OIE Collaborating Centres Reports Activities

Activities in 2018

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Name (including Title and Position) of Head of the Collaborating Centre (formally OIE Contact Point):	Professor Sándor Belák, DVM, PhD, DSc, Head of OIE Collaborating Centre
Name of writer:	Professor Sándor Belák, Head of OIE CC, SLU and Dr. Karl Ståhl, Deputy State Epizootiologist, SVA

ToR: To provide services to the OIE, in particular within the region, in the designated specialty, in support of the implementation of OIE policies and, where required, seek for collaboration with OIE Reference Laboratories

ToR: To identify and maintain existing expertise, in particular within its region

1. Activities as a centre of research, expertise, standardisation and dissemination of techniques within the remit of the mandate given by the OIE

Disease control	
Title of activity	**Scope**
Further characterization of the genomes and structural proteins of porcine reproductive and respiratory syndrome virus (PRRSV), in order to study viral infection biology and to improve the tools of disease control.	A short alternative open reading frame named ORF7a has recently been discovered within the nucleocapsid gene of the porcine reproductive and respiratory syndrome virus (PRRSV) genome. Proteins (7ap) translated from the ORF7a of two divergent strains - a type I and a type II - are able to completely reduce the motility of nucleic acids at relatively high molar charge ratios in gel retardation assays indicating strong dsDNA- and ssRNA-binding capability. Conserved RNA- and DNA-binding properties suggest that nucleic acid binding is a functional property of the divergent 7aps, and not an arbitrary consequence of their net positive charge. Sera from Hu7ap-immunised pigs and mice did not react with Hu7ap or Hu7ap-GFP; however, antinuclear antibodies were detected in the sera of the immunised animals, suggesting an ability of Hu7ap to interact with or mimic autoantigenic macromolecules.
Determination of the complete genome sequence of an African Swine Fever Virus isolate from Sardinia, Italy.	Previous genetic characterization of African swine fever virus isolates from the Italian island of Sardinia, where the virus has been present since 1978, has largely been limited to a few selected genomic regions. Here, we report the complete genome sequence of the isolate 47/Ss/08 collected during an outbreak in 2008.
Body temperature and motion: Evaluation of an online monitoring system in pigs challenged with Porcine Reproductive & Respiratory Syndrome Virus.	Highly contagious and emerging diseases cause significant losses in the pig producing industry worldwide. Rapid and exact acquisition of real-time data, like body temperature and animal movement from the production facilities would enable early disease detection and facilitate adequate response. In this study, carried out within the European Union research project RAPIDIA FIELD, we tested an online monitoring system on pigs experimentally infected with the East European subtype 3 Porcine Reproductive & Respiratory Syndrome Virus (PRRSV) strain Lena. We linked data from different body temperature measurement methods and the real-time movement of the pigs. The results showed a negative correlation between body temperature and movement of the animals. The correlation was similar with both body temperature obtaining methods, rectal and thermal sensing microchip, suggesting some advantages of body temperature measurement with transponders compared with invasive and laborious rectal measuring. We also found a significant difference between motion values before and after the challenge with a virulent PRRSV strain. The decrease in motion values was noticeable before any clinical sign was recorded. Based on our results the online monitoring system could represent a practical tool in registering early warning signs of health status alterations, both in experimental and commercial production settings.

Biosecurity aspects of cattle production in Western Uganda, and associations with seroprevalence of brucellosis, salmonellosis and bovine viral diarrhoea.	The objectives of this study were to describe herd management and biosecurity routines with potential impact on the prevalence of infectious diseases, and to estimate the burden of infectious diseases in Ugandan cattle herds, using the seroprevalence of three model infections. Farmer interviews (n = 144) showed that biosecurity measures are rarely practised. Visitors' hand-wash was used by 14%, cleaning of boots or feet by 4 and 79% put new cattle directly into the herd. During the 12 months preceding the interviews, 51% of farmers had cattle that died and 31% had noticed abortions among their cows. Interestingly, 72% were satisfied with the health status of their cattle during the same time period. The prevalence (95% CI) of farms with at least one seropositive animal was 16.7% (11.0;23.8), 23.6% (16.9;31.4), and 53.4% (45.0;61.8) for Brucella, Salmonella and BVD, respectively. A Poisson regression model suggested that having employees looking after the cattle, sharing pasture with other herds, and a higher number of dead cattle were associated with a herd being positive to an increasing number of the diseases. An additive Bayesian network model with biosecurity variables and a variable for the number of diseases the herd was positive to resulted in three separate directed acyclic graphs which illustrate how herd characteristics can be grouped together.
Final workshop of OIE twinning project with Uganda held in Kampala Nov 2018.	Focus on African swine fever surveillance and disease control.
Epidemiology, surveillance, risk assessment, modelling	
Title of activity	**Scope**
Seroprevalence and risk factors for peste des petits ruminants and selected differential diagnosis in sheep and goats in Tanzania.	Livestock husbandry is critical for food security and poverty reduction in a low-income country like Tanzania. Infectious disease is one of the major constraints reducing the productivity in this sector. Peste des petits ruminants (PPR) is one of the most important diseases affecting small ruminants, but other infectious diseases may also be present. Objective: The objective of this study was to determine the seroprevalence and risk factors for exposure to PPR, contagious caprine pleuropneumonia (CCPP), foot-and-mouth disease (FMD), bluetongue (BT), and bovine viral diarrhoea (BVD) in sheep and goats in Tanzania. Methods: Serum samples were collected in 2014 and 2015, and analysed using enzyme-linked immunosorbent assays to detect antibodies to the five pathogens. Results and discussion: This is the first description of seroprevalence of FMD and BT among small ruminants in Tanzania. Risk factor analysis identified sex (female) (OR for 2014: PPR: 2.49, CCPP: 3.11, FMD: 2.98, BT: 12.4, OR for 2015: PPR: 14.1, CCPP: 1.10, FMD: 2.67, BT: 1.90, BVD: 4.73) and increasing age (>2 years) (OR for 2014: PPR: 14.9, CCPP: 2.34, FMD: 7.52, BT: 126, OR for 2015: PPR: 8.13, CCPP: 1.11, FMD: 2.98, BT: 7.83, BVD: 4.74) as risk factors for exposure to these diseases.

Evaluation of Strategies to Control a Potential Outbreak of Foot-and-Mouth Disease in Sweden.	All scenarios of outbreak control included depopulation of detected herds, 3 km protection and 10 km surveillance zones, movement tracing, and 3 days national standstill. With the estimated currently available resources, an FMD outbreak in Sweden is expected to be controlled (i.e., last infected herd detected) within 3 weeks of detection in any evaluated scenario. The density of farms in the area where the epidemic started would have little impact on the time to control the outbreak, but spread in high density areas would require more surveillance resources, compared to areas of lower farm density. The use of vaccination did not result in a reduction in the expected number of infected herds. Preemptive depopulation was able to reduce the number of infected herds in extreme scenarios designed to test a combination of worst-case conditions of virus introduction and spread, but at the cost of doubling the number of herds culled. This likely resulted from a combination of the small outbreaks predicted by the spread model, and the high efficacy of the basic control measures evaluated, under the conditions of the Swedish livestock industry, and considering the assumed control resources available. The results indicate that the duration and extent of FMD outbreaks could be kept limited in Sweden using the EU standard control.
Quantitative assessment of social and economic impact of African swine fever outbreaks in northern Uganda.	The objective of this study was to investigate the socio-economic impact of ASF outbreaks at household level in northern Uganda. In a longitudinal study, structured interviews with two hundred, randomly selected, pig-keeping households were undertaken three times with a six month interval. Questions related to family and pig herd demographics, pig trade and pig business. Associations between ASF outbreaks and economic and social impact variables were evaluated using linear regression models. The study showed that pigs were kept in extreme low-input-low-output farming systems involving only small monetary investments. Yearly incidence of ASF on household level was 19%. Increasing herd size was positively associated with higher economic output. The interaction between ASF outbreaks and the herd size showed that ASF outbreaks were negatively associated with economic output at the second interview occasion and with one out of two economic impact variables at the third interview occasion. No significant associations between the social impact variables included in the study and ASF outbreaks could be established. Trade and consumption of sick and dead pigs were coping strategies used to minimize losses of capital and animal protein. The results indicate that causality of social and economic impact of ASF outbreaks in smallholder systems is complex.
Avian diseases	
Title of activity	**Scope**
Improvement of the diagnosis and control of major infectious diseases in domestic and in wild birds by developing and introducing next generation sample preparation, high-throughput nucleic acid amplification, sequencing and other analytical techniques.	See the detailed results on website of the Formas BioBridges project: http://formas-biobridges.eu. The project was terminated recently however, the website was kept alive, in order to inform the scientific community even in the coming years.
Diagnosis, biotechnology and laboratory	
Title of activity	**Scope**
As one of the main tasks and ongoing our activities, our OIE CC continued the development and validation of various novel methods and approaches of molecular diagnostic virology, such as on site field diagnostics, using portable PCR machines or isothermal thermo-platforms, liquid microarrays, novel ways of pathotyping, high throughput sequencing (HTS) and bioinformatics.	This work yielded novel diagnostic approaches and the detection of emerging new pathogens.

Technological advances in veterinary diagnostics: opportunities to deploy rapid decentralised tests to detect pathogens affecting livestock.	Accurate and rapid diagnostic tests are an essential component of contingency plans to detect, control and eradicate such diseases. Diagnosis involves a 'pipeline' that normally starts with clinical suspicion, followed by collecting samples, transporting specimens to a centralised laboratory setting (e.g. national/international Reference Laboratories), analysing these samples using a range of diagnostic tests and reporting the results. However, the transport of specimens from the field to the laboratory can be a lengthy process that can delay critical decision-making and severely affect the quality of the samples. This important limitation of centralised diagnostic testing has motivated the development of tools for the rapid, simple detection of livestock pathogens. Recent advances in the development of technologies for personalised human medicine have motivated the development of prototype diagnostic tests for a wide selection of diseases of livestock. However, many of these tests are not yet routinely used or commercially available. This paper critically reviews the most promising examples of such assays, and highlights the challenges that remain to transition these tests from applied research and development into routine use.
Vaccines	
Title of activity	**Scope**
Continued work on the construction of new vaccine candidates.	The R&D activities were continued to construct new vaccine candidates against coronaviruses and pestiviruses. The vaccine candidates were tested under in silico,in vitro and in vivo conditions. Ongoing work.

ToR : To propose or develop methods and procedures that facilitate harmonisation of international standards and guidelines applicable to the designated specialty

2. Proposal or development of any procedure that will facilitate harmonisation of international regulations applicable to the surveillance and control of animal diseases, food safety or animal welfare

Proposal title	Scope/Content	Applicable area
To use the novel information, regarding the genome structures and proteins of PRRSV, to develop novel, potent vaccines and diagnostic tools against this virus.	The novel information concerning genome structures and protein structures of PRRSV serves as useful basis in the development of novel vaccines and diagnostic tools.	☒Surveillance and control of animal diseases ☐Food safety ☐Animal welfare
To involve the complete genome sequence data, obtained from an African Swine Fever Virus isolate from Sardinia, is suggested in the studies on viral infection biology.	To involvement of the complete genome sequence data, obtained from an African Swine Fever Virus isolate from Sardinia, is suggested in the studies on viral infection biology, with special regard to viral persistence and eradication.	☒Surveillance and control of animal diseases ☐Food safety ☐Animal welfare
To apply the online monitoring system of Porcine Reproductive & Respiratory Syndrome Virus in practical settings.	The developed online monitoring system provides a practical tool in registering early warning signs of health status alterations, both in experimental and commercial production settings.	☒Surveillance and control of animal diseases ☐Food safety ☐Animal welfare

To use the novel acoustophoretic separation method as powerful novel tool of sample preparation and enrichment.	The novel acoustophoretic separation method, developed partly in the Formas BioBridges project, was tested on clinical samples and found to be a powerful novel tool for the enrichment of target molecules of infectious agents in clinical samples (ongoing activities).	☒Surveillance and control of animal diseases ☐Food safety ☐Animal welfare
To further apply and introduce in routine diagnostic settings the rapid pathotyping method of RNA viruses.	The method was further tested and optimized and it is recommended as a powerful, affordable and very rapid approach for pathogenicity level determination of various RNA viruses.	☐Surveillance and control of animal diseases ☐Food safety ☐Animal welfare

ToR: To establish and maintain a network with other OIE Collaborating Centres designated for the same specialty, and should the need arise, with Collaborating Centres in other disciplines

ToR: To carry out and/or coordinate scientific and technical studies in collaboration with other centres, laboratories or organisations

3. Did your Collaborating Centre maintain a network with other OIE Collaborating Centres (CC), Reference Laboratories (RL), or organisations designated for the same specialty, to coordinate scientific and technical studies?

Yes

Name of OIE CC/RL/other organisation(s)	Location	Region of networking Centre	Purpose
OIE CC for ELISA and Molecular Techniques in Animal Disease Diagnosis, IAEA-FAO	Vienna, Austria	☒Africa ☒Americas ☒Asia and Pacific ☒Europe ☒Middle East	Ongoing collaboration with our sister OIE CC.
OIE Collaborating Centre for Epidemiology, Training and Control of Emerging Avian Diseases	Legnaro (Padova), Italy	☐Africa ☐Americas ☐Asia and Pacific ☒Europe ☐Middle East	Ongoing collaboration with this OIE CC.
OIE Reference Laboratory for Avian Influenza and Newcastle Disease	Legnaro (Padova), Italy	☐Africa ☐Americas ☐Asia and Pacific ☒Europe ☐Middle East	OIE Collaborating Centre for Diseases at the Animal/human Interface

OIE Collaborating Centre for Diseases at the Animal/human Interface	Legnaro (Padova), Italy	☐Africa ☐Americas ☐Asia and Pacific ☒Europe ☐Middle East	Ongoing collaboration of two OIE centres of excellence, coordination of development molecular diagnostic assays for avian diseases.
National Animal Disease Diagnostics and Epidemiology Centre (NADDEC)	Entebbe, Uganda	☒Africa ☐Americas ☐Asia and Pacific ☐Europe ☐Middle East	Ongoing OIE twinning project.

4. Did your Collaborating Centre maintain a network with other OIE Collaborating Centres, Reference laboratories, or organisations in other disciplines, to coordinate scientific and technical studies?

Yes

Name of OIE CC/RL/other organisation(s)	Location	Region of networking Centre	Purpose
OIE CC for ELISA and Molecular Techniques in Animal Disease Diagnosis, IAEA-FAO	Vienna, Austria	☒Africa ☒Americas ☒Asia and Pacific ☒Europe ☒Middle East	To support the international harmonisation and diagnostic services in the OIE member countries.

ToR: To place expert consultants at the disposal of the OIE.

5. Did your Collaborating Centre place expert consultants at the disposal of the OIE?

Yes

Name of expert	Kind of consultancy	Subject
Sándor Belák	established international and national networks in veterinary medicine.	Recent developments in diagnostic virology and epidemiology.
Sándor Belák	Expert support, correction, construction of OIE guidelines.	To support the construction of OIE Manual of Diagnostic Tests and Vaccines for Terrestrial Animals, ninth edition: Chapter on Biotechnology in the Diagnosis of Infectious Diseases

ToR: To provide, within the designated specialty, scientific and technical training to personnel from OIE Member Countries

6. Did your Collaborating Centre provide scientific and technical training, within the remit of the mandate given by the OIE, to personnel from OIE Member Countries?

Yes
a) Technical visits: 0
b) Seminars: 1
c) Hands-on training courses: 0
d) Internships (>1 month): 0

Type of technical training provided (a, b, c or d)	Content	Country of origin of the expert(s) provided with training	No. participants from the corresponding country
B	Workshop on surveillance and control focusing on ASF, as part of OIE twinning project	Uganda	50

ToR: To organise and participate in scientific meetings and other activities on behalf of the OIE

7. Did your Collaborating Centre organise or participate in the organisation of scientific meetings on behalf of the OIE?

No

ToR: To collect, process, analyse, publish and disseminate data and information relevant to the designated specialty

8. Publication and dissemination of any information within the remit of the mandate given by the OIE that may be useful to Member Countries of the OIE

a) Articles published in peer-reviewed journals: 11
Howson ELA, Soldan A, Webster K, Beer M, Zientara S, Belák S, Sanchez-Vizcaino JM, Van Borm S, King DP, Fowler VL: Technological advances in veterinary diagnostics: opportunities to deploy rapid decentralised tests to detect pathogens affecting livestock. Rev Sci Tech. 2017 Aug;36(2):479-498. doi: 10.20506/rst.36.2.2668.

Mészáros I, Olasz F, Kádár-Hürkecz E, Bálint Á, Hornyák Á, Belák S, Zádori Z.: Cellular localisation of the proteins of region 3 of feline enteric coronavirus. Acta Vet Hung. 2018 Sep;66(3):493-508. doi: 10.1556/004.2018.044.

Thaduri S, Locke B, Granberg F, de Miranda JR.: Temporal changes in the viromes of Swedish Varroa-resistant and Varroa-susceptible honeybee populations. PLoS One. 2018 Dec 6;13(12):e0206938. doi: 10.1371/journal.pone.0206938. eCollection 2018.

Süli T, Halas M, Benyeda Z, Boda R, Belák S, Martínez-Avilés M, Fernández-Carrión E, Sánchez-Vizcaíno JM.: Body temperature and motion: Evaluation of an online monitoring system in pigs challenged with Porcine Reproductive & Respiratory Syndrome Virus. Res Vet Sci. 2017 Oct;114:482-488. doi: 10.1016/j.rvsc.2017.09.021. Epub 2017 Sep 28.

Tasker S, Hofmann-Lehmann R, Belák S, Frymus T, Addie DD, Pennisi MG, Boucraut-Baralon C, Egberink H, Hartmann K, Hosie MJ, Lloret A, Marsilio F, Radford AD, Thiry E, Truyen U, Möstl K.: Haemoplasmosis in cats: European guidelines from the ABCD on prevention and management. J Feline Med Surg. 2018 Mar;20(3):256-261. doi: 10.1177/1098612X18758594.

Chenais E, Ståhl K, Guberti V, Depner K.: Identification of Wild Boar-Habitat Epidemiologic Cycle in African Swine Fever Epizootic. Emerg Infect Dis. 2018 Apr;24(4):810-812. doi: 10.3201/eid2404.172127.

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Torsson E, Berg M, Misinzo G, Herbe I, Kgotlele T, Päärni M, Roos N, Blomström AL, Ståhl K, Johansson Wensman J.:Seroprevalence and risk factors for peste des petits ruminants and selected differential diagnosis in sheep and goats in Tanzania. Infect Ecol Epidemiol. 2017 Sep 8;7(1):1368336. doi: 10.1080/20008686.2017.1368336. eCollection 2017.

Liu L, Atim S, LeBlanc N, Rauh R, Esau M, Chenais E, Mwebe R, Nelson WM, Masembe C, Nantima N, Ayebazibwe C, Ståhl K.: Overcoming the challenges of pen-side molecular diagnosis of African swine fever to support outbreak investigations under field conditions. Transbound Emerg Dis. 2018 Dec 16. doi: 10.1111/tbed.13103. [Epub ahead of print]

Sternberg Lewerin S, Wolff C, Masembe C, Ståhl K, Boqvist S, Franko MA.:Methodological aspects of serosurveillance in resource-poor settings. Vet Rec Open. 2018 Apr 9;5(1):e000273. doi: 10.1136/vetreco-2017-000273. eCollection 2018.

b) International conferences: 0

c) National conferences: 0

d) Other
(Provide website address or link to appropriate information): 0
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