

# Serosurvey of schmallerberg virus infection in sheep in Abruzzo, Italy: Short report

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## Abstract

Infection with Schmallenberg virus (SBV) causes congenital musculoskeletal and vertebral malformations as well as neurological failures in fetuses of several ruminant species. In this study 1038 sheep samples from 10 flocks in the provinces of Chieti, Teramo and Pescara in Italy have been tested for antibodies against SBV by ELISA test. The purpose of the study was to ascertain the extent of SBV infections in sheep in Italy. The results of the ELISA test identified at least one positive animal in 9 of the 10 sheep flocks tested, and a mean within-flock prevalence of 8.57%. Furthermore, large variability of positive animals between flocks was observed (0 and 42.5%). These results demonstrate that SBV was endemic in this region and there could be a risk of novel SBV infections in the following lambing season, raising serious concerns about its so rapid and pervasive spread.

## Introduction

The Schmallenberg virus (SBV), belongs to the Simbu serogroup, genus *Orthobunyavirus* and is a member of the *Bunyaviridae* family [1]. The virus was first isolated in Germany in 2011 in a dairy cattle herd located near the city of Schmallenberg [1]. Orthobunyaviruses are enveloped viruses composed by a three segmented (S, M and L) negative stranded RNA genome covered by nucleoplasmid proteins [2]. While the M segment has been shown to be more variable, the S and L segments are quite stable [3].

Once identified in 2011 in Germany the virus spread very rapidly in 29 European countries [4], and circulated at a very low level since 2013, while an increased circulation has been seen in UK, Germany and the Netherlands in 2015-2016 [5].

SBV is transmitted to animals by insect vectors, midges, of the *Culicoides* species [6] as well as by vertical transmission during gestation from the maternal placenta [7]. SBV infection between animal and animal has not been seen. SBV is not considered zoonotic. The virus is known to cause mild symptoms in adult animals such as fever, diarrhea, reduced milk yield. If pregnant female animals get infected the virus could be transmitted to the fetus via the placenta causing abortion, stillbirth or head, spine or limb congenital malformations.

The purpose of this study was to assess, if sheep flocks in Italy showed positive reply to the ELISA test for the antibodies against the virus, and to determine the within flock prevalence in three different sheep breeds.

## Method

Samples were collected in 10 randomly selected sheep flock in Italy in the region of Abruzzo in the provinces of Chieti, Teramo and Pescara. All animals were older than two years of age and were all

females. Serum samples were analyzed for the presence of antibodies against SBV with a commercial ELISA (ID Screen, Schmallenberg virus Indirect, IDvet Laboratories, Montpellier, France), according to the manufacturer's instructions.

## Result and discussion

Results of the Elisa test conducted on 10 sheep flocks are shown in Table 1. In total 1038 sheep have been tested (Table 2). Of these 89 sheep resulted positive to the ELISA test. Herd prevalence revealed that one flock had more than 42% of infected animals, while the other flocks showed lower values. Three sheep breeds were included in the study, and the merinizzata breed had the highest number of infected animals 70 out of 635 compared to the other two breeds, the Lacaune and Bergamasca breeds. The results presented in this study show that almost all flocks tested positive to the ELISA test for Schmallenberg virus infection. However, these should be considered preliminary findings, due to the limited sample size. Results highlight a wide range of within-flock prevalence (0–42,5.3%) in sheep flocks for SBV in the Abruzzo region in Italy (Table 1). Furthermore, these findings give rise to the assumption that the animals are at risk of getting novel SBV infections. One flock showed only one inconclusive case, whereas, one merinizzata sheep breed flock showed more than 42% of animals positive to the test.

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**Table 1.** Results of the ELISA test for Schmallenberg virus in 10 sheep flocks

Farm	Specie	Breed	Province	Size of the Flock	Positive to ELISA Schmallenberg	Unconclusive	Flock prevalence %
1	Sheep	BGS	Chieti	113	3	4	2,65
2	Sheep	MRZ	Chieti	120	51	2	42,5
3	Sheep	MRZ	Pescara	76	12	1	15,8
4	Sheep	MRZ	Pescara	120	2	0	1,7
5	Sheep	MRZ	Chieti	80	1	2	1,25
6	Sheep	Lacaune	Pescara	80	11	1	13,75
7	Sheep	BGS	Teramo	117	5	2	4,27
8	Sheep	MRZ	Pescara	93	0	1	0
9	Sheep	MRZ	Chieti	119	1	2	0,84
10	Sheep	MRZ	Chieti	120	3	2	2,5
				1038	89		8,57% mean flock prevalence

**Table 2.** Summary of animals tested with the ELISA test for the presence of Antibodies against Schmallenberg virus

	Total animals	ELISA Positive
Total sheep tested	1038	89
Total Merinizzata sheep tested	635	70
Total Bergamasca sheep tested	230	8
Total Lacaune sheep tested	80	11

As the SBV is transmitted by Culicoides the most important factors to consider related to its prevalence within the year and across the years are temperature, rainfall, humidity and in general the climatic conditions favorable or not for the spread of the virus. Today, it is still unclear how the virus is able to survive from one year to the other or how the animals could have been infected, in particular in the Abruzzo region, as the temperatures in these regions in winter are quite cold and are not suitable for its survival.

Antibodies against SBV can be detected starting from 2 to 3 weeks post infection and can persist in sheep up to 16 months [8]. Consequently, the data shown indicates possible new or one-year old infections related to 2012. Further, antibodies against SBV has been found in wildlife species such as deer and wild boar, suggesting that there could be the possibility of a wildlife reservoir [9].

In conclusion, the presence of a very high proportion of infected flocks in a region very far from Germany only two years after the first identification in cattle, raises serious concern about its so rapid and pervasive spread. The damage that SBV can cause in livestock breeding of these species could in fact prove to be very serious, compromising an economic sector, that of small ruminants, which in the southern Italian regions constitutes the backbone of the breeding economy.

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## Conflict of interest statement

None

## Ethical statement

Blood Samples used were taken during obligatory routine animal sanitary controls by an authorized veterinarian. Ethical approval was given by Ethical Commission of the University of Milan number: OPBA\_56\_2016.

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