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EU Reference Laboratory
for Capripox viruses

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healthy all life long

EURL activities of importance to the LSD diagnosis and vaccine control

Wannes Philips, Ilse De Leeuw,
Andy Haegeman, Kris De Clercq, Nick De Regge

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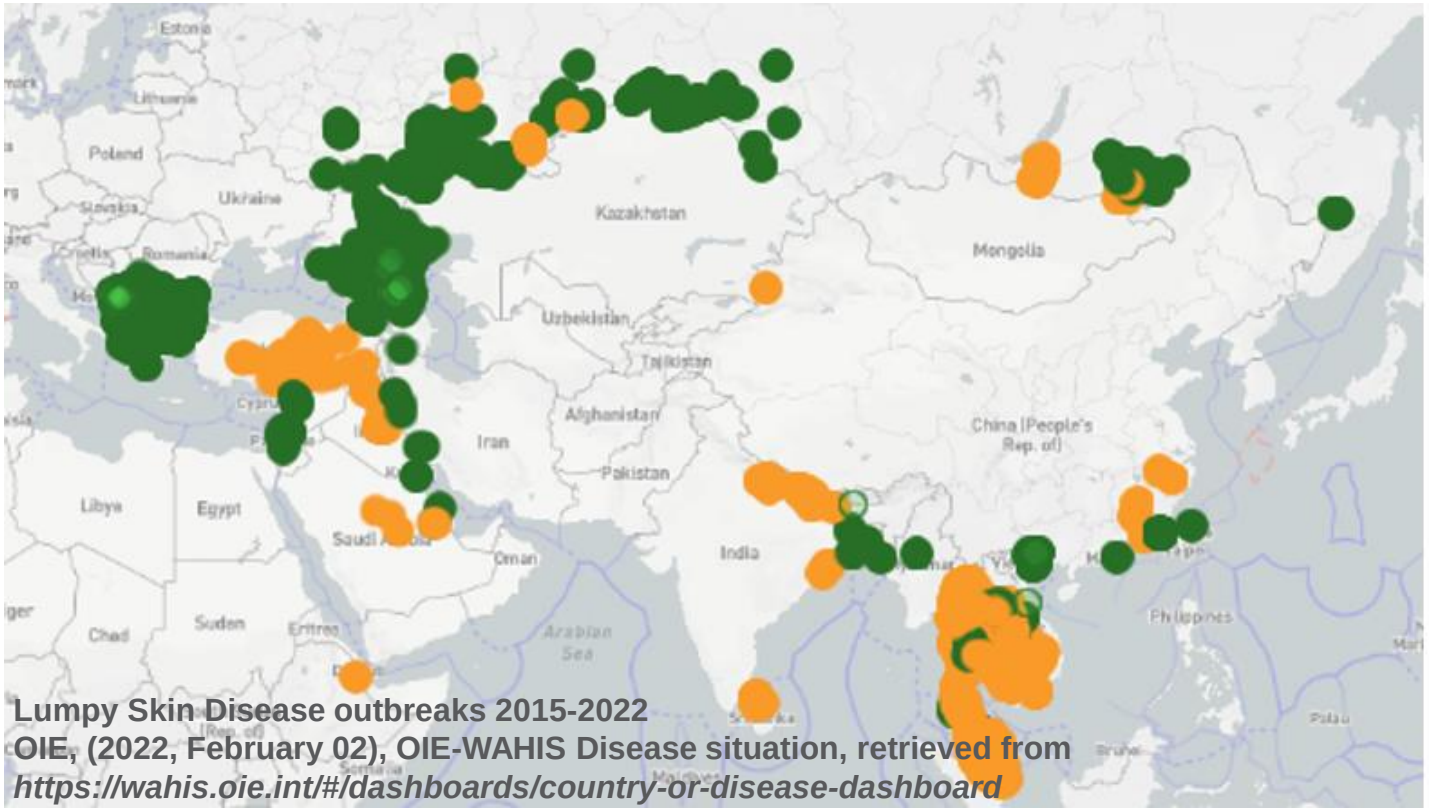
Content

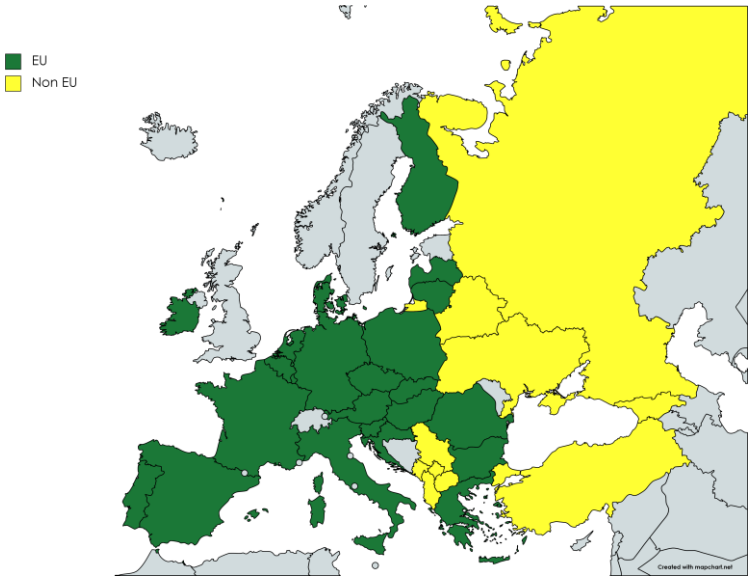


Lumpy Skin Disease outbreaks 2015-2022
OIE, (2022, February 02), OIE-WAHIS Disease situation, retrieved from *https://wahis.oie.int/#/dashboards/country-or-disease-dashboard*

Part I: Tasks related to South-East European epidemic

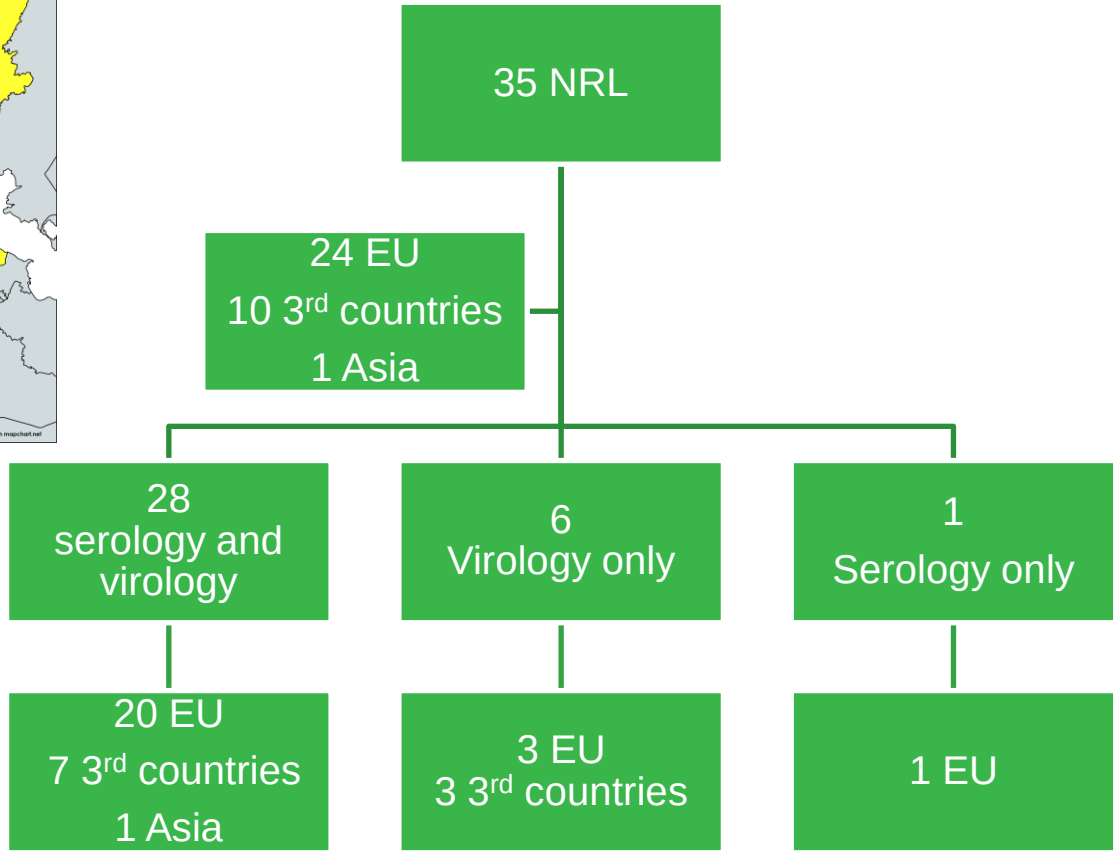
Part II: Preparedness for Central Asian epidemic

Part I: Proficiency test



Objective: to assess the ability of NRLs to perform

Capripox virus serological and molecular virology diagnosis

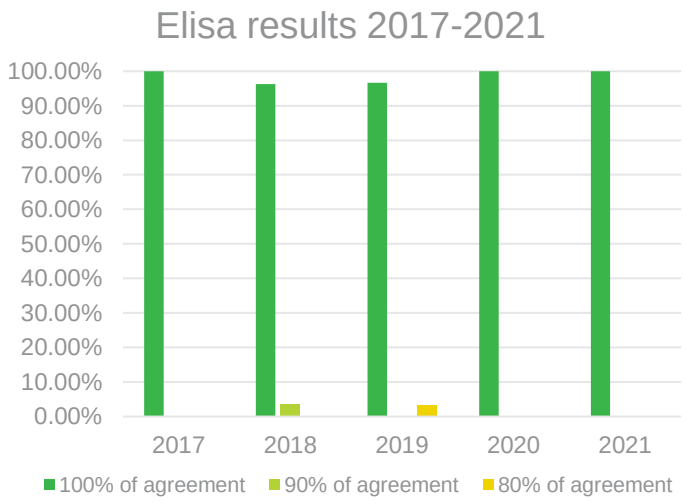


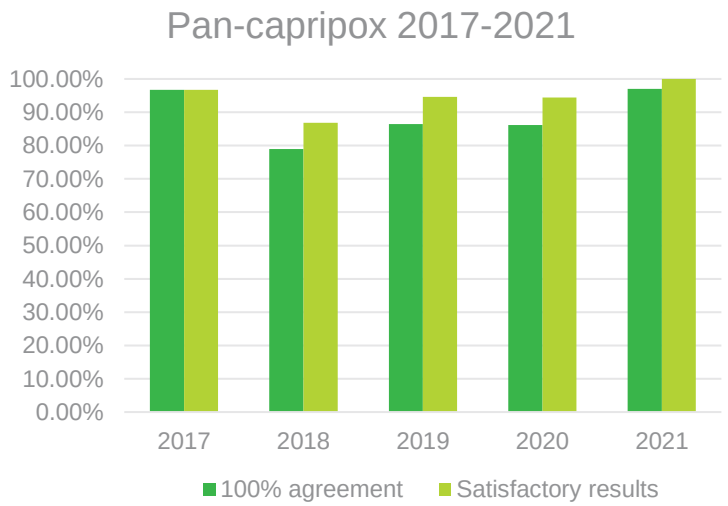
ISO17043 ‘Conformity assessment - General requirements for proficiency testing’

Part I: Proficiency test

For the detection of specific antibodies to capripox virus in bovine and ovine sera, all participating laboratories achieved a satisfactory performance

For the detection of capripox virus nucleic acid in the PT samples, all participating laboratories achieved a satisfactory performance





Part I: Training

- Annual meeting: update of the most recent epidemiological situation and diagnostic tools

- Training for Pendik Institute (Turkey): LSDV diagnostics, vaccines and vaccine quality control

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Part I: In vitro studies to improve diagnostics

- LSDV DIVA PCRs: are important to differentiate adverse reactions after vaccination from clinical disease induced by wild type strains

Mol Cell Probes. 2021 Dec;60:101778. doi: 10.1016/j.mcp.2021.101778. Epub 2021 Nov 11.

A TaqMan probe-based multiplex real-time PCR method for the specific detection of wild type lumpy skin disease virus with beta-actin as internal amplification control

Eirini I Agianniotaki [1], Serafeim C Chaintoutis [2], Andy Haegeman [3], Kris De Clercq [3], Eleni Chondrokouki [4], Chrysostomos I Dovas [5]

microorganisms MDPI

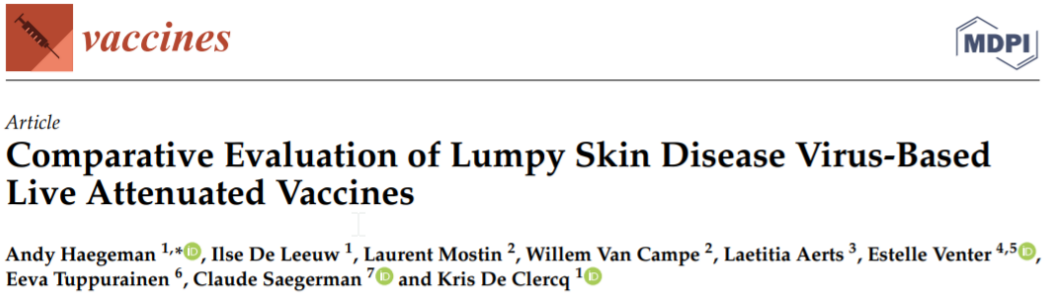
Article

Validation of TaqMan-Based Assays for Specific Detection and Differentiation of Wild-Type and Neethling Vaccine Strains of LSDV

Dejan Vidanović [1,*], Bojana Tešović [1], Milanko Šekler [1], Zoran Debeljak [1], Nikola Vasković [1], Kazimir Matović [1], Andrey Koltsov [2], Kiril Krstevski [3], Tamaš Petrović [4], Ilse De Leeuw [5] and Andy Haegeman [5]

Part I: In vivo studies in support of policy decisions

- Evaluation of safety/efficacy of inactivated and live-attenuated vaccines



- LSDV transmission by *Stomoxys calcitrans* flies and *Haematopota* horseflies from LSDV infected cattle with clinical signs

Experimental evidence of mechanical lumpy skin disease virus transmission by *Stomoxys calcitrans* biting flies and *Haematopota spp.* horseflies

C. Sohier[1,3*], A. Haegeman[1,3], L. Mostin[1], I. De Leeuw[1], W. Van Campe[1], A. De Vleeschauwer[1], E. S. M. Tuppurainen[2], T. van den Berg[1], N. De Regge[1] & K. De Clercq[1]

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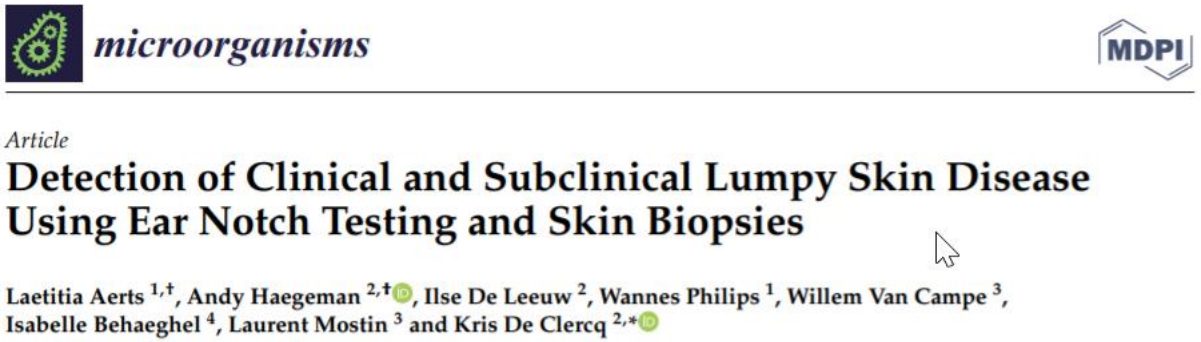
Part I: In vivo studies in support of policy decisions

- Potential role of subclinical LSDV infected cattle in transmission



microorganisms

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Article

Detection of Clinical and Subclinical Lumpy Skin Disease Using Ear Notch Testing and Skin Biopsies

Laetitia Aerts [1,†], Andy Haegeman [2,†], Ilse De Leeuw [2], Wannes Philips [1], Willem Van Campe [3], Isabelle Behaeghel [4], Laurent Mostin [3] and Kris De Clercq [2,*]

- Evaluation ongoing of LSDV transmission by *Stomoxys calcitrans* flies from subclinical LSDV infected cattle

- Evaluation ongoing of transmission of vaccine strains (LSD vaccine (OBP) and Lumpivax (Kevevapi)) by *Stomoxys calcitrans* flies

Part I: Vaccine control

- In vitro vaccine batch control
  - European LSDV vaccine bank
  - Turkish batch control for LSDV and SHPX vaccines

- In vitro and in vivo quality control of Lumpivax LSDV vaccine (Kevevapi)

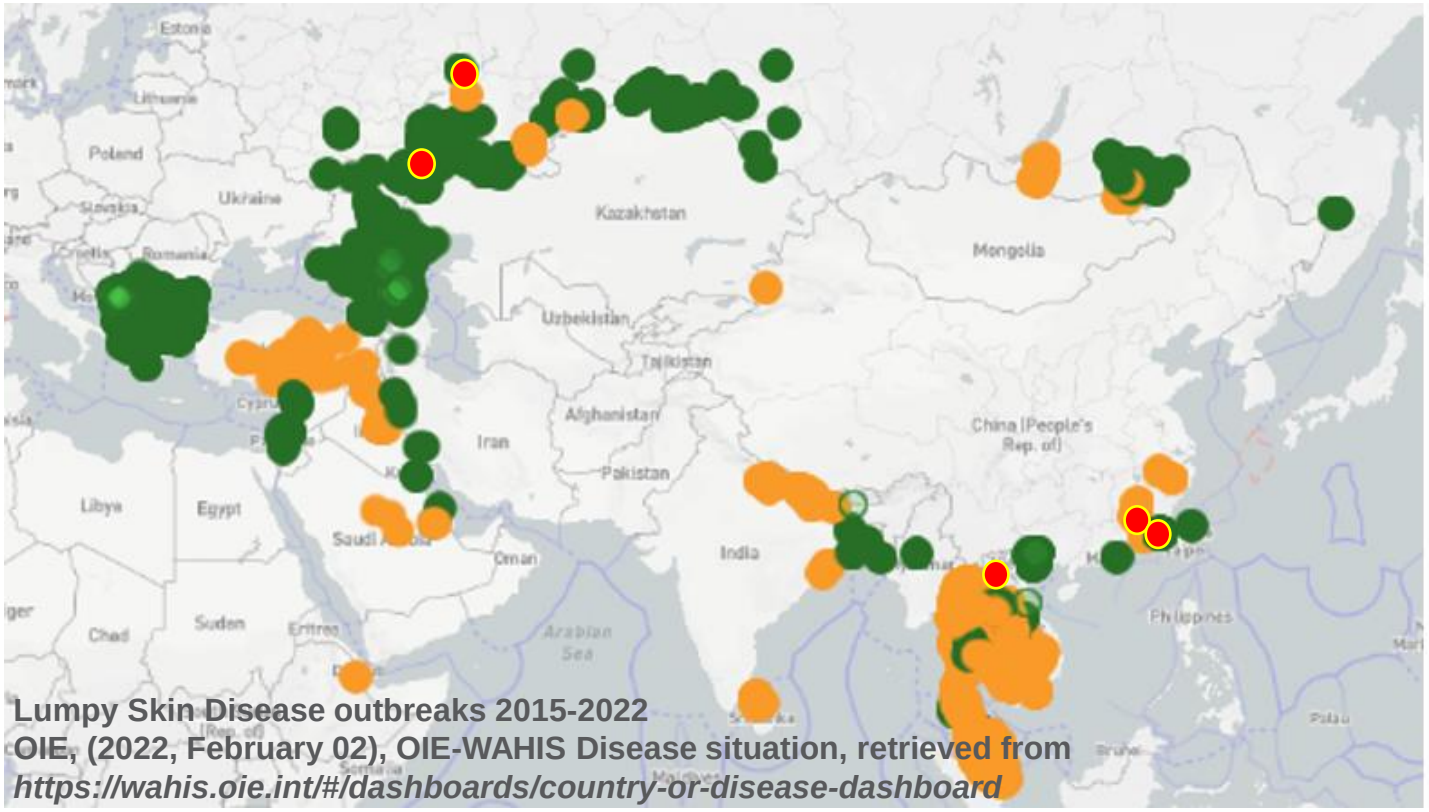
✓ Contained genomic sequences of LSDV vaccine and field type strains and goatpox virus

✓ Indications of recombinant strains in vaccine – result of a poorly controlled production process

follow-up studies via NGS ongoing

✓ Provided protection against challenge infection

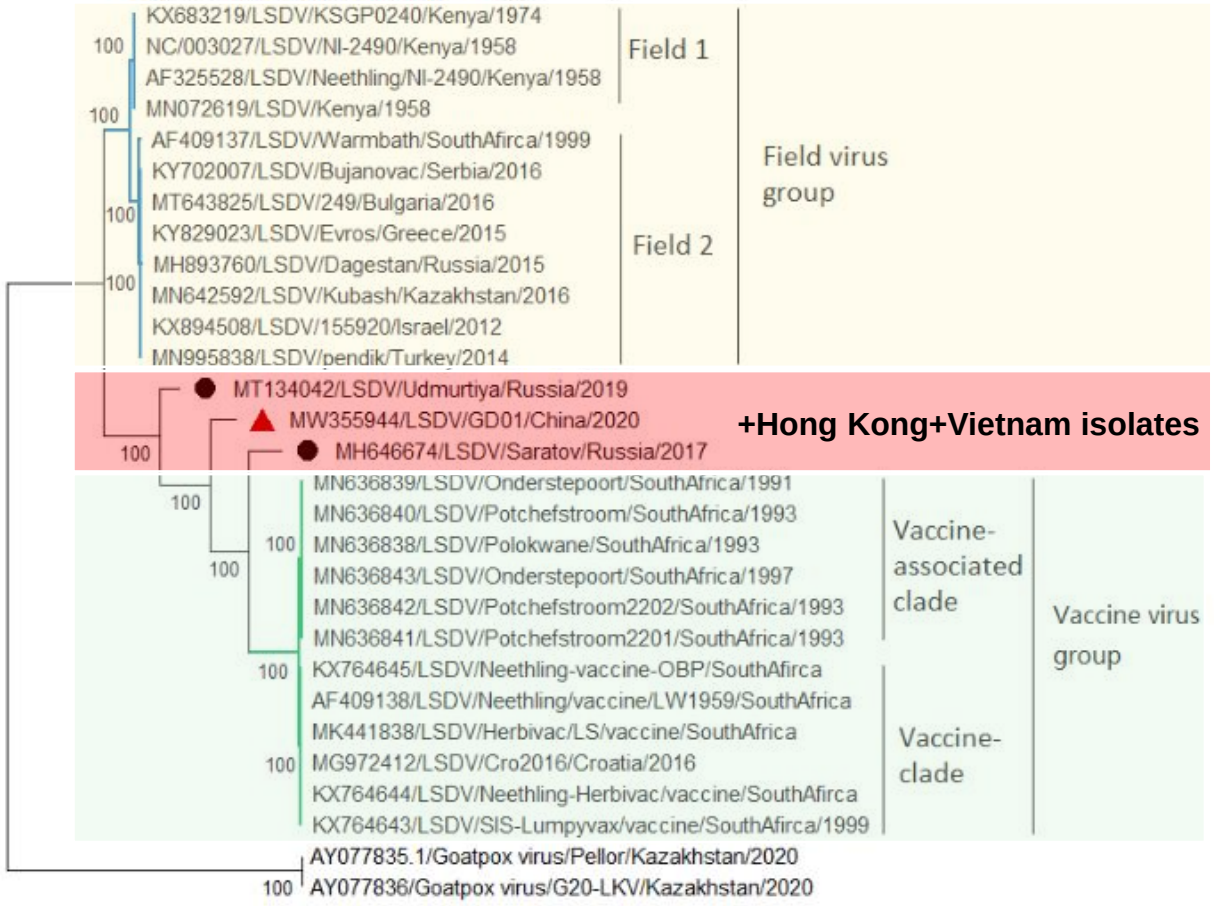
Part II: Central Asia – recombinant strains



Lumpy Skin Disease outbreaks 2015-2022
OIE, (2022, February 02), OIE-WAHIS Disease situation, retrieved from *https://wahis.oie.int/#/dashboards/country-or-disease-dashboard*

- Recombinant LSDV strains seem to have a Neethling-like vaccine strain backbone combined with sequences of field type LSDV strain(s), resulting in a wild type phenotype

Part II:recombinant strains - phylogeny



Ma et al, 2022 – based on full genome sequences

- Recombinant strains cluster more closely to vaccine strains, but behave as wild type field strains

Part II:recombinant strains – full genome sequencing

- Important to collect and share information on circulating strains during an epidemic – important for preparedness
- Full genome sequencing is advised for a correct classification

Journal of Virological Methods 301 (2022) 114464

Contents lists available at ScienceDirect

Journal of Virological Methods

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

Protocols

A robust, cost-effective and widely applicable whole-genome sequencing protocol for capripoxviruses

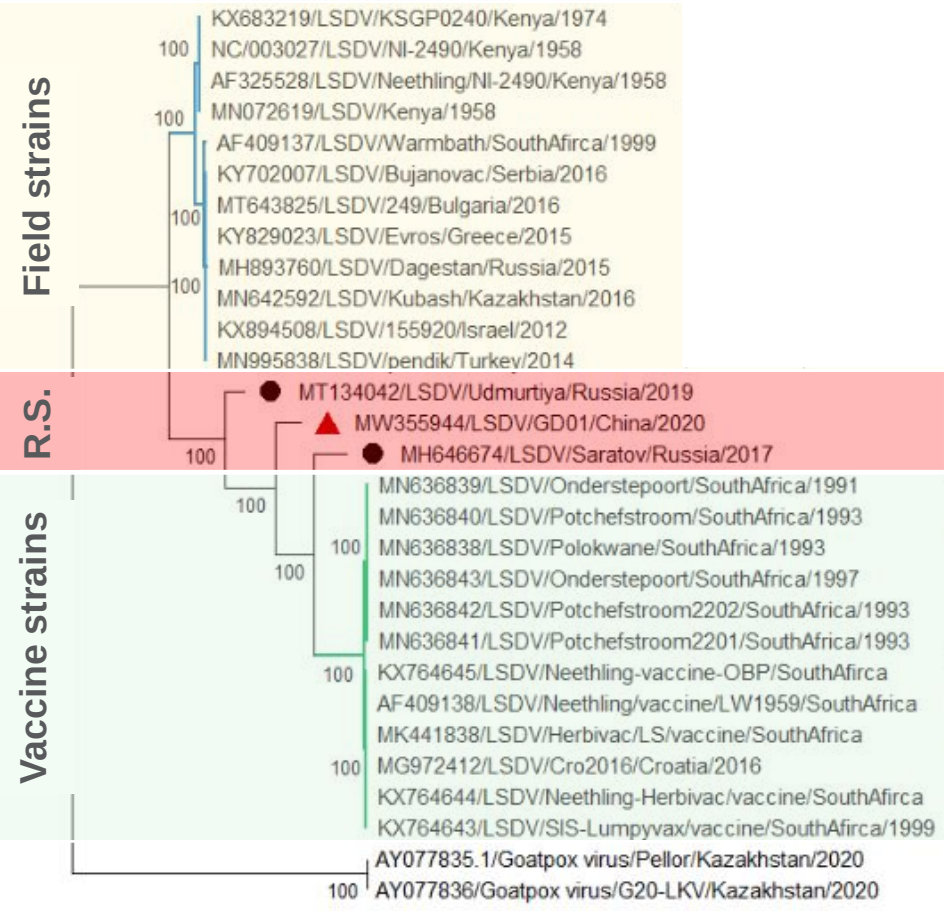
Elisabeth Mathijs *, Andy Haegeman, Kris De Clercq, Steven Van Borm, Frank Vandenbussche

Infectious Diseases in Animals, Sciensano, Rue Juliette Wytsmanstraat 14, 1050, Brussels, Belgium

- EURL is ready to provide help to countries for strain characterization

Part II:recombinant strains – DIVA PCRs

- DIVA PCRs are important to differentiate adverse reactions after vaccination from clinical disease induced by wild type strains



› Transbound Emerg Dis. 2021 Nov;68(6):3020-3024. doi: 10.1111/tbed.13942. Epub 2021 May 13.

Performance of the currently available DIVA real-time PCR assays in classical and recombinant lumpy skin disease viruses

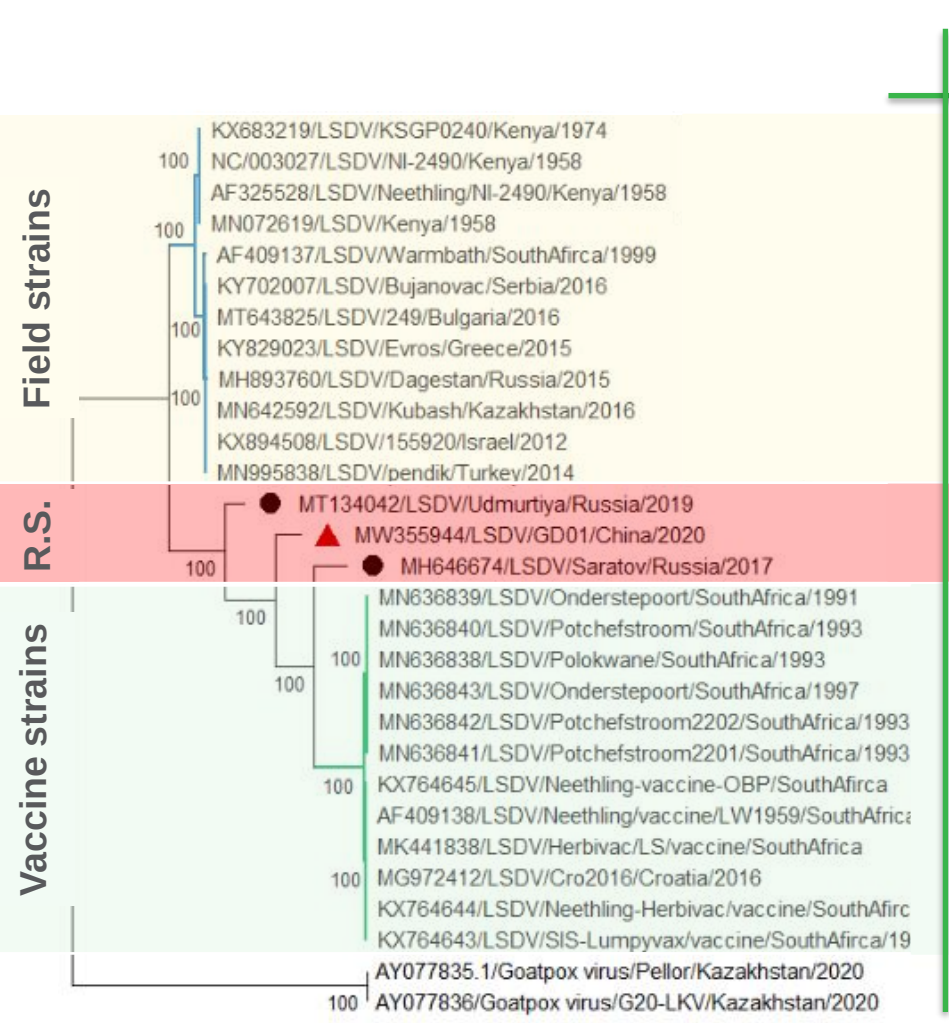
Olga Byadovskaya [1], Yana Pestova [1], Aleksandr Kononov [1], Irina Shumilova [1], Svetlana Kononova [1], Alexander Nesterov [1], Shawn Babiuk [2], Alexander Sprygin [1]

- IDVet (commercial)
- Biosellal (commercial)
- Agianniotaki et al, 2017
- Sprygin et al, 2018
- Kononov et al, 2019

➢ Recombinant field strains classified as vaccine strains in several DIVA PCRs

Part II:recombinant strains – DIVA PCRs

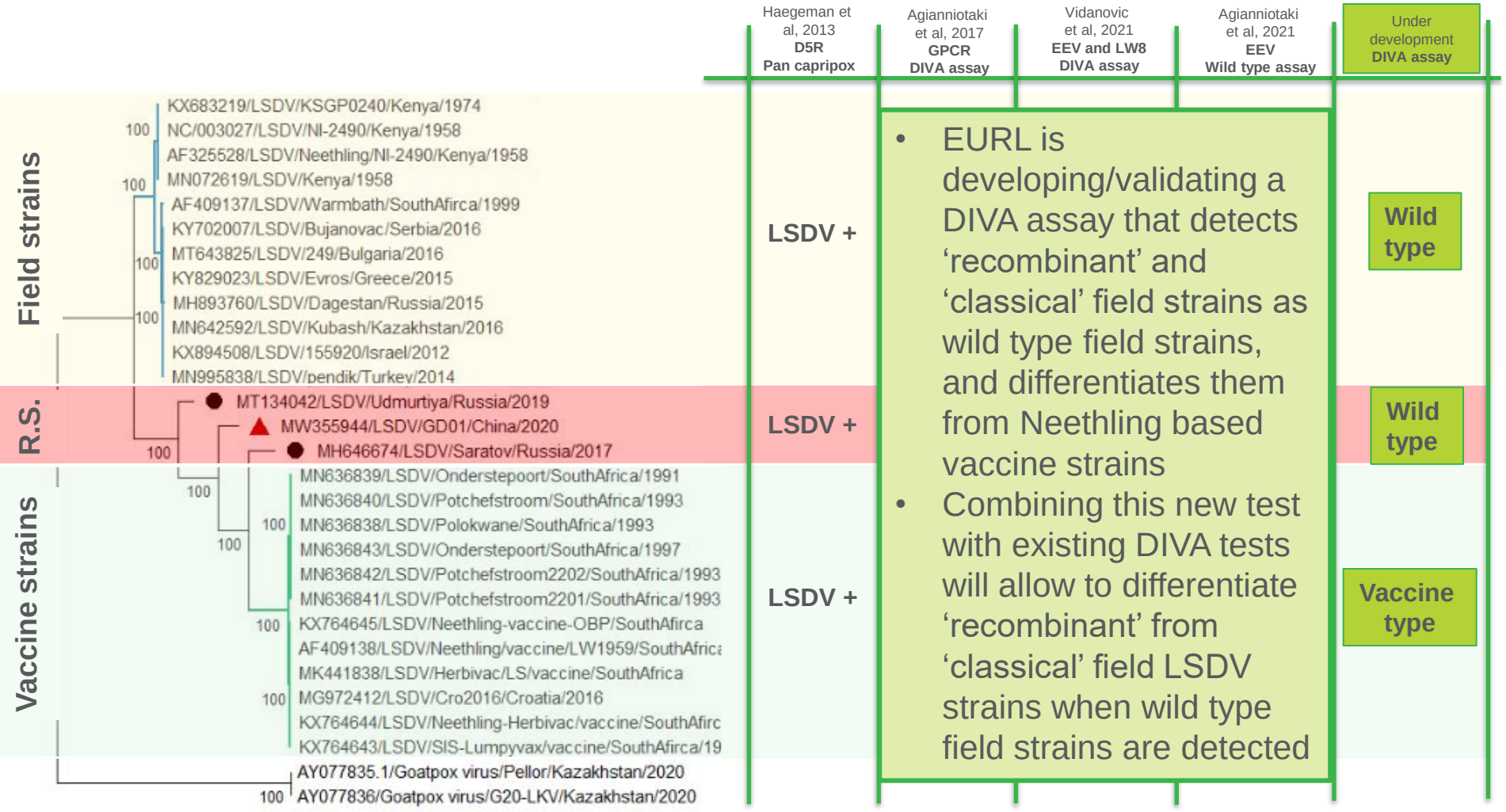
- Extensive in silico analysis by EURL-some examples



	Haegeman et al, 2013 **D5R Pan capripox**	Agianniotaki et al, 2017 **GPCR DIVA assay**	Vidanovic et al, 2021 **EEV and LW8 DIVA assay**	Agianniotaki et al, 2021 **EEV Wild type assay**	Sprygin et al, 2018 **ORF008 Vaccine type assay**
Field strains	LSDV +	Wild type	Wild type	Wild type	Not detected
R.S.	LSDV +	Vaccine type	Vaccine type - Saratov not detected	Not detected	Vaccine type
Vaccine strains	LSDV +	Vaccine type	Vaccine type	Not detected	Vaccine type

Part II:recombinant strains – DIVA PCRs

- Extensive in silico analysis by EURL-some examples



Part II:recombinant strains – epidemiological implications

- EURL will try to obtain funding to perform studies:
  - on the pathogenesis of recombinant LSDV strains
  - efficacy of available vaccines against infection with recombinant strains
  - on the transmission routes of recombinant LSDV strains

- EURL is optimizing infection models for sheep pox and goat pox virus to perform vaccine evaluations

Sheep- and Goatpox outbreaks 2015-2022
OIE, (2022, February 02), OIE-WAHIS Disease situation, retrieved from *https://wahis.oie.int/#/dashboards/country-or-disease-dashboard*

Thanks to the EC for the support

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