

Section

Fields (of activity)

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Lumpy skin disease: improvement of diagnostic methods and assessment of the vector potential of insects of Switzerland

Anca Paslaru¹, Andrea Vögtlin¹, Eva Veronesi²

¹Institute of Virology and Immunology, Sensemattstr. 293, CH-3147 Mittelhäusern ²Institute of Parasitology, Winterthurerstr. 266a, CH-8057 Zürich

Key words

Lumpy skin disease, cattle, vectors, biting arthropods, Switzerland, diagnostics

Aim of the study

The aims of our project are (a) to establish reliable diagnostic tools (qPCR and ELISA, Virus isolation [VI] and Virus Neutralization Test [VNT], Indirect Immunofluorescence [IIF]) for LSDV detection (b) assessment of the vectorial potential of local arthropods for LSDV. Gaining substantial knowledge on the way of transmission (mechanical, biological) by various abundant arthropods in Switzerland under realistic temperature conditions (c) to investigate the largely unknown populations of biting flies (biting stable fly, *Stomoxys calcitrans*) (incriminated main vector in warm climates).

Material and methods

Recent LSDV outbreaks in SE Europe in cattle prompted us to investigate the infectivity currently circulating LSDV Macedonia 2016, field strain isolate for biting arthropods. In order to address these issues biting arthropods (mosquitoes: *Ae. aegypti, Ae. japonicus, Cx. pipiens; Culicoides: C. nubeculosus*, field *Culicoides* and stable flies: Stomoxys *calcitrans*) were experimentally infected with a LSDV Macedonia 2016, field strain and incubated under fluctuating temperature regime and body parts, blood regurgitate, and faecal samples were analyzed for the presence of viral DNA and infectious virus at different time points. The aims of our studies included determination of mechanical or biological transmission of LSDV via biting arthropods. Moreover, currently used diagnostic techniques were evaluated for their suitability to diagnose a LSDV infection in cattle and biting arthropods.

Additionally, a commercially available ELISA test (IDScreen Capripox Double Antigen Multi-species, ID.vet Innovative Diagnostics, Grables France) has been validated with samples from animal experiments from The Pirbright Institute, England and samples originating from the Swiss Serum bank. The same samples were used for the VNT and IIF tests.

Since there are no studies describing the abundance of *S. calcitrans* in Switzerland, particularly in cattle farms, we have here provided a distribution of this species among several Swiss farms.

Results and significance

In summary, *S. calcitrans* proved to be a mechanical vector for LSDV (virus particles could be isolated up to two days post infection from body parts and faeces) and *C. nubeculosus* might be a biological vector as the virus could be isolated form different body parts (head, abdomen, wings) after ten days post infection, which would prove a virus dissemination. Furthermore, qPCR and VI assays showed to be appropriate in detecting LSDV in arthropods.

In our study, IIF proved to be a more sensitive diagnostic tool compared with ELISA and VNT. *Stomoxys calcitrans* presence was monitored at eight farms with different livestock animals in Switzerland. *Stomoxys calcitrans* were collected at all the monitored farms, although the average number of flies per week varied between 0.3 ± 0.14 . Although only two collections were carried out at a high-altitude farm (2,412 m) they were both positive for *S. calcitrans* with 47 and 15 individuals respectively. This would suggest that during summer season in Switzerland, stable flies might follow the cattle during transhumance period and could explain their presence even to higher altitudes.

Publications, posters and presentations

Publications:

Paslaru et al.; Assessment studies of lumpy skin disease virus (LSDV) mechanical transmission by *Stomoxys calcitrans* biting flies (*to be submitted for publishing*)

Paslaru et al.; Attempted mechanical and biological transmission of lumpy skin disease virus by biting arthropods (*to be submitted for publishing*)

Posters:

Poster presentation of" Lumpy skin disease: improvement of diagnostic methods and assessment of the vector potential of insects of Switzerland"- Poster and Networking Day of the Vetsuisse faculty Zürich, University of Zürich, 5th of December, 2018, Zürich, Switzerland

Poster presentation of "Lumpy skin disease: improvement of diagnostic methods and assessment of the vector potential of insects of Switzerland" –E-SOVE, European Society for Vector Ecology Conference, October 22-26th 2018, Palermo, Italy

Presentations:

Oral presentation of "Lumpy Skin Disease: improvement of diagnostic methods and assessment of the potential for arthropod transmission in Switzerland" – Institute of Virology and Immunology Mittelhäusern- Seminar project report, February, 18th 2020, Mittelhäusern, Switzerland.

Oral presentation of "Vector competence for Lumpy Skin Disease Virus of laboratory and field-collected arthropods" – Annual scientific meeting of the Swiss vector entomology group (SVEG), January 16-17th 2020, Basel, Switzerland.

Oral presentation of "Vector competence for Lumpy Skin Disease Virus of laboratory and field-collected arthropods" – 13th Annual meeting of EPIZONE European research group, August 26-28th 2019, Berlin, Germany.

Oral presentation of "Lumpy skin disease: improvement of diagnostic methods and assessment of the vector potential of insects of Switzerland" – Annual scientific meeting of the Swiss vector entomology group (SVEG), January 18th 2019, Neuchatel, Switzerland

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