EXTERNAL REFERENCES

ID SCREEN® CAPRIPOX DOUBLE ANTIGEN MULTI-SPECIES

Last update: May 2023

Publications / References:

1)Haegeman A. *et al.* (2023). **Duration of Immunit Induced after Vaccination of Cattle with a Live Attenuated or Inactivate Lumpy Skin Disease Virus Vaccine**. Microorganisms 11, 210.	• Evaluation of the duration of immunity induced on cattle by a commercial live attenuated vaccine (Lumpyvax, MSD animal Health, South-Africa) and an inactivated vaccine (obtained from MCI, Santé Animale, Morocco), both based on LSDV. Humoral response was followed using the ID Screen® CPVDA ELISA, IPMA and 2 VNT tests. • *Results*: using the ELISA, in unvaccinated animals, first detection and complete conversion were after 14- and 21-days post challenge (dpv), respectively.; in attenuated LSDV-vaccinated animals, the onset of seroconversion was seen at 11 dpv; in inactivated LSDV-vaccinated animals, the earlier onset of seroconversion was seen at 28 dpv.	Correlation with othrt techniques			Experimental infection	
2)Hakobyan V. *et al.* (2023). **The Serological Response in Cattle following Administration of a Heterologous Sheep Pox Virus Strain Vaccine for Protection from Lump Skin Disease; Current Situation in Armenia.** Veterinary Sciences, 10(2), 102.	• Seroprevalence and seroconversion testing was carried out on cattle vaccinated with a dry culture sheep-pox virus (produced by the Federal Center for Animal Health, Armenia), using the ID Screen® CPVDA ELISA before and 30 days after vaccination. • Results: Prior to vaccination, none of the tested cattle had detectible antibodies using ELISA. Following 30 days after vaccination, 86.09% of the studied animals seroconverted with detectable antibodies to LSDV.			Epidemilological study	Vaccination monitoring	

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3)Suwankitwat N. *et al*. (2023). **Long-term monitoring of immune response to recombinant lumpy skin disease virus in dairy cattle from small-household farms in western Thailand**. https://doi.org/10.21203/rs.3.rs-2534351/v1	• Study of the duration of LSD immune response of subclinical and clinical animals after natural infection in dairy cattle (n=66). Antibody response was detected using serum neutralization test (SNT) and the ID Screen® CPVDA ELISA. • *Results*: **LSDV antibodies were detected in the LSDV infected cattle at least 15 months post symptoms (mps). ELISA positives were ranged from 36.11 to 75.00% of the sample during the studied period**. Clinical animals showed the average antibody level at 122.44% S/P ratio at 1 mps and increased to the peak of 149.95% S/P ratio at 2 mps before decreasing slightly to 77.64%S/P ratio at 15 mps. Subclinical animals showed 42.12% S/P ratio at 1 mps and increased to 75.10% at 10 mps before dropped marginally to 56.78% at 15 mps. **SNT positives were ranged from 47.22–67.19% of the samples over the studied periods.** ***SNT provided results equivalent to ELISA, implying that both assays may be used interchangeably between 1 and 15 mps.* (sic)	Correlation with other techniques		Epidemiological study		
4)Fay P. C. *et al*. (2022). **The immune response to lumpy skin disease virus in cattle is influenced by inoculation route**. Frontiers in Immunology, 13, 6947.	• Analysis of the immune responses of calves experimentally inoculated with LSDV (live strain originated from a LSD outbreak in Easter Europe in 2016, Pirbright), via either needle-inoculation or arthropod-inoculation using virus-positive vectors. The ID Screen® Ruminant IFN-g ELISA was used to follow the cellular response (secretory IFN-G) and the LSDV-specific antibodies were detected using the ID Screen® CPVDA ELISA. VNT was therefore performed to detect neutralizing antibodies. • *Results*: a stronger and more rapid humoral immune response was detected in clinical animals compared to the nonclinical animals, when calves were inoculated via needle-inoculation; all the arthropod-inoculated calves developed a detectable antibody response to LSDV.	Correlation with other techniques		Experimental infection		
5)Hussien M.O. *et al.* (2022). **Serological, virological and molecular diagnosis of an outbreak of lumpy skin disease among cattle in Butana area, Eastern Sudan**. Veterinary Medicine and Science, 1–7.	• The study reports an LSD outbreak and discusses serological, virological, and molecular investigations of the disease. Sera samples (n=43) were tested with the ID Screen® CPVDA ELISA. • *Results*: 18 out of the 43 (41.9 %) serum samples were found positive. Diagnosis of LSD was confirmed with clinical, virological, and molecular investigations.	Correlation with other techniques		Epidemiological study		

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6)Ibrahim A.I. *et al.* (2022). **Serodiagnosis of Lumpy Skin Disease Using Sheep Pox Virus Compared to a Commercial ELISA Kit**. Journal of Applied Veterinary Sciences, 7(1), pp. 46-52.	• This study was conducted on 150 control and 200 field samples to evaluate and compare both the ID Screen® CPVDA ELISA and virus neutralization test (VNT) using sheep pox virus (SPV) and Lumpy Skin Disease Virus (LSDV) for monitoring the humoral response against LSDV. • *Results*: Sensitivity and specificity of VNT were higher using LSDV (96% and 100%, respectively) than using SPV (89.3% and 98.6%, respectively). Sensitivity and specificity of the ID Screen® CPVDA ELISA were 98.6% and 97.3% respectively. Agreement between VNT using SPV and ELISA: 0.93 and 0.90 with Kappa index of 0.86, and 0.78 for control and field samples tested. Agreement between VNT using LSDV and ELISA: 0.97 and 0.96 with a Kappa index of 0.94 and 0.90 for control and field-tested. ***The ID Screen® CPVDA ELISA is the most sensitive test for detection of LSDV antibodies in vaccinated and infected cattle (sic).***	Correlation with other techniques				Performance evaluation
7)Ko Y. S. *et al*. (2022). **Serological and molecular prevalence of lumpy skin disease virus in Korean water deer, native and dairy cattle in Korea**. Korean Journal of Veterinary Service, 45(2), 133-137.	• The purpose of this study was to confirm the existence of LSDV antigens or antibodies in Korean livestock. 1200 blood samples from cattle (691 Korean native cattle, 419 dairy cattle and 90 Korean water deer) were tested using PCR and the ID Screen® CPVDA ELISA. • *Results*: all the animals were tested negative for antigen and antibody to LSDV **The study presents specificity data on Korean livestock (cattle and water deer) for the ID Screen® CPVDA ELISA, confirmed by PCR.**		Particular species	Epidemiological study		Specificity data
8)Matsiela M. S. *et al*. (2022). **Improved safety profile of inactivated Neethling strain of the lumpy skin disease vaccine**. Vaccine: X, 12, 100209.	• Experimental immunization of rabbits using LSDV Neethling attenuated vaccine strain (from the OBP stock repository) prepared with Montanide adjuvant. Serological response was followed using the ID Screen® CPVDA ELISA and SNT. • *Results*: the non-vaccinated animals did not develop any detectable antibody responses; serological assays revealed that the 1,00E + 06 TCID50/dose of the Montanide adjuvanted inactivated LSDV vaccine induced high level of antibodies when compared to the 1,00E + 05 TCID50/dose of the vaccine. The antibody response increased after secondary vaccination and was comparable with both serological assays.	Correlation with other techniques			Experimental infection	
9)Shumilova I. *et al.* (2022). **A Recombinant Vaccine-like Strain of Lumpy Skin Disease Virus Causes Low-Level Infection of Cattle through Virus-Inoculated Feed**. Pathogens, 11(8), 920.	• Study of attempted indirect contact transmission of virus LSDV (classical field strain Dagestan/2015 and recombinant vaccine-like Saratov/2017) from inoculated feed via the alimentary canal. Serological response was followed using the ID Screen® CPVDA ELISA.				Experimental infection	

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	• *Results*: all bulls in the Dagestan/2015 group remained healthy and did not seroconvert by the end of the experiment, whereas for those in the Saratov/2017 recombinant virus group, of the five bulls fed on virus-inoculated feed, three remained clinically healthy, while two displayed evidence of a mild infection.					
10)Uzar S. *et al*. (2022). **Comparison and efficacy of two different sheep pox vaccines prepared from the Bakırköy strain against lumpy skin disease in cattle**. Clin Exp Vaccine Res 2022; 11:1-11.	• Experimental immunization using sheep pox vaccine (Penpox-M, from Pendik Veterinay Control Institute) prepared from the Bakırköy strain in MDBK or primary lamb kidney cells, followed by challenge with a virulent Pendik strain of LSD, from Pendik Veterinary Control Institute. Serum samples were tested for the presence of vaccine-induced antibodies with the ID Screen® CPVDA ELISA and VNT. • *Results:* Antibodies were detected 9, 11, 15, 21, and 25 days after challenge by ELISA and SNT. Commercial Bakırköy SP vaccine produced in primary lamb kidney cells, protected against LSD in cattle. ***The ID Screen® CPVDA ELISA is able to detect antibodies in experimental immunization using sheep pox vaccine followed by challenge with LSDV from day 9 and is well correlated with VNT. SP vaccines used against LSD may be a good alternative in countries with high cattle populations***	Correlation with other techniques			Experimental immunization	
11)Adedeji A.J. *et al*. (2021). **Household and animal factors associated with sheeppox and goatpox sero-prevalence and identification of high-risk areas in selected States of northern Nigeria**. Preventive Veterinary Medicine,Volume 196,105473.	• Cross-sectional study on sera samples collected from 1800 small ruminants, then tested using the ID Screen® CPVDA ELISA. • *Results*: Measured seroprevalence: 2%.			Epidemiological study		
12)Ahmed E. M. *et al*. (2021). **Lumpy skin disease outbreaks investigation in Egyptian cattle and buffaloes: Serological evidence and molecular characterization of genome termini**. Comparative Immunology, Microbiology and Infectious Diseases, 76, 101639.	• 198 serum samples (102 from cattle and 96 from contact buffaloes) collected during LSD outbreaks in Egypt were examined using the ID Screen® CPVDA ELISA. • *Results*: The analysis of ELISA testing in serum samples from clinically infected cattle showed that all samples collected in the first three days of infection were negative (n = 18), except one sample (from an animal with a history of vaccination) gave positive result. While all samples tested after 2-4 weeks were positive (100 %); positive results were obtained in 17 out of 96 serum samples collected from non-vaccinated buffaloes with a percentage of 17.7 %.			Epidemiological study		

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13)Fay P. *et al*. (2021). **A field study evaluating the humoral immune response in Mongolian sheep vaccinated against sheeppox virus**. Transboundary and Emerging Diseases, 1-10.	• Post-vaccination monitoring study after live-attenuated vaccine (SPPV Perego strain, produced by Biocombinat SOI, Mongolia) using both the ID Screen® CPVDA ELISA (400 samples) and VNT (subset of 45 samples). • *Results*: substantial agreement between the VNT and ELISA. Antibodies to CPPV were detected between 40- and 262-days post-vaccination. ***The ID Screen® CPVDA ELISA is a robust and reliable assay for post-CPPV vaccination surveillance in resource-restricted settings and provide temporal parameters to be considered when planning sheeppox post-vaccination monitoring programmes* (sic).**	Correlation with other techniques			Vaccination study	Performance evaluation
14)Mansour M. E. *et al.* (2021). **Sero Prevalence and Risk factors for Sheep Pox and Lumpy Skin Disease and Their Comparison to Capri Pox Double Antigen Multispecies ELISA in Khartoum and Kordofan States in Sudan**. Archives of Clinical Microbiology, Vol.12 No.S3: 001.	• Cross-sectionnal survey using both the ID Screen® CPVDA ELISA and VNT for sheep pox and the ID Screen® CPVDA ELISA for Lumpy Skin Disease. Receiver Operation Characteristics (ROC) was used to analyze test performances. • *Results*: measured seroprevalence of sheeppox was 73.4% (n=260) using VNT and 62% (n=52 ovine sera) using the ID Screen® CPVDA ELISA; measured seroprevalence of Lumpy Skin Disease was 5% (n=40 bovine sera samples); ROC described an improvement to the ID Screen® CPVDA ELISA in comparison to VNT. ***The ID Screen® CPVDA ELISA is a suitable candidate for serological diagnosis for* CPV (sic).**	Correlation with other techniques		Epidemiological study		Performance evaluation
15)Pandeya Y.R. *et al*. (2021). **CASE STUDY OF LUMPY SKIN DISEASE IN CATTLE OF CHITWAN NEPAL**. National Cattle Research Program, Rampur, Nepal.	• Diagnosis of a clinical case (a cow with skin nodules in the body and increased salivation) by history, study of clinical signs and symptoms and serological testing using the ID Screen® CPVDA ELISA.			Diagnosis of a clinical case		
16)Sanz-Bernardo B. *et al*. (2021). **Quantifying and modeling the acquisition and retention of lumpy skin disease virus by hematophagus insects reveals clinically but not subclinically affected cattle are promoters of viral transmission and key targets for control of disease outbreaks**. J Virol 95:e02239-20.	• Experimental infection (n=8 calves) using LSDV strain sourced from the OIE Capripoxvirus Reference Laboratory at Pirbright and originated from the skin of an LSD-affected bovine in eastern Europe in 2016. The ID Screen® CPVDA ELISA was used to follow humoral response. • *Results*: Sera from the three clinically affected calves contained antibodies against LSDV at 15 to 17 days post-challenge. By the end of the study period, all subclinical animals had also developed detectable anti-LSDV antibodies. **The ID Screen® CPVDA ELISA is able to follow humoral response after experimental infection from day 15.**				Experimental infection	

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17)Selim A. *et al*. (2021). **Seroprevalence and risk factors for lumpy skin disease in cattle in Northern Egypt**. Tropical Animal Health and Production, 53(3), 1-8.	• 1000 sera samples were collected from cattle and serologically tested using the ID Screen® CPVDA ELISA. • *Results*: Measured seroprevalence: 19.5%			Epidemiological study		
18)Wolff J. *et al*. (2021). **Development of a Safe and Highly Efficient Inactivated Vaccine Candidate against Lumpy Skin Disease Virus**. Vaccines 9, 4.	• Experimental infection using 3 different vaccines: inactivated LSDV- "Neethling vaccine" strain, live-attenuated vaccine "Herbivac LS" and LSDV- "Serbia"field strain. Different adjuvants were tested too. After vaccination and challenge infection with virulent LSDV- "Macedonia2016"field strain, sera were tested using the ID Screen® CPVDA ELISA and VNT. • *Results*: the ID Screen® CPVDA ELISA detected antibodies against LSDV at 21 days post vaccination (first collection point) as VNT. **The ID Screen® CPVDA ELISA can follow humoral response after experimental infection from day 21.**	Correlation with other techniques			Experimental vaccination	Performance evaluation
19)Kononov A. *et al*. (2020). **Non-vector-borne transmission of lumpy skin disease virus**. Scientific reports, 10(1), 1-12.	• Experimental infection using the vaccine-derived virulent recombinant LSDV Saratov/2017 strain (FGBI ARRIAH depository) to study a possible non-vector transmission in inoculated bulls and in-contact bulls. Infection was confirmed clinically, virologically and serologically both in infected and in contact bulls, using the ID Screen® CPVDA ELISA and VNT. • *Results*: it was confirmed that at day 0 before the inoculation, all animals were found seronegative using the ID Screen® CPVDA ELISA. By post-infection day 42, the five inoculated bulls seroconverted whereas, only three out of the five in-contact group showed a weak seropositive response. By post-infection day 60, all inoculated bulls were strongly seropositive, which was also verified using VNT, as were all in-contact animals. **The ID Screen® CPVDA ELISA is able as well as VNT to follow serological response in experimental studies.**	Correlation with other techniques			Experimental infection	Performance evaluation
20)Krešić N. *et al*. (2020). **Evaluation of serological tests for detection of antibodies against lumpy skin disease virus**. Journal of Clinical Microbiology, 58(9).	• The study compared a modified VNT on MDBK cells with VNT/OIE and the ID Screen® CPVDA ELISA. The compatibility of results obtained by ELISA and VNT/MDBK was compared on 291 samples and agreement between ELISA and VNT/MDBK was achieved using 238 positive and 40 negative samples. • *Results*: compatibility of results obtained by ELISA and VNT/MDBK resulted in a kappa index of 0.834 with overall proportion agreement of 0.955. The sensitivity of VNT/MDBK compared to that of ELISA was 95%, while specificity was 97.56%. **The ID Screen® CPVDA ELISA strongly correlates with VNT/MDBK.**	Correlation with other techniques				Performance evaluation

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21)Milovanović M. *et al*. (2020). **Suitability of individual and bulk milk samples to investigate the humoral immune response to lumpy skin disease vaccination by ELISA**. Virology journal, 17(1), 1-7.	• The study investigated the suitability **of milk, as individual and bulk samples** to detect LSD specific antibodies using the ID Screen® CPVDA ELISA. 154 serum and milk samples from vaccinated dairy cows were used as positive samples and 353 repository cattle samples from LSD-free area where vaccination against LSD is forbidden were used. Investigation of milk samples was performed with modifications of samples incubation time, from 90 min at + 21 °C to overnight incubation at + 4 °C. • *Results*: optimal cut-off of ≥10 S/P % was determined for milk samples tested with the adapted protocol, with high agreement between investigated serum and milk samples with both protocols. ***The ID Screen® CPVDA ELISA is in principle suitable to be used on milk samples, from individual animals as well as pooled milk samples of small bulks. Cut-off values will need to be specified according to the purpose of testing.*** **(sic)**		**Particular matrix**			**Performance evaluation**
22)Wolff J. *et al*. (2020). **Establishment of a Challenge Model for Sheeppox Virus Infection**. Microorganisms, 8(12), 2001.	• Two Sheep Pox Virus (isolates SPPV-"India/2013/Surankote" and SPPV-"Egypt/2018") and three different infection routes were tested to establish a challenge model for SPPV infections that can be used in future vaccine studies. Seroconversion was analyzed using the ID Screen® CPVDA ELISA and SNT. • *Results*: the ID Screen® CPVDA ELISA detects seroconversion earlier than SNT (7-10 days post-infection and 14-21 post-infection respectively). **The ID Screen® CPVDA ELISA is suitable to detect early seroconversion in experimental studies (7-10 dpi).**	**Correlation with other techniques**			**Experimental infection**	**Performance evaluation**
23)Wolff J. *et al*. (2020). **Minimum Infective Dose of a Lumpy Skin Disease Virus Field Strain from North Macedonia**. Viruses, 12(7), 768.	• The ID Screen® CPVDA ELISA and SNT were used to follow serological response after experimental LSDV inoculation with LSDV-"Macedonia2016" strain. • *Results*: the ID Screen® CPVDA ELISA as well as SNT detected seroconversion (17-28 dpi). **The ID Screen® CPVDA ELISA is suitable to detect seroconversion in experimental studies.**	**Correlation with other techniques**			**Experimental infection**	**Performance evaluation**

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24)Aldeewan A. B. *et al*. (2019). **Clinical and serological study of Lumpy skin disease in cattle in Basrah Provence. Kufa**. Journal For Veterinary Medical Sciences, 10(1).	• 600 blood samples were collected from cattle suspected infected with LSD according to the clinical examination and tested using the ID Screen® CPVDA ELISA. • *Results*: overall prevalence = 18.66%.			Epidemiological study		
25)Dawoud M. *et al*. (2019). **Prevalence and molecular characterization of lumpy skin disease in cattle during period 2016-2017**. Benha Veterinary Medical Journal 37.1 (2019): 172-175.	• 875 serum samples were collected from clinically infected (n=300) and apparent healthy cattle (n=575) and were examined using the ID Screen® CPVDA ELISA. • *Results*: measured seroprevalence: 24%.			Epidemiological study		
26)Milovanović M. *et al*. (2019**). Humoral immune response to repeated lumpy skin disease virus vaccination and performance of serological tests.** BMC Veterinary Research 15(1), 1-9.	• LSDV vaccination (using LSDV Neethling vaccine) study comparing performances of the ID Screen® CPVDA ELISA, IFAT and VNT. • *Results*: sensitivity and specificity of the ID Screen® CPVDA ELISA was estimated to be SeELISA 91% and SpELISA 87% calculated by the results of VNT and SeELISA 88% and SpELISA 76% calculated by the results of IFAT. ***Of all tests used the commercially available ELISA shows to be the most useful for high throughput analysis compared to VNT or IFAT.* (sic)**	Correlation with other techniques		Epidemiological study	Vaccination monitoring	Performances evaluation
27)Möller J. *et al*. (2019). **Experimental lumpy skin disease virus infection of cattle: Comparison of a field strain and a vaccine strain**. Archives of virology, 164(12), 2931-2941.	• LSDV vaccination study (using LSDV-Neethling vaccine strain and the LSDV-Macedonia 2016 field strain) compared performances of the ID Screen® CPVDA ELISA, IFAT and VNT. • *Results*: the ID Screen® CPVDA ELISA and SNT results were in general agreement regarding positive/negative results. The ID Screen® CPVDA ELISA reactions were positive at 14 dpi for six of nine animals. Eight of nine animals had seroconverted at 28 dpi. In the IFAT, a very slight antibody reaction was detected as early as 7 dpi; however, strong immunofluorescence signals were observed with a sample from one animal that was negative in both SNT and ELISA (nonspecific reactions in the IFAT cannot be completely ruled out). ***The ID Screen® CPVDA ELISA seems to be as specific as the SNT and therefore provides an excellent tool for rapid and simple serological examination of LSDV-vaccinated or infected cattle.* (sic)**	Correlation with other techniques		Epidemiological study	Vaccination monitoring	Performances evaluation
28)Ochwo S. *et al*. (2019). **Seroprevalence and risk factors for lumpy skin disease virus seropositivity in cattle in Uganda**. BMC Veterinary Research 15:236.	• First study of seroprevalence of LSDV in Uganda (n=2263), using the ID Screen® CPVDA ELISA. • Results: overall animal and herd-level seroprevalences were respectively 8.7% and 72.3%.			Epidemiological study		

29)Samojlović M. *et al.* (2019). **Detection of antibodies against lumpy skin disease virus by virus neutralization test and elisa methods**. Acta Veterinaria-Beograd, 69 (1), 47-60.	• Performances were evaluated for both VNT and ID Screen® CPVDA ELISA on 325 cattle sera. • *Results*: Results correlation obtained for both tests was exceptionally high (kappa: 0.913). The measured specificity of the ID Screen® CPVDA ELISA was 99.2%. In vaccinated cattle, antibodies were detected 20 days after vaccination. **ID Screen® CPVDA ELISA perfectly correlates with VNT.**	Correlation with other techniques Performances evaluation

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