

EXTERNAL REFERENCES

ID SCREEN® WEST NILE COMPETITION

Last update: September 2022

WEST NILE VIRUS ANTIBODY DETECTION

EQUINE

<p>1) Molini U. <i>et al.</i> (2021) West Nile Virus Seroprevalence in a Selected Donkey Population of Namibia. <i>Front. Vet. Sci.</i> 8:681354.</p>	<ul style="list-style-type: none"> • 260 donkey sera were tested using the ID Screen® WNC ELISA; ELISA positive samples were confirmed using a virus neutralization test (VNT). • <i>Results:</i> A total of 108 out of 260 samples were tested positive by ELISA, and in 47 out of 260 the presence of WNV neutralizing antibodies was confirmed by VNT. 	<p>Correlation with other techniques</p>	<p>Epidemiological study</p>
<p>2) Assaid N. <i>et al.</i> (2020) Evidence of circulation of West Nile virus in <i>Culex pipiens</i> mosquitoes and horses in Morocco. <i>Acta Tropica</i> 205, 105414.</p>	<ul style="list-style-type: none"> • 92 horse sera were tested using the ID Screen® WNC ELISA. Flavivirus microsphere immunoassay (MIA, test which allows to distinguish between the three flavivirus: WNV, USUV and TBEV) was performed on cELISA positive samples; flaviviruses identified by MIA and all undetermined ELISA-positive flavivirus samples were investigated using MNT against WNV and USUV. • <i>Results:</i> The seroprevalence by the ID Screen® WNC ELISA was 33.7% (31/92). The MIA test showed that 25.0% (23/92) were positive for WNV, 2.1% (2/92) were positive for USUV, 4.3% (4/92) were positive for undetermined flavivirus and 2.1% (2/92) were positive for both WNV and USUV. The MNT showed that 30.4% (28/92) were positive for WNV; samples positive for USUV, 2 positives for both WNV and USUV and one for undetermined flavivirus by MIA were found WNV positive by MNT. All sera were negative for USUV in MNT. <p>The ID Screen® WNC ELISA is well correlated with MIA and MNT do detect antibodies against WNV</p>	<p>Correlation with other techniques</p>	<p>Epidemiological study</p>

<p>3) Selim A. <i>et al.</i> (2020) Seroprevalence and molecular characterization of West Nile Virus in Egypt. <i>Comparative Immunology, Microbiology and Infectious diseases</i> 71, 101473</p>	<ul style="list-style-type: none"> Serological survey was conducted on 500 horse sera using the ID Screen® WNC ELISA. <i>Results:</i> 97 out 500 samples were tested positive (seroprevalence 19.4 %). 			Epidemiological study	
<p>4) Monaco F. <i>et al.</i> (2019) Immunological response in horses following west Nile virus vaccination with inactivated or recombinant vaccines. <i>Veterinaria Italiana</i> 55 (1), 73-79.</p>	<ul style="list-style-type: none"> To evaluate the immunological response following vaccination, WNV serologically negative horses were divided in two groups of 20 animals. One group was vaccinated (booster after 28 days) with a whole inactivated viral strain and the second group with a live recombinant canarypox virus expressing the genes coding for the WNV preM/E viral proteins. Antibodies were monitored using the ID Screen® WN IgM capture ELISA (and another commercial IgM capture Elisa), the ID Screen® WNC ELISA and serum neutralization assay (to exclude any cross reaction with other co-circulating related flaviviruses such as Usutu) for 360 days. <i>Results :</i> All horses immunized with the inactivated product developed a detectable IgG response starting from the 18th dpv while 35 days were necessary to achieve the complete seroconversion in the group which received the recombinant vaccine IgG antibodies were detected in the animals of both groups until the end of the trial (one year after vaccination). None of the animals in the trial developed neutralizing antibodies against Usutu virus. <p>The ID Screen® WNC ELISA is able to detect antibodies from the 18th dpv (inactivated vaccine) and from the 35th dmpv for recombinant vaccine until one year post vaccination</p>	Correlation with other techniques		Vaccination monitoring	
<p>5) Benjelloun A. <i>et al.</i> (2017) Seroprevalence of West Nile virus in horses in different Moroccan regions. <i>Veterinary Medicine and Science</i>, 3, 198–207</p>	<ul style="list-style-type: none"> Epidemiological study by quantifying seroprevalence of WN antibodies in horses using the ID Screen® WNC ELISA. <i>Results:</i> Overall prevalence: 31,1%; 260/298 ELISA positive sera were confirmed in VNT. 	Correlation with other techniques		Epidemiological study	
<p>6) Haroun M. <i>et al.</i> (2017) Occurrence of Equine West Nile Virus Among Horses in Qatar: A Preliminary Investigation. <i>European Scientific Journal</i> January 2017 /SPECIAL/ edition ISSN: 1857 – 7881 (Print) e ISSN 1857-7431</p>	<ul style="list-style-type: none"> Serological study to examine possible exposition to WNV among horses (n=260) using the ID Screen® WNC ELISA. <i>Results:</i> seroprevalence 23,5%. 			Epidemiological study	

<p>7) Joó K. <i>et al.</i> (2017) Comparison of assays for the detection of West Nile virus antibodies in equine serum after natural infection or vaccination. <i>Veterinary Immunology and Immunopathology</i> 183, 1–6</p>	<ul style="list-style-type: none"> • Comparison of different serological tests on naturally exposed and vaccinated horses (ID Screen® WNC ELISA, a commercial IgM capture, HIT, PRNT). • <i>Results:</i> High rate of seropositivity=16-38%; ELISA more sensitive than HIT. 	Correlation with other techniques			Vaccination monitoring	Performance evaluation
<p>8) Mehmet K. <i>et al.</i> (2017) Serological investigation of west Nile virus infection in domestic horses and donkeys in Turkey. <i>Pak Vet J</i>, 37(1): 51-54</p>	<ul style="list-style-type: none"> • Serum samples were collected from 650 domestic horses and 234 domestic donkeys and tested using the ID Screen® WNC ELISA. • <i>Results:</i> WNV seropositivity was detected at a level of 4.15% (27/650) for horse serum samples and 1.28% (3/234) for donkey serum samples. 			Epidemiological study		
<p>9) Bahuon C. <i>et al.</i> (2016) West Nile virus epizootics in the Camargue (France) in 2015 and reinforcement of surveillance and control networks. <i>Rev. Sci. Tech. Off. Int. Epiz.</i>, 35 (3), 811-824</p>	<ul style="list-style-type: none"> • WNV epizootics in 2015 among horses in the Camargue, using ID Screen® WNC ELISA and ID Screen® WN IgM capture ELISA, followed by confirmatory serological test VNT. • <i>Results:</i> Early detection of first equine cases, confirmed by VNT. 	Correlation with other techniques		Epidemiological study		
<p>10) Bouzalas I.<i>et al.</i> (2016) Emergence of Equine West Nile Encephalitis in Central Macedonia, Greece, 2010. <i>Transboundary and Emerging Diseases</i>. 63(6):e219-e227</p>	<ul style="list-style-type: none"> • Epidemiological study of WNV infection among horses (n=70) using study of clinical cases, MAC-ELISA, VNT and the ID Screen® WNC ELISA. • <i>Results:</i> Seroprevalence in asymptomatic horses = 33%. 	Correlation with other techniques		Epidemiological study		
<p>11) Chaintoutis S. <i>et al.</i> (2015) Evaluation of cross-protection of a lineage 1 West Nile virus inactivated vaccine against natural infections from a virulent lineage 2 strain in horses, under field conditions. <i>Clin Vaccine Immunol</i> 22:1040 –1049</p>	<ul style="list-style-type: none"> • Vaccination study during epidemic periods in horses, under field conditions; ID screen® WNC ELISA and/or SNT were used to check WNV in control and immunized horses. • <i>Results:</i> ID Screen® WNC ELISA confirms circulation of WNV in horse-riding clubs and efficiency of immunization. <p>ID Screen® WNC ELISA, a tool for monitoring WNV circulation during epidemics and efficiency of vaccination campaigns</p>	Correlation with other techniques		Epidemiological study	Vaccination monitoring	

<p>12) Zohaib A. <i>et al.</i> (2014) High prevalence of West Nile virus in equines from the two provinces of Pakistan . <i>Epidemiol. Infect.</i>, Page 1 of 5</p>	<ul style="list-style-type: none"> Serosurvey on WNV in equine population in Pakistan (248 horses and 201 donkeys) using the ID Screen® WNC ELISA; further investigation on ELISA-positive samples was conducting using MNT (WNV, JEV and TBEV). <i>Results:</i> 292 sera were detected positive (seroprevalence 65%) with ID Screen® WNC ELISA; within 249 sera (seroprevalence 55,4%) were found WNV positive by MNT. 	Correlation with other techniques		Epidemiological study		
<p>13) Barbić L. <i>et al.</i> (2013) West Nile virus serosurveillance in horses in Croatia during the 2012 transmission season. <i>Medical Sciences</i>, 39 (2013): 95-104</p>	<ul style="list-style-type: none"> Active serosurveillance study of WNV in sentinel horses using the ID Screen® WNC ELISA and the ID Screen® WN IgM capture ELISA. <i>Results:</i> Acute infection was revealed with the ID Screen® WN IgM capture ELISA; seroprevalence was estimated at 8,7% on 1472 horses with the ID Screen® WNC ELISA. 			Epidemiological study		
<p>14) Bargaoui R. <i>et al.</i>(2013) Mapping the Serological Prevalence Rate of West Nile Fever in Equids, Tunisia. <i>Blackwell Verlag GmbH-Transboundary and Emerging Diseases</i></p>	<ul style="list-style-type: none"> Seroprevalence study of WNV in Tunisian equids using the ID Screen® WNC ELISA and microneutralization tests (MNT). <i>Results:</i> The overall serological prevalence rate was estimated at 28%. <p>The study demonstrated a perfect agreement (100%) between ID Screen® WNC ELISA and MNT</p>	Correlation with other techniques		Epidemiological study		
<p>15) Borujeni P. <i>et al</i> (2013) A serological survey on antibodies against West Nile virus in horses of Khuzestan province. <i>Iranian Journal of Veterinary Medicine IJVM</i> 7(3):185-191</p>	<ul style="list-style-type: none"> Evaluation of seroprevalence of WNV infection in horses using the ID Screen® WNC ELISA. <i>Results:</i> The overall serological prevalence rate was estimated at 70,3%. 			Epidemiological study		

<p>16) Jonquiere F.<i>et al.</i> (2011) West Nile Virus Vaccination in Horses –IgM and IgG responses after injection in different muscles <i>Pferdeheilkunde</i> 27 ,4 (July/August) 412-416</p>	<ul style="list-style-type: none"> • Study of serological response after WNV vaccination in horses with ID Screen® West Nile Competition ELISA. • <i>Results:</i> From day 28 all samples were strongly positive, demonstrated a high humoral response to vaccination. <p>ID Screen® WNC ELISA, a tool to follow seroconversion, in cases of vaccination</p>					<p>Vaccination monitoring</p>
---	---	--	--	--	--	-------------------------------

AVIAN

<p>17) Pallari C.T. <i>et al.</i> (2021) Evidence of West Nile Virus seropositivity in wild birds on the island of Cyprus. <i>Comparative immunology, microbiology and infectious diseases</i>, 74, 101592</p>	<ul style="list-style-type: none"> • The study investigated seroprevalence of WNV antibodies in migratory and resident birds (836 avian blood samples comprising 44 species) using the ID Screen® WNC ELISA. • <i>Results:</i> Seroprevalence 1,3% (11/836 samples). 					<p>Epidemiological study</p>
<p>18) Holicki C.M. <i>et al.</i> (2020) Pathogenicity of West Nile Virus Lineage 1 to German Poultry. <i>Vaccines</i> 8, 507</p>	<ul style="list-style-type: none"> • This study examined the pathogenicity of an Italian WNV lineage 1 strain after inoculation for domestic poultry (chickens, ducks, and geese). A challenge was performed on geese using WNV infected mosquito bites. Sera were analyzed using VNT. For confirmation, the samples were also screened using the ID Screen® WNC ELISA. • <i>Results:</i> Seroconversion was observed in all three poultry species after inoculation (from 10 dpi), measured via VNT and the ID Screen® WNC ELISA. Of the eight geese that were exposed to the WNV-positive mosquitoes, four became infected and seroconverted. <p>ID Screen® WNC ELISA, a tool to follow seroconversion, in cases of vaccination, as well as VNT.</p>	<p>Correlation with other techniques</p>				<p>Experimental infection</p>

<p>19) Islam A. et al. (2020) Serological Evidence of West Nile Virus in Wild Birds in Bangladesh. Vet. Sci. 2020, 7, 164</p>	<ul style="list-style-type: none"> • 184 sera samples from wild resident and migratory birds (19 identified species) were tested using the ID Screen® WNC ELISA. • <i>Results:</i> Seroprevalence 11.9% (22 sera tested positive). 			Epidemiological study	
<p>20) Ain-Najwaa M.Y. et al. (2020) Evidence of West Nile virus infection in migratory and resident wild birds in west coast of peninsular Malaysia. One Health 10, 100134</p>	<ul style="list-style-type: none"> • Sera for 155 migratory birds were tested using the ID Screen® WNC ELISA. Cross-reactivity towards Japanese Encephalitis virus (JEV) was also carried out using a JEV-double antigen sandwich (DAS) ELISA. • <i>Results :</i> Out of 155 serum samples analyzed using the ID Screen® WNC ELISA , 30 samples were positive. Out of these serum samples only one sample showed positive reaction using the JEV DAS-ELISA. Therefore, this study found positive reaction for anti-WNV IgG antibodies in 18.71% (29/155). 			Epidemiological study	
<p>21) Kim C-Y. et al. (2016) First detection of West Nile virus in domestic pigeon in Korea. J Vet Sci, 17(4), 587-589</p>	<ul style="list-style-type: none"> • 75 sera samples from pigeons were tested using the ID Screen® WNC ELISA. • <i>Results:</i> out of 75 samples, 3 pigeons were tested positive. WNV presence. was confirmed with nested reverse transcription polymerase chain reaction analysis and sequencing. 	Correlation with other techniques		Epidemiological study	
<p>22) Pastiu A. et al. (2016) Wild Birds in Romania Are More Exposed to West Nile Virus Than to Newcastle Disease Virus. Vector-Borne and Zoonotic Diseases, 16(3), 176-180</p>	<ul style="list-style-type: none"> • Evaluation of seroprevalence of WNV in wild birds (n=159) and domestic birds (n=21) from Romania with ID Screen® WNC ELISA. • <i>Results:</i> Seroprevalence in wild birds= 32,14% and seroprevalence in domestic birds = 19,05%. 			Epidemiological study	
<p>23) Hammouda A. et al. (2015) Exposure of resident sparrows to West Nile virus evidenced in South Tunisia. Epidemiol. Infect., 143, 3546–3549</p>	<ul style="list-style-type: none"> • Investigation of exposure of wild sparrows (n=208) through the ID Screen® WNC ELISA and VNT (to discriminate WNV and USUV). • <i>Results:</i> Seroprevalence = 1%, sera found positive with ID Screen® WNC ELISA were confirmed WN specific with VNT. 	Correlation with other techniques		Epidemiological study	

<p>24) Chaintoutis S. <i>et al.</i> (2014) Evaluation of a West Nile virus surveillance and early warning system in Greece, based on domestic pigeons. <i>Comparative Immunology, Microbiology and Infectious Diseases</i> 37, 131– 141</p>	<ul style="list-style-type: none"> • After a WNV epidemic, surveillance system based on serological testing of domestic pigeons with ID Screen® WNC ELISA; samples positive by ELISA further assayed by VNT against USUV. Study 1: n=655, study 2: n=210. • <i>Results:</i> Study 1: seroprevalence 38%; study 2: seroprevalence 31%. All samples assayed by VNT were WNV confirmed except one, USUV confirmed. 	Correlation with other techniques		Epidemiological study		
<p>25) Chaskopoulou A. <i>et al.</i> (2013) Detection and Early Warning of West Nile Virus Circulation in Central Macedonia, Greece, Using Sentinel Chickens and Mosquitoes. <i>Vector Borne Zoonotic Dis.</i> 13(10):723-32</p>	<ul style="list-style-type: none"> • WN seroprevalence study in Macedonia in sentinel chickens with ID Screen® WNC ELISA; ELISA positive sera were further tested by =micro-PRNT. • <i>Results:</i> 11/47 chicken seroconverted; all positive samples were confirmed by micro-PRNT. 	Correlation with other techniques		Epidemiological study		
<p>26) Ziegler <i>et al.</i> (2013) Pathogenesis of West Nile virus lineage 1 and 2 in experimentally infected large falcons. <i>Veterinary microbiology</i>, 161(3-4), 263-273</p>	<ul style="list-style-type: none"> • To investigate the WNV pathogenesis, twelve large falcons were inoculated with viruses belonging to two different lineages (lineage 1 strain NY 99 and lineage 2 strain Austria). Serology was followed using the ID Screen® WNC ELISA. • <i>Results:</i> Seroconversion of experimentally infected falcons was detected at 6 dpi with the ID Screen® WNC ELISA. 				Experimental study	
<p>27) Sotelo E. <i>et al.</i> (2011) Pathogenicity of two recent Western Mediterranean West Nile virus isolates in a wild bird species indigenous to Southern Europe: the red-legged partridge. <i>Veterinary Research</i> 42:11</p>	<ul style="list-style-type: none"> • Red-legged partridges were experimentally infected with two WNV isolates; ID Screen® WNC ELISA and RT-PCR were used prior to the experiment to ensure that exposure to WNV had not occurred; ELISA and VNT were then used to follow antibody response. • <i>Results:</i> in inoculated partridges, specific antibodies to WNV as revealed by ID Screen® WNC ELISA were observed slightly earlier (6dpi) than neutralizing antibodies (VNT). 	Correlation with other techniques			Vaccination monitoring	

AVIAN AND HORSES

<p>28) Raleigh P. <i>et al.</i> (2012) Surveillance for antibodies to West Nile virus in Ireland. <i>Veterinary Record</i> 170: 180</p>	<ul style="list-style-type: none"> • Serological study of WNV in birds and horses (from field or vaccination experiments) using the ID Screen® WNC ELISA, a commercial ELISA, MVNT and PRNT. • <i>Results:</i> All the post-vaccination sera were positive (up to 149 dpi in chicken); good agreement between the ELISAs; MVNT and PRNT confirmed results. 	<p>Correlation with other techniques</p>			<p>Experimental study</p>	<p>Performance evaluation</p>
--	--	--	--	--	---------------------------	-------------------------------

OTHER SPECIES

<p>29) Cosseddu G.M. <i>et al.</i> (2021) Sero-surveillance of emerging viral diseases in camels and cattle in Nouakchott, Mauritania: an abattoir study. <i>Tropical Animal Health and Production</i>, 53(2), 1-6</p>	<ul style="list-style-type: none"> • 159 camel sera were tested using. Samples, which resulted positive were tested with the confirmatory virus neutralization test (VNT). • <i>Results:</i> Seroprevalence 92% (146 sera out 159) prevalence of WNV; 41 camel sera out of 146 were confirmed to be WNV positive by VNT. 	<p>Correlation with other techniques</p>		<p>Epidemiological study</p>		
<p>30) Mohammed M.N. <i>et al.</i> (2021) Serological evidence of West Nile viral infection in archived swine serum samples from Peninsular Malaysia. <i>J Vet Sci.</i>22(3):e29</p>	<ul style="list-style-type: none"> • 80 archived swine serum samples were tested using the ID Screen® WNC ELISA; a DAS ELISA kit – Porcine JE-IgG ELISA kit was used to screen samples against the endemic cross-reacting JEV. • <i>Results:</i> Seroprevalence 62.5% (50/80 sera) Out of the 50 positive sera, only one sample was positive for Japanese encephalitis virus antibodies. 			<p>Epidemiological study</p>		
<p>31) Pham-Thanh L. <i>et al.</i> (2021) Dogs as Sentinels for Flavivirus Exposure in Urban, Peri-Urban and Rural Hanoi, Vietnam. <i>Viruses</i> 13, 507</p>	<ul style="list-style-type: none"> • Cross-sectionnal study to estimate seroprevalence of flavivirus among dogs (n=475). • <i>Results:</i> The overall flavivirus seroprevalence in the dog population was 70.7%. 			<p>Epidemiological study</p>		

<p>32) Ain-Najwa M.Y. <i>et al.</i> (2020) Exposure to Zoonotic West Nile Virus in Long-Tailed Macaques and Bats in Peninsular Malaysia. <i>Animals</i> 2020, 10, 2367</p>	<ul style="list-style-type: none"> Sera from 81 long tail macaques were tested using the ID Screen® WNC ELISA. The samples, which resulted positive were subjected to JEV screening using a specific double-antibody sandwich ELISA to rule out cross-reactivity. <i>Results:</i> 24 of the 81 sera tested were positive (seropositivity: 29.63%); none of the samples showed a positive reaction towards JEV. 		Epidemiological study	
<p>33) Dinç E. <i>et al.</i> (2020) Serological Investigation of West Nile Virus (WNV) Infection in Cats and Dogs. <i>ARRB</i>, 35(1): 65-71</p>	<ul style="list-style-type: none"> Sera from 82 cats and 246 dogs were tested using the ID Screen® WNC ELISA. <i>Results:</i> presence of antibodies was detected in 0.41% of the tested dog blood sera (1/246) and in 1.22% of the cat blood sera (1/82). 		Epidemiological study	
<p>34) Selim A. <i>et al.</i> (2020) The first detection of anti-West Nile virus antibody in domestic ruminants in Egypt. <i>Tropical Animal Health and Production</i>, 52(6), 3147-3151</p>	<ul style="list-style-type: none"> 360 serum samples (100 cattle, 50 buffalo, 50 camels, 85 sheep, and 75 goats) were examined using the ID Screen® WNC ELISA. <i>Results:</i> Seroprevalence 22%, 0%, 40%, 3.5%, and 5.3% in cattle, buffalo, camel, sheep, and goats, respectively. 		Epidemiological study	
<p>35) Vitaskova E. <i>et al.</i> (2019) Serologic Survey of Selected Viral Pathogens in Free-Ranging Eurasian Brown Bears (<i>Ursus arctos arctos</i>) from Slovakia. <i>Journal of wildlife diseases</i>, 55(2), 499-503</p>	<ul style="list-style-type: none"> sera of 24 European brown bears were tested using the ID Screen® WNC ELISA. Positive samples were subsequently confirmed by virus neutralization test for WNV and TBEV. <i>Results:</i> 1/24 of the bears was positive (seropositivity 4%). The positive sampled was further examined by VNT and was found to be positive to WNV but negative to TBEV. 		Epidemiological study	
<p>36) Hassine, T.B. <i>et al.</i> (2017) Emerging vector-borne diseases in dromedaries in Tunisia: West Nile, Blue Tongue, Epizootic Haemorrhagic disease and Rift Valley fever. <i>Onderstepoort Journal of Veterinary Research</i> 84(1), a1316</p>	<ul style="list-style-type: none"> 118 sera from dromedaries were tested with ID Screen® WNC ELISA. <i>Results:</i> Seroprevalence=25,8%. 		Epidemiological study	
<p>37) Pâslaru A. <i>et al.</i> (2016) West Nile Virus Serosurveillance in Wild Boars from the East of Romania. <i>Bull. UASVM Vet. Med</i>, 73, 144-148</p>	<ul style="list-style-type: none"> Assessment of WNV circulation in wild boars (n=68) using the ID Screen® WNC ELISA. <i>Results:</i> seroprevalence in the two regions respectively 53,33% and 71,05%. 		Epidemiological study	

<p>38) Lan D. <i>et al.</i>(2011) Serological evidence of West Nile virus in dogs and cats in Chine. Arch Virol 156:893-895</p>	<ul style="list-style-type: none"> • WNV seroprevalence study in dogs (n=367) and cats (n=309) using the ID Screen® WNC ELISA. • <i>Results:</i> Dogs: seroprevalence 5,7%; when ELISA positive samples were tested by PRNT, 4,6% samples were positive and two samples were JEV positive; seroprevalence cats: 15,9%; among ELISA positive samples, 14,9% were tested positive by PRNT. 			<p>Epidemiological study</p>		
--	--	--	--	------------------------------	--	--

HUMANS

<p>39) Niczyporuk J.<i>et al.</i> (2015) Occurrence of West Nile Virus Antibodies in Wild Birds, Horses, and Humans in Poland. BioMed Research International vol 2015, Article ID 234181</p>	<ul style="list-style-type: none"> • Study on detection of WNV antibodies in serum samples from wild birds (n=474), horses (378) and humans with neurological symptoms (n=42) by ID Screen® WNC ELISA, ID Screen® WN IgM capture ELISA and another commercial blocking ELISA; positive results in bird samples were submitted to VNT. • <i>Results:</i> Study revealed WNV antibodies in 63 samples from birds (with ID Screen® WNC ELISA and another commercial test), 1 from horses and 14 from human samples; all positive samples were negative with ID Screen® WN IgM capture ELISA but were confirmed positive with VNT. <p>ID Screen® WNC ELISA able to detect WNV antibodies in humans.</p>	<p>Correlation with other techniques</p>	<p>Particular species</p>	<p>Epidemiological study</p>		
---	--	--	---------------------------	------------------------------	--	--

FLAVIVIRUS ANTIBODY DETECTION

PANFLAVIRUS

<p>40) Beck C. <i>et al.</i> (2017) Improved reliability of serological tools for the diagnosis of West Nile fever in horses within Europe. PLoS Negl Trop Dis 11(9): e0005936</p>	<ul style="list-style-type: none"> • Inter-laboratory proficiency tests held in 2010 and 2013 to evaluate WNV serological diagnostic tools suitable for European national reference laboratories (horses). • Results: ID Screen® WNC ELISA: Sp =100%, high analytical sensitivity =100% for flaviviruses. <p>ID Screen® WNC ELISA, a tool for flavivirus diagnostic</p>	<p>Correlation with other techniques</p>				<p>Performance evaluation</p>
---	--	--	--	--	--	-------------------------------

WEST NILE/USUTU/BAGAZA VIRUSES

<p>41) Constant O. <i>et al.</i> (2022). One Health surveillance of West Nile and Usutu viruses: A repeated cross-sectional study exploring seroprevalence and endemicity in Southern France, 2016 to 2020. Eurosurveillance, 27(25), 2200068</p>	<ul style="list-style-type: none"> • Prevalence study of WNV and USUV in a repeated cross-sectional study by serological and molecular analyses of human, dog, horse, bird and mosquito samples. Serological study on dogs (n=149), horses (n=135), and human (n=500) sera was performed using the ID Screen® WNC ELISA. To confirm WNV or USUV infection, viral microneutralization tests (MNT) were performed on ELISA positive samples. • Results: Human sera: 53 of the 500 samples were identified positive using the ID Screen® WNC ELISA. Among these samples, 15 were tested positive for USUV-specific antibodies (3%; 95% CI: 1.5–4.5) and six for WNV specific antibodies (1.2%; 95% CI: 0.25–2.15). One sample demonstrated neutralizing activity for both WNV and USUV. Dog sera: presence of flavivirus antibodies using the ID Screen® WNC ELISA was detected in three dog samples analyzed (1.63%; 95% CI: 0.00–3.46): two USUV antibody-positive samples were detected by MNT (1.08%; 95% CI: 0.00–2.58). One dog was positive for WNV antibodies (0.54%; 95% CI: 0.00–1.60). Horse sera: 40 out of 235 sera identified positive using the ID Screen® WNC ELISA (17.02%; 95% CI: 12.21–21.82). Among these samples, nine were positive for USUV-specific antibodies (3.83%; 95% CI: 1.37–6.28) and 31 for WNV specific antibodies (13.19%; 95% CI: 8.86–17.51) 	<p>Correlation with other techniques</p>		<p>Epidemiological study</p>		
--	--	--	--	------------------------------	--	--

<p>42) Vasic A. <i>et al.</i> (2022) West Nile virus in the Republic of Serbia—Diagnostic performance of five serological tests in dog and horse sera. <i>Transbound Emerg Dis.</i> 1–10</p>	<ul style="list-style-type: none"> • Seroprevalence study for WNV in clinically healthy dog (n=184) and horse sera (n=232) comparing diagnostic values of ‘in-house’ and commercially available indirect immunofluorescence (IFA) and the ID Screen® WNC ELISA tests to gold standard’ virus neutralization test (VNT). Sera were further tested for Usutu virus and tick-borne encephalitis virus in VNT (WNV and USUTUV). • <i>Results:</i> Comparative results of diagnostic tests in dogs ranged from 18.7% seropositivity by an ‘in-house’ ELISA to 31.9% by commercially available ELISA. In horses, seropositivity ranged from 36.2% by ‘in-house’ IFA to 32.5% by a commercially available IFA and from 26.3% by ‘in-house’ IgG ELISA to 20.9% by the ID Screen® WNC ELISA. Seropositivity was confirmed by VNT in 36.9 % tested dog sera while in four dog and seven horse sera, positivity resulted from Usutu virus infection. 	<p>Correlation with other techniques</p>		<p>Epidemiological study</p>	<p>Performance evaluation</p>
<p>43) Constant O. <i>et al.</i> (2020). Evidence of Exposure to USUV and WNV in Zoo Animals in France. <i>Pathogens</i> 9(12), 1005</p>	<ul style="list-style-type: none"> • 411 sera from 70 species (captive birds, n=137 and mammals, n=274) were tested using the ID Screen® WNC ELISA. The positive sera were then tested using virus-specific microneutralization tests against USUV and WNV. When positive samples of ELISA were found negative in WNV and USUV MNTs, TBEV and MEAV virus neutralization assays were carried out. • <i>Results:</i> antibodies against flaviviruses were identified in 23 out of 137 birds (seropositivity 16.79%). Among them, 20 specimens tested positive for USUV-specific antibodies by MNT (seropositivity 14.59%) and 2 specimens for WNV-specific antibodies (seropositivity 1.45%). A total of 11 mammals were positive with the ELISA kit (seropositivity 4.01%). Most of the positive mammals had antibodies against USUV, including one Asian lion, one maned wolf, one Iberian wolf and two African wild dogs. Antibodies against WNV were found in one dama gazelle and 3 animals presented antibodies against non-identified flaviviruses (the corresponding sera turned out to be negative in TBEV and MEAV neutralization assays). 	<p>Correlation with other techniques</p>		<p>Epidemiological study</p>	
<p>44) Llorente F. <i>et al.</i> (2019). Influence of flavivirus co-circulation in serological diagnostics and surveillance: A model of study using West Nile, Usutu and Bagaza viruses. <i>Transboundary and emerging diseases</i>, 66(5), 2100-2106</p>	<ul style="list-style-type: none"> • Red-legged partridges were experimentally infected with WNV (lineages 1 and 2), USUV or BAGV and further analyzed using the ID Screen® WNC ELISA and another available commercial WN competition ELISA, and by the confirmatory virus neutralization test (VNT). • <i>Results:</i> The two ELISA kits examined reacted positively with all serum samples from WNV-infected partridges. However, differences arose when analysing sera obtained from birds inoculated with heterologous flaviviruses 	<p>Correlation with other techniques</p>		<p>Epidemiological study</p>	<p>Performance evaluation</p>

	<p>(USUV and BAGV): while the other commercial kit gave negative results in all sera from USUV-infected partridges (n = 8) and just one positive reaction and two doubtful results out of 12 sera from BAGV-infected partridges, the IDvet kit reacted with all non-WNV flavivirus sera (seven from USUV-infected partridges and five from BAGV-infected partridges).</p> <ul style="list-style-type: none"> • The ID Screen® WNC ELISA is better than the other available commercial WN Competition ELISA for detecting a wide spectrum of flaviviruses 				
<p>45) Montagnaro S. <i>et al.</i> (2019). Serological evidence of mosquito-borne flaviviruses circulation in hunting dogs in Campania Region, Italy. Vector-Borne and Zoonotic Diseases, 19(2), 142-147</p>	<ul style="list-style-type: none"> • A flavivirus survey was performed on 183 hunting dogs using the ID screen® WNC ELISA. To identify the circulating Flavivirus, WNV and USUV seroneutralization assays were performed on ELISApositive samples. • Results: Seroprevalence 40.43% (74/183). Among the 74 ELISA-positive sera, seroneutralization test showed that 24 sera resulted positive for Usutu virus with an overall prevalence of 13.11% (24/183) but none of ELISA-positive samples resulted positive for West Nile virus. 	Correlation with other techniques		Epidemiological study	
<p>46) Napp S. <i>et al.</i> (2019) Usefulness of Eurasian Magpies (<i>Pica pica</i>) for West Nile virus Surveillance in Non-Endemic and Endemic Situations. Viruses 11, 716</p>	<ul style="list-style-type: none"> • A multiyear series of cross-sectional surveys for WNV were carried out in Eurasian magpies using the ID screen® WNC ELISA. Positive samples were screened for confirmation by SNT for WNV and Bagaza virus (BAGV). • Results: August 2017: out of 9 magpies tested, 2 were positive (seroprevalence 22%), these 2 cases were confirmed WNV positive by SNT. 2018-2019: seroprevalence flaviviruses 44-83%, seroprevalence WNV 8-44%, ; one of the magpies sampled positive by ELISA was tested positive for Bagaza virus (BAGV) by SNT. 	Correlation with other techniques		Epidemiological study	
<p>47) Lim S.M. <i>et al.</i> (2018) Serologic evidence of West Nile virus and Usutu virus infections in Eurasian Coots in the Netherlands. Zoonoses and public health, 65(1), 96-102</p>	<ul style="list-style-type: none"> • 265 serum samples from wild birds were screened using the ID screen® WNC ELISA. Elisa positive samples were further tested using VNT (against WNV-Ita09, WNV-Greece- 1 or USUV-939/01 strains). • Results: Of the 265 screened serum samples, 27 were found to be WNV–antibody-positive using the ID screen® WNC ELISA and subsequent cross-neutralization experiments using WNV and USUV confirmed that five serum samples were positive for only WNV-neutralizing antibodies and seven for only USUV. 	Correlation with other techniques		Epidemiological study	

TICK-BORNE ENCEPHALITIS VIRUS (TBEV)

<p>48) Gonzalez G. <i>et al.</i> (2022) A One-Health Approach to Investigating an Outbreak of Alimentary Tick-Borne Encephalitis in a Non-endemic Area in France (Ain, Eastern France): A Longitudinal Serological Study in Livestock, Detection in Ticks, and the First Tick-Borne Encephalitis Virus Isolation and Molecular Characterisation. <i>Frontiers in microbiology.</i> 13, 863725-863725</p>	<ul style="list-style-type: none"> • One health study performed during one year about an outbreak of tick-born encephalitis (TBE) in France. Serology was followed in suspected animals (goats and cows) using the ID Screen® WNC ELISA (interpretation was modified for sera close to the doubtful and negative thresholds, with an extension of the doubtful interval, to ascertain the detection of sera with low-TBEV antibody levels by ELISA and then increase sensitivity). Samples with positive and doubtful results in ELISA were then tested for the presence of specific neutralizing antibodies against TBEV by micro virus neutralization tests. An in-house IgM-capture enzyme immunoassay (MAC-ELISA) with whole inactivated TBEV was also performed. • Results: IgG and IgM antibodies against TBEV were detected using the ELISA tests (ID Screen® WNC ELISA and IgM capture) and MNT. 	<p>Correlation with other techniques</p>		<p>Epidemiological study</p>	
<p>49) Bournez L.<i>et al.</i> (2020) Exposure of Wild Ungulates to the Usutu and Tick-Borne Encephalitis Viruses in France in 2009–2014: Evidence of Undetected Flavivirus Circulation a Decade Ago. <i>Viruses</i> 12(1), 10</p>	<ul style="list-style-type: none"> • Serum samples from wild boar and roe deer were screened with ID Screen® WNC ELISA. Samples found positive or doubtful were then tested for antibodies against WNV, BAGV, USUV and TBEV/LIV by MIA and MNT. • Results: Panflavivirus antibodies: 5,6% in wild boars and 2,1% in roe deer; Usutu and TBEV/LIV antibodies were then detected in both species. ELISA positive or doubtful results could not be confirmed by MNT or MIA due to serum quality or the lower analytical sensitivity of these tests, which is consistent with the low antibody titers (high % S/N) found by cELISA for most of these serum samples. • ID Screen® WNC ELISA, used as a panflavivirus cELISA to screen samples before specific flavivirus detection 	<p>Correlation with other techniques</p>		<p>Epidemiological study</p>	
<p>50) Beck C. <i>et al.</i> (2015) A High-Performance Multiplex Immunoassay for Serodiagnosis of Flavivirus-Associated Neurological Diseases in Horses. <i>BioMed Research International</i> Volume 2015, Article ID 678084</p>	<ul style="list-style-type: none"> • Description of a multiplex immunoassay compared to MNT, PRNT and ID screen® WNC ELISA to detect WNV antibodies in horses. • Results: ID Screen® WNC ELISA recognizes all the WN, JEV and TBEV infected sera. • ID Screen® WNC ELISA, a tool to detect 3 flaviviruses: WNV, JEV and TBEV 	<p>Correlation with other techniques</p>			

<p>51) Rushton J. <i>et al.</i> (2013) Tick-borne Encephalitis Virus in Horses, Austria, 2011. Emerging Infectious Diseases Vol. 19, No 4</p>	<ul style="list-style-type: none"> • Study to determine status of TBEV infection in horses in Austria, using ID Screen® WNC ELISA for screening antibodies against flaviviruses; ELISA-positive samples further investigated by using virus-specific neutralization assays for WNV, USUV and TBEV. • Results: 26,1% horses were positive with ID Screen® WNC ELISA, all these samples were positive for TBEV by virus-specific neutralization test. 	<p>Correlation with other techniques</p>		<p>Epidemiological study</p>		
--	--	--	--	------------------------------	--	--

JAPANESE ENCEPHALITIS VIRUS (JEV)

<p>52) Ruget A. S. <i>et al.</i> (2018). Japanese encephalitis circulation pattern in swine of northern Vietnam and consequences for swine's vaccination recommendations. Transboundary and emerging diseases. 65(6), 1485-1492</p>	<ul style="list-style-type: none"> • 641 pigs sera were analysed for Japanese encephalitis virus (JEV) using the ID screen® WNC ELISA. A subset of ELISA-positive samples were confirmed by JEV neutralization test compared with West Nile virus neutralization test. • Results: Three hundred and eighty-seven (60.4%) and 28 (4.4%) samples of 641 were tested positive and doubtful by ELISA, respectively. A set of 108 flavivirus ELISA-positive sera were tested in JEV and WNV MNTs. JEV infection was evidenced in 105 pigs (97.2%, CI95% [95.5–100]). 	<p>Correlation with other techniques</p>		<p>Epidemiological study</p>		
--	--	--	--	------------------------------	--	--

ZIKA AND DENGUE VIRUSES

<p>53) Tinto B. <i>et al.</i> (2022) Serological Evidence of Zika Virus Circulation in Burkina Faso. Pathogens 11, 741</p>	<ul style="list-style-type: none"> • A total of 501 human sera were first tested using the ID Screen® WNC ELISA to detect flavivirus antibodies. Positive sera were then tested using Luminex to detect ZIKV and the four serotypes of DENV antibodies and virus-specific microneutralization tests against ZIKV were performed. • Results: From those 501 serum samples screened by ELISA to detect prior flavivirus infection, antibodies against flaviviruses were identified in 400 samples (79.84%). These ELISA-positive samples were then tested with Luminex: 229 samples were found positive for ZIKV (representing 45.70% of the total samples) 98 positives for DENV-1 (19.56%), 280 positives for DENV-2 (48.86%), 204 DENV-3 positive (40.71%) and 199 DENV-4 positive 	<p>Correlation with other techniques</p>		<p>Epidemiological study</p>		
---	--	--	--	------------------------------	--	--

	<p>(39.72%). All ZIKV Luminex-positive samples were tested by microneutralization tests: 114 samples were found positive (22.75%).</p>				
<p>54) Beck C. <i>et al.</i> (2019) Serological evidence of infection with dengue and Zika viruses in horses on French Pacific Islands. PLoS Negl Trop Dis 13(2): e0007162</p>	<ul style="list-style-type: none"> • Horse sera were tested to highlight flaviviruses: sera were first identified with ID Screen® WNC ELISA then confirmed with MIA, then tested with MNT (DENV, ZIKV, WN, JEV). • Results: Identification of DENV and ZIKV sera. • ID Screen® WNC ELISA, a tool to detect ZIKAV and DENV in endemic areas. 	Correlation with other techniques		Epidemiological study	
<p>55) Dolz G. <i>et al.</i> (2019). Detection of antibodies against flavivirus over time in wild non-human primates from the lowlands of Costa Rica. PLoS One, 14(7), e0219271</p>	<ul style="list-style-type: none"> • A total of 209 sera from free-range non-human primates were tested using the ID screen® WNC ELISA. Sera sampled in 2010-2012 tested positive were tested in PCR for DENV and WNV. • Results: A total of 53 (25.4%) out of 209 individuals yielded positive results in ELISA, while only two animals (1.0%) showed inconclusive reactions. A total of four (5.6%) out of 71 blood samples yielded positive results in PCR to DENV2 (one animal), DENV3 (one animal) and DENV4 (two animals). Furthermore, three samples (4.2%) yielded positive results in RT-PCR to WNV. 	Correlation with other techniques		Epidemiological study	