

## Investigation on Circulation of BVD Virus Type 1 and 2 in Burgundy, France

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### Abstract

A survey in France has been conducted in order to detect the seroprevalence of antibodies (AB) to BVDV-1 and BVDV-2 in French commercial cattle farms. A total of 260 beef cows from 2nd lactation onwards have been blood sampled to be analysed for BVDV AB's. Blood samples have been screened for existence of BVDV AB's and in case of positive result a differentiation between BVDV AB's for type 1 or type 2 has been conducted. Both, for screening and differentiation a FLI validated serum neutralisation test (SNT) performed at the Bavarian animal Health Service Lab in Poing was chosen.

The majority (76%) of included animals were detected to carry BVDV AB's. Of these, BVDV AB's for Type 1 has been detected in 157 animals (60.4%). Differentiation tests (serum neutralisation test titration) have detected 23 animals (8.9%) in which the existence of BVDV Type 2 AB's has been evaluated as likely.

This survey confirms the existence of BVDV in French cattle herds in burgundy area. Most importantly, both BVDV-1 and BVDV-2 are likely to be present in different French beef cattle areas.

### Introduction

Bovine Viral Diarrhea (BVD) is one of the most important viral diseases in cattle herds. Besides the high production losses any BVD infection causes, the animal welfare aspect is reason enough to improve and implement all existing measures for prevention of BVD in cattle herds of all farming systems [1].

Two major genotypes of the causative virus can be distinguished: BVD Type 1 (BVDV-1) and BVD Type 2 (BVDV-2). Their prevalence across the world varies as BVDV-2 represents around 50% of the isolates in North America and BVDV-1 dominates in Europe, with more than 90% [2,3].

BVDV can be detected testing bulk milk samples, blood or via an ear notch test. Regional data are showing different but rather high seroprevalence for BVDV (exposure to the virus) [3]: UK: 90% - 95%; Ireland: 98%; Germany: 60%; France: 60%; Italy: 62%; Spain: 80%. BVDV-2 may be associated with different set of clinical signs compared to BVD type 1, often with higher virulence.

As the virus causes transient immunosuppression in infected animals, acute infections are often exacerbated by secondary infections. The effect of the virus on the immune system can also lead to lethal haemorrhagic disease. The BVD virus also interferes extensively with reproductive functions. Depending on the time of infection, there may be a significant reduction in conception rates and an increased number of abortions, malformations, stillbirths or births of persistently infected (PI) calves [4].

It is known that BVDV is endemic throughout Europe-and as such also in France – but the data available mainly refers to BVDV-1. Reports from several countries in Europe have been published, but especially for an important beef cattle region like Burgundy/France only few surveys have focussed on BVDV-2. As acknowledged by French veterinarians, BVD is strongly under-diagnosed in France, which is the country containing the biggest cattle population in the European Union.

This short communication describes a field survey which has been conducted in order to detect the seroprevalence of antibodies (AB) to BVDV in French commercial beef farms.

### Material and Methods

The investigation has been conducted from December 2015 to February 2016 and implied 13 veterinary clinics and 52 farms for a total of 260 sampled animals. The 52 involved farms were selected by the veterinary surgeons of the Burgundy area and were categorized according to the number of pregnant cows registered by the Burgundy department.

In each herd, 5 animals have been blood sampled. Adult cows, 2nd parity or greater, pregnant or not pregnant, with a median age from 6 to 8 years did fulfil the inclusion criteria. 4 of the 52 included farms had reported historic BVD outbreaks and 19 of them have carried out BVD vaccination-except with the vaccine BOVELA®-to protect their animals. Cows vaccinated with BOVELA® have been excluded due to the fact that this vaccine elicits a strong immune response for BVDV-1 and BVDV-2.

Blood samples were collected by the veterinary surgeons in a short time frame at each farm so that the collected serums could be combined and sent chilled at the beginning of each week to the analyzing lab in Bavaria/Germany, where the analyses were carried out.

For this epidemiological investigation, the technique of serum neutralization has been used. This method of analysis makes it possible to quantify the titer of neutralizing antibodies against a virus in serum. This technique has the special benefit that it is able to differentiate the antibodies between type 1 and type 2, which was of specific interest for this epidemiological survey. A downside of this technique compared to a routine immune-enzymatic BVD analysis technique like ELISA is that it needs a well-equipped laboratory with good experience and as such is more time consuming. To our knowledge, this is the first time that this approach is used to assess the prevalence of BVDV antibodies in a large-scale study.

All sera were initially tested for the presence of antibodies against BVDV-1 and BVDV-2. For this purpose a screening test in terms of a neutralization assay was performed using only two serum dilutions (1:5 and 1:40). Subsequently sera with a detectable level of antibodies in the screening test were selected. Serial dilutions of these sera were analyzed by a standard virus neutralization test performed according to the official method published by the German National Reference Laboratory for BVD/MD of the Friedrich-Loeffler Institute (FLI) [5].

## Results

As shown in Table 1, in this investigation 63 animals showed negative results regarding serum neutralizing antibodies for BVDV

	Negative	Positive for BVD-1	Positive for BVD-1 and 2	Positive for BVD-1 (interpretation based on the epidemiological context of the farm)
Number of blood samples	63	157	23	17
%	24.20%	60.40%	8.90%	6.50%

**Table 1:** Numbers and percentages of animals BVDV antibody detections in burgundy cattle farms in winter 2015/16.

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(24% of the sampled cows). On 6 farms the sampled animals were 100% negative, whereas on 5 farms 80% of the sampled animals were negative for antibodies. This implies a high susceptibility of those farms to an infection by BVD type 1 or type 2.

Sixty percent of all sampled cows presented positive titers of serum neutralizing antibodies against BVDV Type 1, representing an active circulation of this virus in the area. This is not surprising given the epidemiological context of the Burgundy area. Whether or not those levels of presented antibody titers would be sufficient to be protective against a new BVDV infection is difficult to predict.

In 40 blood samples, titers were close between Type 1 and Type 2. In 23 samples (9%), the titers for serum neutralizing antibodies have been analyzed as positive against Type 1 as well as against Type 2. In another 17 cows (6.5%), the results have been interpreted as rather positive for BVD type 1, taking into account the epidemiologic context of the farm.

It can be concluded, that the BVD Virus has been circulating in the 4 Burgundy departments: Côte d'Or, Nièvre, Saone and Loire and Yonne. In certain sampled cows titers of serum neutralizing antibodies against BVDV Type 2 have been detected, which is indicating the circulation of this virus, probably associated with a circulation of BVDV Type 1. Finally it can be assumed, that the majority of the farms included in this investigation are not well protected against an infection of BVDV type 2.