

EXTERNAL REFERENCES

ID SCREEN® MVV / CAEV INDIRECT

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Publications / References:

GOATS

SERUM					
<p>1)Kaba J. <i>et al.</i> (2022). Longitudinal study on seroreactivity of goats exposed to colostrum and milk of small ruminant lentivirus–infected dams. <i>Journal of Veterinary Research</i>, 66(4), 511-521.</p>	<ul style="list-style-type: none"> The serological status of goats was studied longitudinally from the moment of natural exposure to colostrum and milk of SRLV-positive dams through the age of 24 months. The goats were tested serologically every month using the ID SCREEN® MVV / CAEV INDIRECT and another commercial ELISA (VMRD) Results: Both ELISA tests allowed to conclude, that seroconversion appeared to occur in less than 50% of goats exposed to oral ingestion. There was no significant difference between the 2 ELISAs tests. 	Correlation with other techniques		Epidemiological study	
<p>2)Nardelli S. <i>et al.</i> (2020). Eradication of caprine arthritis encephalitis virus in the goat population of South Tyrol, Italy: Analysis of the tailing phenomenon during the 2016–2017 campaign. <i>Journal of veterinary diagnostic investigation</i>, 32(4), 589-593.</p>	<ul style="list-style-type: none"> Serological study on 22445 goats using the ID SCREEN® MVV / CAEV INDIRECT. If one or more samples tested positive, all goats within the tested farm were tested with the IN3 screening ELISA (Eradikit SRLV screening kit; IN3Diagnostics). All positive samples from each or both previous ELISAs were tested with the IDEXX screening ELISA (MVV/CAEV p28 Ab screening test); and, in order to detect the infecting genotype, with the IN3 genotyping ELISA (Eradikit SRLV genotyping kit; IN3Diagnostics). Results: IDvet-negative/IN3-positive screening ELISA samples have a distinct profile in the genotyping ELISA suggests pitfalls in the sensitivity of the IN3 screening ELISA. 	Correlation with other techniques		Epidemiological study	

<p>3)Czopowicz M. <i>et al.</i> (2017). Fall in antibody titer to small ruminant lentivirus in the periparturient period in goats. <i>Small Ruminant Research</i>, 147, 37-40.</p>	<ul style="list-style-type: none"> • A prospective study was carried out to document the change of antibody level to small ruminant lentivirus (SRLV) in chronically infected pregnant does. 13 dairy goats were blood-sampled at mating, then four times during pregnancy, 2 weeks before kidding, at kidding and monthly for three months postpartum. Antibody titers to SRLV were determined by screening sera in increasing dilutions with three different commercial ELISAs: indirect ELISA based on the whole-virus antigen (the ID SCREEN® MVV / CAEV INDIRECT, designed as wELISA), indirect ELISA based on the recombinant transmembrane and capsid protein (IDEXX MVV/CAEV p28 Ab Screening, designed as TM/CA-ELISA), and competitive ELISA based on the surface glycoprotein (SRLV Antibody Test Kit, VMRD designed as SU-ELISA). • <i>Results:</i> Compared to the level at mating antibody titers significantly fell at kidding in all three tests. Significant decrease in antibody titer was observed for the longest time in SU-ELISA and for the shortest time in p28-TM-ELISA. At kidding false negative results were observed in two ELISAs (p28-TM-ELISA and SU-ELISA) and 3 of 13 goats became seronegative at kidding in at least one ELISA. At least four-fold fall in antibody titer between mating and kidding was observed in the ID SCREEN® MVV / CAEV INDIRECT in 6 goats, in p28-TM-ELISA in 4 goats and in SU-ELISA in 5 goats. Fall in antibody titer to SRLV in the periparturient period can interfere with the results of serological screening of pregnant goats. <p><i>If only one ELISA has to be used for screening pregnant goats, the ID SCREEN® MVV / CAEV INDIRECT seems to suit best. (sic)</i></p>	Correlation with other techniques		Serological study	Performance validation
<p>4)Gumusova S. <i>et al.</i> (2016). Caprine Arthritis Encephalitis and Bluetongue Virus Infections in Maltese, Saanen and Hair Goat Breeds. <i>Pakistan Journal of Zoology</i>, 48(5).</p>	<ul style="list-style-type: none"> • 368 goat serum samples were analyzed using the ID SCREEN® MVV / CAEV INDIRECT. • <i>Results:</i> overall prevalence 1.35%. 			Epidemiological study	
<p>5)Nowicka D. <i>et al.</i> (2014). Diagnostic performance of ID Screen MVV-CAEV Indirect Screening ELISA in identifying small ruminant lentiviruses-infected goats. <i>Polish Journal of Veterinary Sciences</i>. Vol. 17, N°3, 501-506.</p>	<ul style="list-style-type: none"> • Diagnostic performance of the ID SCREEN® MVV / CAEV INDIRECT was evaluated using 109 truly positive and 190 truly negative goat sera. • <i>Results:</i> Sensitivity = 91.7%; specificity = 98.9%; Area Under Curve = 98.8%. <p><i>The results of this study indicate that the ID SCREEN® MVV / CAEV INDIRECT is a highly accurate diagnostic test for SRL V infection. (SIC).</i></p>				Performance evaluation

SERUM AND MILK

<p>6)Potărniche A.V. et al. (2021). Diagnostic accuracy of three commercial immunoenzymatic assays for small ruminant lentivirus infection in goats performed on individual milk samples. Preventive Veterinary Medicine, 191, 105347.</p>	<ul style="list-style-type: none"> Paired serum and milk samples were collected from 420 goats and tested with 3 commercial ELISAs – indirect ELISA based on the whole-virus antigen (the ID SCREEN® MVV / CAEV INDIRECT, designed as wELISA), indirect ELISA based on the recombinated transmembrane and capsid protein (IDEXX MVV/CAEV p28 Ab Screening, designed as TM/CA-ELISA), and competitive ELISA based on the surface glycoprotein (SRLV Antibody Test Kit, VMRD designed as SU-ELISA). The true status of goats was based on the composite reference standard comprising the results of all three ELISAs done on serum and the true prevalence of SRLV infection in the herd of origin. 243 (57.9 %) goats were classified as truly positive and 177 (42.1 %) goats as truly negative. Diagnostic accuracy was evaluated using the area under the ROC curve (AUROC) as well as sensitivity and specificity for a range of cut-off values. Results: AUROC was 98.8 % for the ID SCREEN® MVV / CAEV INDIRECT, 97.9 % for TM/CA ELISA, and 91.7 % for SU-ELISA. At the cut-off values recommended by the manufacturers both the ID SCREEN® MVV / CAEV INDIRECT and TM/CA ELISA were highly sensitive (89.3 % and 91.4 %, respectively) and highly specific (98.3 % and 95.5 %, respectively), whereas SU-ELISA had only moderate sensitivity (71.2 %) at comparably high specificity (96.6 %). Nevertheless, the optimal cut-off values were lower than those recommended by manufacturers for serum sample-to-positive control serum ratio (S/P%) of 10 % for the ID SCREEN® MVV / CAEV INDIRECT. The agreement between results performed using serum and milk samples was very good for the ID SCREEN® MVV / CAEV INDIRECT (92.5 %). <p>Concluding, the study shows that the ID SCREEN® MVV / CAEV INDIRECT and IDEXX MVV/CAEV p28 Ab Screening may be interchangeably used for testing individual goat milk samples for SRLV infection. Diagnostic sensitivity and specificity of these ELISAs appear not to be lower on milk than on serum. VMRD ELISA is considerably less sensitive on milk samples than indirect ELISAs.</p> <p>Our results strongly corroborate the high accuracy and usefulness of in routine diagnostics of the ID SCREEN® MVV / CAEV INDIRECT in routine diagnostic of SRLV infection. (sic)</p>	<p>Correlation with other techniques</p>		<p>Epidemiological study</p>	<p>Performance evaluation</p>
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<p>7)Adjadj N.R. <i>et al.</i> (2019). (Non-) Sense of milk testing in small ruminant Lentivirus control programs in goats. Comparative Analysis of Antibody Detection and Molecular Diagnosis in Blood and Milk. <i>Viruses</i>, 12(1), 3.</p>	<ul style="list-style-type: none"> • Small ruminant lentivirus (SRLV) detection via two commercial ELISA tests (the ID SCREEN® MVV / CAEV INDIRECT and the Elitest® ELISA by Hyphen) in blood and corresponding milk samples from 321 goats, and qPCR on milk cell pellets. Therefore, the analytical sensitivity of both ELISA tests was performed by dilution series of a serum sample of an SRLV-positive goat in serum of an SRLV-negative certified sheep. • Results: The ID SCREEN® MVV / CAEV INDIRECT had a better relative sensitivity (97% vs 93%) and specificity (100% and 97%) than the Elitest® ELISA for SRLV-specific antibody detection in milk compared to serum. The higher sensitivity correlates with a 10-fold higher analytical sensitivity of the ID SCREEN® MVV / CAEV INDIRECT. In contrast to the overall good ELISA results, qPCR on milk cell pellets lacked sensitivity (81%) and specificity (88%), compared to molecular detection in blood leucocyte pellets. <p><i>These results show that serology is more suitable than qPCR for SRLV diagnosis and that milk may represent an interesting matrix for a preliminary evaluation of a herd's infection status. Serum remains however the sample of choice for control programs where it is important to identify positive animals with the highest sensitivity. The results described above show that considerably more serum and milk samples were found positive in the IDscreen® ELISA than in the Elitest®.</i></p> <p><i>On top of the mixed results in SRLV detection by qPCR in milk and serum, it is important to notice that virological SRLV detection showed to be clearly less sensitive than antibody detection by IDscreen® ELISA. (sic)</i></p>	Correlation with other techniques		Epidemiological study	Performance evaluation
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SHEEP (SERUM)

<p>8)Pavlak M. <i>et al.</i> (2022). Seroprevalence and risk factors associated with Maedi-Visna virus in sheep population in southwestern Croatia. Veterinarski arhiv, 92(3), 277-289.</p>	<ul style="list-style-type: none"> • 460 sheep sera were analyzed using the ID SCREEN® MVV / CAEV INDIRECT. • <i>Results:</i> overall prevalence 10%. 			Epidemiological study	
<p>9)Jerre A. <i>et al.</i> (2022). Evaluation of three commercial ELISA tests for serological detection of Maedi-Visna virus using Bayesian latent class analysis. Preventive Veterinary Medicine, 208, 105765.</p>	<ul style="list-style-type: none"> • 615 sheep sera from 6 flocks were analyzed using the ID Screen® MVV/CAEV Indirect), IDEXX MVV/CAEV p28 Ab Verification Test and Elitest MVV/CAEV by Hyphen. Without a perfect reference test, we used Bayesian latent class analysis, including conditional dependence between tests, to estimate diagnostic accuracy and true prevalence in the flocks. • <i>Results:</i> Using recommended cut-off values, the study found that the ID Screen® MVV/CAEV Indirect and Elitest had significantly higher sensitivity estimates (99.3 % and 97.4 % respectively) than IDEXXp28 (79.5 %), while IDEXXp28 and the ID Screen® MVV/CAEV Indirect had significantly higher specificity estimates than Elitest (99.7 % and 93.7 %, respectively). The estimated true prevalence in the six flocks ranged from a median of 0.8–93.5 %. Combining ID Screen and Elitest in serial interpretation showed the highest median sensitivity and specificity (96.7 % and 100.0 %, respectively), as well as the highest median positive predictive value (PPV) for the population with the lowest prevalence. <p><i>Our study confirms the use of ID Screen for screening as a good choice because it shows the highest sensitivity. (sic)</i></p>	Correlation with other techniques		Epidemiological study	Performance evaluation
<p>10)Al-Baroodi S.Y. <i>et al.</i> (2022). Detection of Maedi-Visna virus in sheep in Nineveh province. Iraqi Journal of Veterinary Sciences, 36(1), 61-64.</p>	<ul style="list-style-type: none"> • 240 sheep sera and nasal swabs were analyzed using the ID SCREEN® MVV / CAEV INDIRECT and AGID based on gp 135 antigen of Maedi-Visna virus, respectively. • <i>Results:</i> overall seroprevalence was 22.9%. Results by using AGID showed an infection rate of 12.9%. The 2 methods showed a high prevalence of Maedi-Visna virus in sheep less than one-year-old and animals suffering from respiratory problems. <p>This study indicated high correlation between the ID SCREEN® MVV / CAEV INDIRECT and AGID, with higher seroprevalence shown using the ID SCREEN® MVV / CAEV INDIRECT.</p>	Correlation with other techniques		Epidemiological study	

<p>11) Alemnew E. <i>et al.</i> (2021) Serological Surveys Of Maedi-Visna Virus In Sheep Population Of Selected Areas Of Eastern Amhara, Ethiopia. Biomedicine and Nursing 2021;7(1): 59-64.</p>	<ul style="list-style-type: none"> • 323 sheep sera were analyzed using the ID SCREEN® MVV / CAEV INDIRECT. • <i>Results:</i> overall prevalence of 4%. 			Epidemiological study		
<p>12) Alemnew E. <i>et al.</i> (2021). Seroprevalence and associated risk factors of Maedi-Visna in sheep population of North Shoa zone, Ethiopia. Research in: Agricultural & Veterinary Sciences Vol.5, No.1, pp.11-18.</p>	<ul style="list-style-type: none"> • 2009 sheep sera were analyzed using the ID SCREEN® MVV / CAEV INDIRECT. • <i>Results:</i> overall prevalence 1.2%. 			Epidemiological study		
<p>13) Gezer T. <i>et al.</i> (2021). Investigation of Seroprevalence of Maedi-Visna Infection in some Sheep Flocks in Kars Province, Turkey. Dicle Üniversitesi Veteriner Fakültesi Dergisi, 14(1), 48-51.</p>	<ul style="list-style-type: none"> • 200 sheep sera were analyzed using the ID SCREEN® MVV / CAEV INDIRECT. • <i>Results:</i> overall prevalence 16%. 			Epidemiological study		
<p>14) Mosa A.H. <i>et al.</i> (2020). Serological and histopathological detection of Maedi-Visna virus in middle Iraq regions. Plant Arch, 20(2), 6339-6343.</p>	<ul style="list-style-type: none"> • 210 sheep sera were analyzed using the ID SCREEN® MVV / CAEV INDIRECT. • <i>Results:</i> overall prevalence 16.19%. 			Epidemiological study		
<p>15) Yizengaw L. <i>et al.</i> (2020). Seroprevalence and associated risk factors of Maedi-Visna virus in sheep population of selected area of Eastern Amhara, Ethiopia. Indian J. Anim. Hlth, 59(2), 150-158.</p>	<ul style="list-style-type: none"> • 494 sheep sera were analyzed using the ID SCREEN® MVV / CAEV INDIRECT. • <i>Results:</i> overall prevalence 3.24%. 			Epidemiological study		

SHEEP AND GOATS (SERUM)

<p>16)Hailat N.Q. <i>et al.</i> (2022). Pathological, molecular, and serological study of small ruminant lentiviruses in Jordan. Veterinary World, 15(6), 1423.</p>	<ul style="list-style-type: none"> 633 sheep sera and 173 goat sera were analyzed using the ID SCREEN® MVV / CAEV INDIRECT. <i>Results:</i> seroprevalence for sheep and goats 40.1% and 18.5% respectively. 			Epidemiological study	
<p>17)Michiels R. <i>et al.</i> (2021). Species-specific humoral immune responses in sheep and goats upon small ruminant lentivirus infections inversely correlate with protection against virus replication and pathological lesions. International Journal of Molecular Sciences, 22(18), 9824.</p>	<ul style="list-style-type: none"> A 9-month experimental study on goats (n=21) and sheep (n=20) with genotype A and B SRLV strains. Follow-up of seroconversion was performed using the ID SCREEN® MVV / CAEV INDIRECT and two commercial AGID tests (AGID-CAEV p28 kit Idexx and Maeditect kit Apha Scientific). The presence of SRLV strains in blood and organs was determined using qPCR. <i>Results:</i> the ID SCREEN® MVV / CAEV INDIRECT detected seroconversion after homologous and heterologous infections, whereas the AGID results for genotype B infected sheep remained seronegative during the entire experiment. The ID SCREEN® MVV / CAEV INDIRECT detected seroconversion earlier than AGID (from 6 weeks from sheep infected with genotype A and from 2 weeks among goats infected with genotype B). Although qPCR was able to detect provirus somewhat earlier than the antibody response with the ID SCREEN® MVV / CAEV INDIRECT, the ID SCREEN® MVV / CAEV INDIRECT would be recommendable since antibodies remained detectable throughout the experiment, while this was not the case for provirus detection via qPCR. <p style="color: red;">The ID SCREEN® MVV / CAEV INDIRECT is more recommendable than qPCR for SRLV diagnosis and is able to detect antibodies earlier than AGID tests.</p>	Correlation with other techniques		Experimental study	
<p>18)Aalberts M. <i>et al.</i> (2021). Evaluation of five SRLV ELISAs for fitness for purpose in sheep and goat accreditation schemes in the Netherlands. Small Ruminant Research, 202, 106452.</p>	<ul style="list-style-type: none"> This study evaluated the characteristics of five different commercially available ELISAs (including the ID SCREEN® MVV / CAEV INDIRECT) and an AGID test. The specificity of the ELISAs was determined using Icelandic sheep sera (n=84) and sera from Dutch SRLV accredited sheep flocks (n=213) and goat herds (n=203). In the absence of a gold standard test for SRLV infection, goats (n=88) and sheep (n=87) from infected herds and flocks, and sheep (n=52) with clinical Maedi-Visna were considered positive if three or more out of five ELISAs tested positive (relative sensitivity). Therefore, an SRLV experimental infection on 10 goats and 4 sheep was performed and analyzed using the 5 ELISAS. 	Correlation with other techniques			Performance evaluation

	<ul style="list-style-type: none"> • <i>Results:</i> The ID SCREEN® MVV / CAEV INDIRECT showed a specificity of 100%, 98.6% and 99.5% for Icelandic sheep, sheep from accredited flocks and goats from accredited herds, respectively. The ID SCREEN® MVV / CAEV INDIRECT showed a relative sensitivity of 100%, 98.9% and 98.9% for clinically affected sheep, positive sheep flocks and positive goat herds, respectively. About the experimental infection, the ID SCREEN® MVV / CAEV INDIRECT detected seroconversion on 9/10 goats (between 14 and 55 days post-infection, median dpi = 35) and on 4/4 sheep (between 36 and 63 days post-infection, median dpi = 52). <p>The ID SCREEN® MVV / CAEV INDIRECT showed high specificity and sensitivity on sheep and goats; despite this performance evaluation, the study highlighted a lower specificity compared to ELISA A (Hyphen, chosen by the authors as the best choice in the Dutch accreditation schema), but gave a possible explanation:</p> <p><i>The ID SCREEN® MVV / CAEV INDIRECT showed a lower specificity than ELISA A and C in the serum panel from the MVV accredited sheep flock. The lower apparent specificity of the ID SCREEN® MVV / CAEV INDIRECT may be due to detection of MVV antibodies that were not detected by ELISA A. This difference may be due to the fact that the ID SCREEN® MVV / CAEV INDIRECT is based on several gag, TM and env antigens, while ELISA A is based on major core protein p25 and a gag (TM) antigen (gp46). Moreover, the ID SCREEN® MVV / CAEV INDIRECT is based on several MVV/CAEV antigens while test A based on antigens derived from a single MVV strain. It cannot be ruled out that animals that were identified as false positives in the ID SCREEN® MVV / CAEV INDIRECT, may have been infected with SRLV strains that were not detected by ELISA A. However, seroprevalences in the sample panels with MVV and CAEV positive animals were not different between ELISA A and the ID SCREEN® MVV / CAEV INDIRECT, indicating that the sensitivities of these ELISAs are comparable. PCR and virus isolation are advisable to further study the nature of discrepancies between the ID SCREEN® MVV / CAEV INDIRECT and ELISA A. (sic)</i></p>				
<p>19)Savić S. <i>et al.</i> (2020). Prevalence of Small Ruminant Lentivirus Infections In Sheep and Goats in Some Regions of Vojvodina Province. Arhiv veterinarske medicine, Vol. 13, No. 1, 29 – 40.</p>	<ul style="list-style-type: none"> • Sera from 1316 sheep, 2587 rams, 994 goats and 142 bucks were analyzed using the ID SCREEN® MVV / CAEV INDIRECT. A confirmation assay was performed to confirm the positive samples obtained. • <i>Results:</i> overall seroprevalence of 5.59% was found. seroprevalence was 5.15% in male animals while in female animals it was 6.15%, with seroprevalence of 4.52% in rams, 17.61% in bucks, 1.14% in sheep and 12.57% in goats. 			Epidemiological study	

<p>20)Olech M. <i>et al.</i> (2019). Molecular analysis of small-ruminant lentiviruses in Polish flocks reveals the existence of a novel subtype in sheep. Archives of Virology, 164(4), 1193-1198.</p>	<ul style="list-style-type: none"> • Blood samples were collected from 68 sheep and 14 goats, selected from four mixed flocks where infection with SRLV was recognized based on previous serological testing. These samples were analyzed using the ID SCREEN® MVV / CAEV INDIRECT. The positive samples were therefore used for a molecular analysis. • <i>Results:</i> Out of 68 sheep serum samples, 22 were positive in ELISA, while no positive serological results were obtained with samples from goats. Consistent with this, none of the samples from goats gave a positive amplification signal in PCR. 			Epidemiological study		
<p>21)Michiels R. <i>et al.</i> (2018). Comparative analysis of different serological and molecular tests for the detection of small ruminant lentiviruses (SRLVs) in Belgian sheep and goats. Viruses, 10(12), 696.</p>	<ul style="list-style-type: none"> • The study undertook an extensive comparative analysis of seven commercially available serological tests (including the ID SCREEN® MVV / CAEV INDIRECT, Elitest by Hyphen, and Idexx p28). and one in-house qPCR using a large panel of representative sheep and goats field samples and samples from experimentally infected 2 sheep and 1 goat. • <i>Results:</i> Among all the ELISA tests, the highest sensitivity (100%) in sheep was observed with the ID SCREEN® MVV / CAEV INDIRECT. In goat samples, a sensitivity of 100% was found with 3 ELISA kits, including the ID SCREEN® MVV / CAEV INDIRECT. The ID SCREEN® MVV / CAEV INDIRECT showed therefore a specificity of 97.8% and 97.6% for sheep and goats, respectively. The experimental study showed an early seroconversion at 21 dpi for all the ELISA kits and both the AGIDs. The ID SCREEN® MVV / CAEV INDIRECT and Elitest showed the highest sensitivities (>96%) and specificities (>95%) in both species, and their combined use allowed to correctly identify the infection status of all animals. AGID kits lacked sensitivity. qPCRs detected SRLV infection before seroconversion at two weeks post infection and showed a specificity of 100%. Sensitivity however remained suboptimal at 85%. <p><i>These results allow to propose a faster and cheaper diagnostic testing strategy by combining a first ELISA screening, followed by confirmation of positive samples in AGID and/or a second ELISA.</i></p> <p><i>The use of the currently used Elitest MVV/CAEV kit seems justified and the ID screen® MVV/CAEV indirect test could be a valid alternative for the first line screening.</i></p> <p><i>In conclusion, a first screening with the Elitest MVV/CAEV ELISA kit, combined with both AGID tests and/or the ID screen® MVV/CAEV indirect ELISA kit as a confirmation test seems to be a valid testing protocol for SRLV monitoring and certification. (sic)</i></p>	Correlation with other techniques		Epidemiological study	Experimental study	Performance evaluation