/kliniken-institute/institute/institut-fuer-biometrie-epidemiologie-und-informationsverarbeitung/publikationen/zusatzmaterial-publikationen/

2.3. Test material/laboratory tests

All German cattle farmers are obliged to mark their calves by ear