

# **Field veterinary survey on clinical and economic impact of Schmallenberg virus in Belgium**

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## Summary

We implemented a questionnaire-based methodology targeting veterinary field practitioners to evaluate clinical and economic impact of Schmallenberg virus in Belgium. First suspicious cases were detected as soon as July 2011. The mean cost for individual symptomatic treatment was 57 or 82 Euros, in case of fatal outcome or apparent recovery respectively.

**Keywords:** Schmallenberg virus, survey, clinical signs, economical losses, impact evaluation, emerging disease

## Introduction

Since August 2011, veterinarians and farmers reported in lactating cows an unusually high frequency of fever, milk-drop and sometimes diarrhoea. This nonspecific clinical picture lasted several days before self-resolution (ProMed-Mail, 2011). In November 2011, metagenomic analysis performed on pooled blood by the Friedrich-Loeffler-Institut identified a novel *Orthobunyavirus* (family *Bunyaviridae*), provisionally named Schmallenberg virus (SBV). As soon as December 2011, several European countries, including Belgium, reported an increase in abortions, still birth and births of deformed lambs, kids and calves, regularly associated with positive SBV detection by RTqPCR, in blood or organs of affected animals. In 2012 the disease will probably have a lower impact on areas where it circulated in 2011 due to the very high seroprevalence, up to 90% in Belgian cattle (Garigliany et al, 2012), and the resulting self-limitation of virus spread. However, SBV emergence remains a major sanitary event in animal health, and its socio-economic impact on livestock is still unclear. The main objective of this study was to collect information regarding clinical and epidemiological observations from the field, by means of a questionnaire-based methodology,

targeting field veterinarians. The preliminary results of this survey are presented here, and will be used to set up a proper evaluation of the economic losses caused by SBV outbreak in Belgium.

## **Materials and methods**

The anonymous questionnaire was submitted by the professional journal *Veterinaria* and also by mail to large animal practitioners (N=758) in the Walloon region (South part of Belgium; Figure 1). An important part of them had only a limited rural activity (a few percent of their working time); 350 veterinarians are reported by the Veterinary Professional Union as having a significant activity in relation with animal farms. In addition, the questionnaire was also mailed to the same veterinarians and, after translation, to the Flemish veterinarians of the neighbouring northern region. The answers were gathered from March to May 2012. The questionnaire was divided in three parts: data regarding veterinarian's personal information, data associated with involved animal populations and clinical observations.

Comparison of reported morbidity rates in adult ruminants and their offspring as well as treatment cost of the considered species were realised using a non parametric Mann-Whitney test (the hypothesis of normality of the distributions could not have been verified). The percentage of bovine and small ruminants households tested for SBV versus monitored farms has been analysed with a Fisher's exact test (Petrie and Watson, 2006).

## **Results and discussion**

The answer rate was about 8 % (N=27), slightly above the 5% lower threshold expected for surveys of this kind (Dufour, 1994).

Age of the participating veterinarians was homogeneous (ranging from 26 to 65 years), and most of them had mainly a rural activity. Participating veterinarians were in charge of a total of 1507 herds (1310 cattle, 145 sheep, 12 goat, 10 pig and 30 mixed species herds). The

following breeds were represented: in cattle, mostly Belgian blue and Holstein; in sheep, mostly Texel and in goats, dwarf goats (small herds).

First suspicious clinical cases were reported as soon as July 2011 (Figure 2) in cattle (Holstein), in a farm located in the eastern part of Belgium and near to the German border, which is in line with the EFSA report regarding the beginning of the viral circulation (European Food Safety Authority, 2012). Clinical signs consisted in milk drop, diarrhoea and hyperthermia. Cases of SBV-induced congenital malformations dramatically increased since January 2012, involving the three ruminant species. The first official SBV positive case was confirmed in sheep the 21<sup>st</sup> of December 2011 (ProMed-Mail, 2011b).

In adult cattle, the most frequent clinical signs were milk drop, diarrhoea, fever, abortion and dystocia. Mastitis was also reported. Duration of clinical signs was recorded in 7 cattle herds, and lasted on average 12 days (from 4 to 25). In adult small ruminants, only abortion and dystocia were described.

In cattle offspring, in descending order, the most frequent observations were stiff neck or scoliosis, arthrogryposis, weak calf syndrome, stillbirth, hydranencephaly, unspecific nervous troubles, and brachygnathism. In lambs, arthrogryposis was first reported, then stiff neck or scoliosis, weak lamb syndrome, stillbirth, brachygnathism, then hydranencephaly and finally lambs with unspecific nervous troubles. In kids, stillbirth was regularly reported, but other clinical signs were rarely described. In addition, none of the participating veterinarian had ever been confronted with such a combination of clinical signs before.

Morbidity rate in adults and newborns are summarized in table 1. It has to be pointed out that in adult small ruminants, clinical signs were almost exclusively related to abortions or dystocia. In offspring, comparison was only realized between calves and lambs (insufficient number of kids); calves had a significantly lower morbidity rate than lambs (Mann-Whitney test;  $p = 0.02$ ).

By the time of the survey, SBV could only be confirmed by RTqPCR (Table 2). Amongst the 27 participating veterinarians, 11 treated the affected animals using a symptomatic treatment (non-steroidal anti-inflammatory drugs, antibiotics and B vitamin). Only 5 of them reported an improvement in health of the animals. In case of fatal outcome, treatment costs reached 57 Euros/animal (ranging from 25 to 80 Euros), whichever the considered species. In case of apparent recovery, the treatment costs averaged 82 Euros (ranging from 40 to 200 Euros). Treatment costs did not significantly differ between fatal and non-fatal cases (Mann-Whitney test,  $p = 0.91$ ).

SBV affection does not figure among reportable diseases (Royal Order, 20.11.2009); therefore, it is hard to achieve a representative view of the real situation because of the risk of under-declaration. Moreover, detection by RTqPCR is limited by the short length of the viraemia, ranging from 2 to 5 days in experimentally infected cattle (Hoffmann et al, 2012).

In contrast with bluetongue disease, the emerging disease caused by SBV was from the very beginning characterized by a mild and unspecific affection in adult animals and a very large and fast geographic spreading. Retrospective epidemiologic studies would bring to light useful data to clarify more accurately spatio-temporal circumstances of SBV emergence in Belgium. Participating veterinarians reported the first suspicious cases as soon as July 2011 in cattle, with a first case along the German border, which reminds of the circumstances of BTV emergence, 5 years earlier (Saegerman et al, 2010). The lack of specificity in clinical signs seen in adult animals explains the delay between first clinical observations and laboratory confirmation. This is supported by a recent EFSA report, which highlights the underreporting of SBV cases, easily missed (European Food Safety Authority, 2012b). This survey allowed a better characterization of clinical signs in adult ruminants, and as a result would help to improve detection of new suspicions in the future. By contrast, clinical picture in offspring was highly specific to retain owner's attention. So far, most of the clinical

detection was linked to the presence of congenital malformations or still birth. Moreover, the interviewed veterinarians never observed a similar clinical picture before SBV emergence. In the future it would be interesting to submit a similar questionnaire to farmers in order to compare their perception with that of practitioners. In addition, some data were gathered regarding the treatments used in the field, their (globally poor) efficacy and their costs.

## **Conclusion**

Taken altogether, these data suggest that a determinist approach (based on data points) would be insufficient to properly characterize socio-economic impact caused by SBV; a probabilistic approach (relying on values distribution) would be more suitable.

SBV biology is currently incompletely characterized, so scenario-based analysis might be of the greatest help, improved by other descriptive surveys to be realized in the future. Although only a limited number of large animal practitioners were involved in this study, the results of the survey bring some new facts that will contribute to set up a proper evaluation of the zootechnical and economical losses caused by SBV emergence in Belgium. As these results are preliminary, they would warrant an implementation in a larger scale and more detailed analysis, including answers of additional practitioners.

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Table 1. Reported morbidity rate in adult and newborn ruminants

Type	Specie	Number of evaluated farms	Median (%)	Mean (% - std dev)	Minimum (%)	Maximum (%)
Mothers	Cattle	10	7.5	20.3 – 23.42	3	70
	Sheep	4	5.5	5.5 – 3.7	1	10
	Goat	2	3.5	3.5 – 2.12	2	5
Offspring	Cattle	14	2	13.36 – 28.11	1	100
	Sheep	9	10	15.89 – 12.68	3	40
	Goat	3	5	3.67 – 2.31	1	5

Table 2. Farms monitored by the veterinarians participating to the survey, with consistent SBV clinical cases, and being tested by RTqPCR

Specie	Evaluated farms	Farms with SBV consistent clinical cases	RTqPCR tested farms	RTqPCR positive farms, amongst tested ones
Cattle	1310	91 (7) <sup>#</sup>	86 (6,5)	39 (51) <sup>*</sup>
Sheep	145	41 (28)	16 (11)	10 (63)
Goat	12	6 (50)	3 (25)	2 (67)

<sup>#</sup>: In brackets, percentage; <sup>\*</sup>: By the time of the survey, analyses regarding 10 farms were still ongoing, so the percentage was calculated on 76 farms only.

Figure 1. Belgian districts where SBV positive cases were observed by the veterinarians participating to the survey

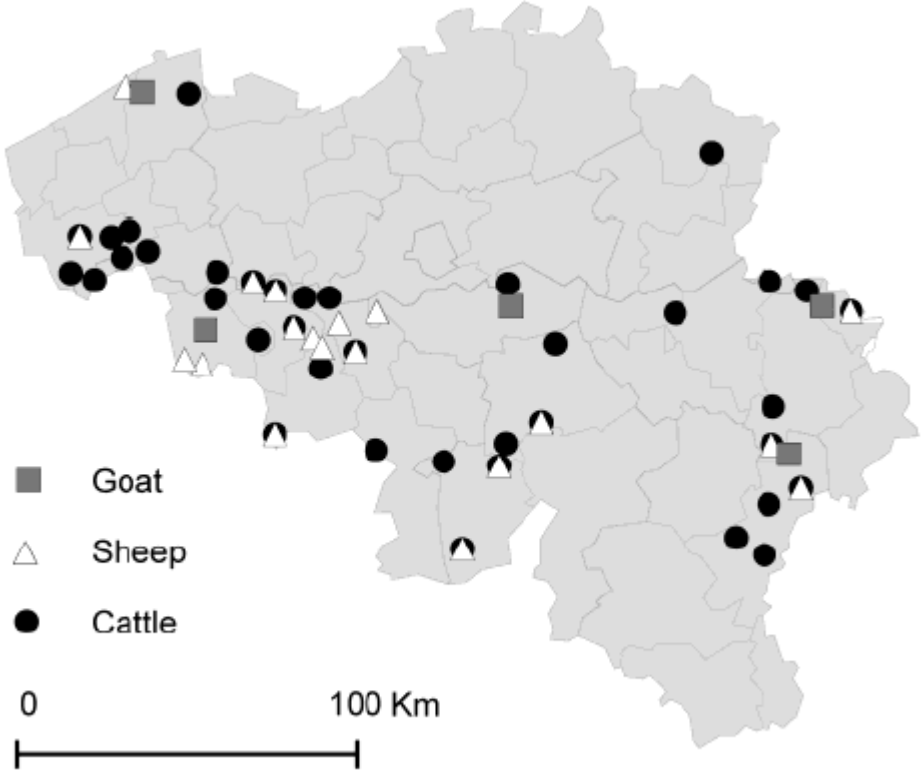


Figure 2. Number of reported herds with consistent SBV clinical cases in Belgium, 2011-2012

