

Agenda & Abstracts



One Health research conference Luxembourg 2023
11 December - Cercle Cité Auditorium

Dear Participants,

Welcome to the One Health conference organised by ALVA. This is an incredible convergence of minds, perspectives, and expertise dedicated to the interconnectedness of human, animal, and environmental health. It is an honour to have you all join us for this crucial event aimed at fostering awareness and collaboration among researchers, advocates, and practitioners.

In today's world, the interdependence of our health, the health of animals and the health of the planet is undeniable. The challenges we face – be it emerging diseases, environmental degradation, or the complex dynamics between humans and animals – require interdisciplinary solutions. At national level, there is a need of collaboration between the different Authorities and research institutes to reach this aim. This conference stands as a beacon of hope, gathering brilliant minds committed to exploring, innovating, and propelling us toward a more harmonious and sustainable future.

Together, let us leverage this unique platform to ignite discussions, spark collaborations, and propel the One Health movement forward. Thank you for being a part of this vital endeavour – we are thrilled to embark on this transformative journey with you.

Warm regards,

Wildschutz

Dr. Félix Wildschutz,
Director Luxembourg Veterinary
and Food Administration (ALVA)



Agenda

- 16h00** Registration & Coffee/snacks & Poster session
- 17h00** Welcome
- 17h15** **Integrated monitoring and surveillance on AMR. The German approach.**
Prof. Annemarie Käsbohrer, head of Epidemiology, Zoonoses and Antimicrobial resistance unit and of the National Reference Laboratory for Antimicrobial Resistance, German Institute for Risk Assessment, Berlin (DE)
- 17h40** **Implementing One health surveillance systems : what have we learnt from the One Health European Joint Projects ORION and Matrix, and how do we move forward?**
Dr. Johanna Dups-Bergmann, Federal Research Institute for Animal Health, Friedrich-Loeffler-Institut, Riems (DE)
- 18h05** **A Belgian vision on One Health and its implementation**
Dr Dominique Vandekerchove, DVM, MSc, PhD – Sciensano and Belgian Biodiversity Platform, Brussels (BE)
- 18h40** **One Health: Systematically resolving infective competence in microbiome reservoirs to understand organismal and functional transfer across biomes**
Prof. Paul Wilmes & Dr. Cedric Laczny, Luxembourg Centre for Systems Biomedicine, University of Luxembourg (LU)
- 19h05** **Surveillance of viral zoonoses in Luxembourg for public and animal health**
Dr. Chantal Snoeck, Scientist in the Clinical and Applied Virology group, Department of Infection and Immunity, Luxembourg Institute of Health (LIH)
- 19h30** **VectorNet-Update on arthropod vectors of medical and veterinary importance in Luxembourg**
Dr. Alexander Weigand, Zoology Curator, National Museum of Natural History Luxembourg (LU)
- 19h55** **Human Biomonitoring: a tool to identify priorities for health protection and a driver for advanced in-depth chemical risk assessment – a Luxembourgish perspective**
Dr. Ruth Moeller, Senior Scientist Environmental Health and Risk Assessment, Laboratoire national de santé (LNS)
- 20h20** Wrap up
- 20h30** Reception & Poster session

Implementing One health surveillance systems : what have we learnt from the One Health European Joint Projects ORION and Matrix, and how do we move forward?

Dr. Johanna Dups-Bergmann, Federal Research Institute for Animal Health, Friedrich-Loeffler-Institut, Riems (DE)

Effective disease management programs are underpinned by surveillance data. These data support decision makers not only with developing control/eradication/prevention programs, but also with evaluating the performance of existing programs. Naturally, disease management programs that take a One health approach, are best supported with information from surveillance systems that also subscribe to the One health concept. These surveillance systems are known as One health surveillance systems (OHSS), and aim to share or integrate information across all the sectors affected. However, considerable obstacles to the development and implementation of such systems exist, including practical and legal limitations to data or information sharing, resistance to data or information sharing due to lack of trust between sectors, and a lack of assurance that shared data or information would be interpreted appropriately. The resulting difficulty in setting up OHSSs is reflected in the fact that relatively few true OHSSs exist, despite the growing need for them.

In light of this problem, several projects within the One Health European Joint project (OH EJP) were funded by the European Union's Horizon 2020 Research and Innovation programme to research and develop resources to facilitate development and implementation of One health surveillance, or data integration across sectors. Two of these projects were ORION (One health surveillance Initiative on harmOnization of data collection and interpretation) and Matrix.

In this presentation we will present the main results and outcomes of the ORION and Matrix projects. We will describe the development of a One health codex and glossary, the latter necessary to resolve confusion borne from differences in surveillance terminology between sectors. We will also discuss the creation of an inventory of foodborne and zoonotic disease surveillance systems in the animal health, public health and food safety sectors. Analysis of the data captured within this inventory highlighted key differences in surveillance approaches between sectors. Lastly, we will present and describe a stepwise guide to creating OHSSs from existing surveillance structures. The guide facilitates the process of creating OHSSs drawing on evidence gathered by interview of persons associated with existing OHSSs, review and analysis of sectoral surveillance systems, expert opinion and literature review.

Biosketch

Johanna Dups-Bergmann completed her PhD in virology on the bat-borne zoonotic viruses Hendra and Nipah virus at the Australian Centre for Disease Preparedness, Geelong. Her laboratory-based PhD also included field-based activities assisting with animal health responses to outbreak events in the field. Johanna went on to complete a Masters and Field Epidemiology Training Program (FETP) based at the Department of Health, Western Australia after which she spent three years with the Western Australian Department of Primary Industries and Regional Development as a policy veterinarian and epidemiologist designing and executing animal disease surveillance systems and management programs. From these experiences Johanna holds a deep understanding of disease surveillance programs from both the human health and animal health perspectives.

Johanna is currently based at the Friedrich-Loeffler-Institute, Germany, and continues to work in her field of interest, One health and disease management, focusing her work on incorporating the One health concepts into surveillance and cohort research activities, within Germany and Europe more broadly.



Integrated monitoring and surveillance on AMR. The German approach.

Prof. Annemarie Käsbohrer, head of Epidemiology, Zoonoses and Antimicrobial resistance unit and of the National Reference Laboratory for Antimicrobial Resistance, German Institute for Risk Assessment, Berlin (DE)

The European One Health Action Plan against Antimicrobial Resistance (AMR) ask Member States to put in place National Action Plans on Antimicrobial Resistance (AMR), to strengthen surveillance of AMR and Antimicrobial use (AMU) and to support integrated surveillance and reporting. The Codex Alimentarius “Guidelines on integrated monitoring and surveillance of foodborne antimicrobial resistance” highlight that the integrated program includes the alignment and harmonization of sampling, testing, analysis and reporting methodologies and practices, as well as the integrated analysis of relevant epidemiological information from humans, animals, crops, and food. During the G7 Conference “From the G7 Health Communiqué to Action: Integrated Surveillance Systems (AMU and AMR)” experts identified 6 critical steps of the implementation of integrated surveillance systems: decision making, political will, methodology, resources, harmonisation and data sharing.

In Germany, since the first German antibiotic resistance strategy “DART” in 2008, a One Health approach is applied. The DART 2030 stresses the closer involvement of the environmental sector in activities to combat AMR. Specific monitoring programmes provide already important sector specific data on AMR. Following a bottom-up approach researchers in Germany support the implementation of integrated surveillance systems to strengthen the One Health approach. Within the One Health European Joint Programme (One Health EJP), research included methodology, harmonisation, data sharing and analysis. Following a top-down approach, a framework with e.g. defined roles, responsibilities and procedures needs to be strengthened. An inter-ministerial working group currently coordinates collaboration between sectors. These are important steps to strengthen preparedness, prevention and control of the threat of AMR.

Biosketch

Annemarie Käsbohrer has graduated as veterinarian at the Free University Berlin, Germany. She is De Facto Specialist in Veterinary Microbiology and holds a Master in Epidemiology.

Since 2006, she is head of the unit for Epidemiology, Zoonoses, Antimicrobial resistance and of the National Reference Laboratory for Antimicrobial Resistance at the German Institute for Risk Assessment. Furthermore, since 2016, she is professor and head of the unit Veterinary Public Health and Epidemiology at the University of Veterinary Medicine in Vienna, Austria.

Her current research priorities cover strategies to improve the implementation of the One Health concept, risk assessment of antimicrobial resistance, data collection and assessment of antimicrobial use and the impact on antimicrobial resistance and source tracking and tracing along the food chain. In the Horizon 2020 project One Health EJP, which recently finished, she was leading the work package science to policy translation.



A Belgian vision on One Health and its implementation

Dr Dominique Vandekerchove, DVM, MSc, PhD – Sciensano and Belgian Biodiversity Platform, Brussels (BE)

The mission and organisation of Sciensano have evolved since its earliest beginnings at the end of the 19th century, in function of emerging crises and new developments. While at first it focused on hygiene, several other fields of activity were added in the course of the years : food safety, microbiology, preventive measures such as vaccines, environment, epidemiology, ... Now, in 2023, Sciensano is a scientific One Health research institute, comprising public health, animal health and environmental health, using state-of-the-art methods. It is involved in numerous projects, and provides the necessary policy support, e.g. during the SARS-CoV-2 pandemic.

So far, Sciensano experts have organized themselves into eight One Health platforms : zoonosis monitoring, exposome, AntiMicrobial Resistance, vector-borne diseases, food-borne pathogens, respiratory pathogens, innovative and generic One Health approaches, and climate change. These platforms allow for targeted information exchange, creation of synergies, and collaborations with external experts and organizations, crucial for a OH approach.

Sciensano is one of the co-creators of the Belgian One Health Network (2019). Through it, it is involved in numerous other One Health-related networks at the European, international and global level, such as One Health EJP, Preventing Zoonotic Disease Emergence (PREZODE), Be-causeHealth and One Sustainable Health Forum. These networking efforts help ensure the information flow and keeping up to date on the continuously evolving needs and possibilities.

Biosketch

Dominique graduated as a veterinary surgeon at Ghent University (BE) in 1992. In 2001 she obtained a Master of Science in Epidemiology at Utrecht University (NL). She defended her PhD in veterinary sciences at Ghent University in 2004.

She was a researcher at the Veterinary and Agrochemical Research centre (now Sciensano) for 10 years, then worked successively at the Belgian Superior Health Council, the Belgian Federal Public Service of Health, Food Chain Safety and Environment – Contractual Research. At the European level she spent 3,5 years at COST Association.

Since 2023 she is active again at Sciensano and at the Belgian Biodiversity Platform as One Health science officer. In this capacity she's involved (among other things) in the PREZODE initiative (Preventing Zoonotic Disease Emergence) and the Belgian One Health Network.



One Health: Systematically resolving infective competence in microbiome reservoirs to understand organismal and functional transfer across biomes

Cedric C. Lazcny¹, Paul Wilmes^{1,2},

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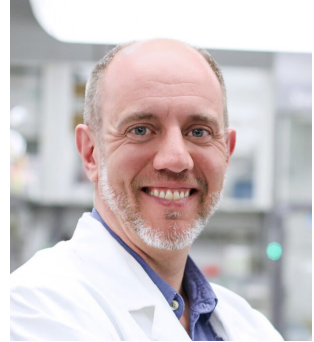
² Department of Life Sciences and Medicine, Faculty of Science, Technology and Medicine, University of Luxembourg, Esch-sur-Alzette, Luxembourg.

The growing emergence and spread of virulence alongside antimicrobial resistance (AMR) within and between microbiome reservoirs in humans, animals and the environment represents a major public health challenge. Studies focussing on the role of infection-mediating genes are typically limited to specific pathogenic taxa and seldomly consider the overall infective competence represented by them in the context of microbiomes. We have recently developed a suite of wet- and dry-lab methods for the systematic characterisation of infective competence across biomes including high-resolution molecular methods (integrated multi-omics) and computational approaches (the PathoFact tool). We have applied these methods to samples from humans, animals as well as heavily human-impacted and pristine environments. In all cases, we observe elevated, at times unexpectedly high levels of infection-mediating genes. Interestingly, we observe that such genes can be transferred differentially via mobile genetic elements (extrachromosomal elements and viruses) depending on the specific microbiome in which they are encoded and expressed. Our findings raise important considerations for our understanding of gene flows across biomes. In my talk, I will discuss the linked implications for One Health as well as for better stewardship of human, animal and the environmental microbiomes in the future.

Biosketches

Paul Wilmes is Full Professor of Systems Ecology and holds appointments at the Luxembourg Centre for Systems Biomedicine (LCSB) and in the Department of Life Sciences and Medicine within the Faculty of Science, Technology and Medicine of the University of Luxembourg. He heads the Systems Ecology Research group at the LCSB.

As a British Chevening Scholar, Paul Wilmes earned his PhD from the School of Environmental Sciences at the University of East Anglia in Norwich (UK) in 2006. For part of his doctoral research, he spent time as a German Academic Exchange Service Visiting Scientist at the Max



Planck Institute for Marine Microbiology in Bremen (Germany). He subsequently carried out postdoctoral research at the University of California, Berkeley (USA) from where he returned in 2010 to his native Luxembourg through the ATTRACT fellowship scheme of the Luxembourg National Research Fund (FNR). He initially established his research group at the Centre de Recherche Public – Gabriel Lippmann (now Luxembourg Institute of Science and Technology) but later joined the LCSB. In 2019, Paul received an ERC Consolidator Grant for his project “ExpoBiome” which explores the interactions between microbial molecules and the human immune system in patients with Parkinson’s disease and rheumatoid arthritis.

Paul’s research group aims at developing and applying molecular systems biology approaches to acquire new knowledge of mixed microbial communities (e.g., gut microbiota), their interactions with their environment (e.g., the human host), and how certain microbial community compositions lead to certain outcomes (e.g., pathogenesis).

Cedric Laczny received his PhD at the University of Luxembourg in 2015 for developing computational solutions to analyze metagenomic data. During his Postdoc at the Chair for Clinical Bioinformatics at the University of Saarland, he worked on applying these methods for the study of clinical pathogens. Currently, Cedric is a Research Scientist in the Systems Ecology group at the Luxembourg Centre for Systems Biomedicine working on the analysis of microbiomes in the context of probiotics, antimicrobial resistance, and variety of diseases, including diabetes, cancer, and Parkinson’s disease. Besides developing and using computational biology techniques to study microbial systems ecology, he is passionate about supporting early-career scientists in helping them build a successful scientific career.



Surveillance of viral zoonoses in Luxembourg for public and animal health

Chantal J Snoeck¹, Aurélie Sausy¹, Regina Sinner¹, Emilie Charpentier¹, Manon Chassaing², Leslie Ogorzaly², Manon Bourg³, Felix Wildschutz⁴, Judith M Hüb-schen¹

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ALVA and LIH started collaborating in 2006 in the field of viral zoonoses. Initially focused on avian influenza, the collaboration was subsequently extended to hepatitis E, SARS-CoV-2, West Nile and Usutu viruses and their molecular characterisation.

Among viral zoonoses, influenza A virus poses a considerable threat, not only because of the epidemic and pandemic potential of certain strains, but also the substantial economic consequences. Molecular surveillance of influenza provides an excellent example of the benefits of a One Health approach for both human and animal health. For instance, the combination of classical epidemiology and complete genome sequencing allowed the identification of cross-border trade as introduction route of highly pathogenic avian influenza to Luxembourg in 2017 and 2021 and wild migratory birds as infection source in 2021-2022 and 2022-2023. Increasing numbers of H5N1 infections in mammals worldwide also warranted expanding surveillance activities in combination with the development of deep sequencing tools for monitoring mutations linked with virus adaptation to mammals. Besides surveillance in animals as an early warning system to recognize threats for human health, environmental surveillance is an expanding field for monitoring pathogen circulation. Our preliminary results showed that signals in wastewater match reported human cases of seasonal influenza, highlighting that environmental surveillance has the potential to early and remotely detect increasing virus circulation in both human and animal populations.

Biosketch

Chantal Snoeck graduated as bio-engineer from the Faculté Universitaire des Sciences Agronomiques de Gembloux. She obtained her PhD in Sciences de la Vie et de la Santé from the Université de Lorraine in 2012 for her work on the molecular epidemiology of avian influenza and Newcastle disease virus in Europe and Africa. During her post-doctoral research, she further developed her research axis on viral zoonoses in a One Health context within the Clinical and Applied Virology group of the Luxembourg Institute of Health (LIH).

She is now a Researcher at LIH and her work focuses on monitoring virus circulation and diversity to assess seasonal trends, geographic spread, inter-species transmission events and identifying risk factors. She is also very active in capacity building by providing regularly in depth training especially to (early-career) scientists from low- and middle income countries to increase global resilience to infectious disease threats.



VectorNet-Update on arthropod vectors of medical and veterinary importance in Luxembourg

Alexander Weigand¹, Francis Schaffner²

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² *Francis Schaffner Consultancy, Lörracherstrasse 50, 4125 Riehen, Switzerland*

VectorNet is a joint project of the European Center for Disease Control and the European Food Safety Authority, aiming at increasing overall preparedness for vector-borne diseases. The National Museum of Natural History of Luxembourg acts as the national contact point for VectorNet.

Here we present updated information on arthropod vectors of medical and veterinary importance in Luxembourg. More precisely, the diversity and currently known distribution of relevant ticks (Acari, Ixodida), mosquitoes (Diptera, Culicidae) and sand flies (Diptera, Psychodidae, Phlebotominae) will be presented. Due to changing environmental conditions and increased globalization, several new arthropod vectors of medical or veterinary importance have been detected, have arrived or have further spread in the country over the last few years, e.g. *Hyalomma marginatum*, *Dermacentor reticulatus*, *Aedes albopictus*, *Aedes japonicus* as well as *Phlebotomus mascittii*.

The most relevant vectors and potential diseases for animal health in the country are a few invasive and native mosquito species that are vectors of West Nile and Usutu viruses (*Aedes albopictus*, *Culex modestus*, *Culex pipiens*) and biting midges of the genus *Culicoides* (Diptera, Ceratopogonidae) as vectors of bluetongue virus.

To assess vector-related risk, surveillance of the main vector species may be further implemented to determine presence, spread, abundance, as well as other vectorial capacity traits.

Biosketch

After graduating in biology from the Technical University of Darmstadt in 2009, Mr Weigand completed his doctorate in evolutionary biology and biodiversity research at the Goethe University Frankfurt from 2010-2012. He then worked in various places (Frankfurt, Düsseldorf, Bochum, Essen) as a researcher and science coordinator as well as an eLearning manager and trainer of natural scientists.



Since 2019, he has been Curator of Zoology at the National Museum of Natural History Luxembourg (natur musée), where he leads various studies in applied and basic research as well as in the field of invertebrate collection management. Using a combination of classical and DNA-based methods, he studies the diversity and distribution of different groups of organisms, including pollinators, parasites or cave and groundwater fauna in Luxembourg and the Greater Region. Since 2020, he has been appointed VectorNet representative of Luxembourg, a European network for medical and veterinary entomology. In his activities, he is always interested in acting at the interface between science and politics in order to raise stakeholder preparedness.

Human Biomonitoring: a tool to identify priorities for health protection and a driver for advanced in-depth chemical risk assessment – a Luxembourgish perspective

Ruth Moeller¹, Radu Duca¹, Maria-Mirela Ani¹, Maria Torres-Toda¹, Matteo Creta¹, Emilie Hardy¹, Françoise Schaefer¹, Cathy Jacobs¹, Justine Pincemaille¹, Cristiana Costa Pereira¹, Laurence Wurth², An van Nieuwenhuysse¹

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Human Biomonitoring (HBM) measures chemicals/metabolites in internal fluids or other specimens and thus reflects internal exposure, i.e. the amount taken up by the body via different routes of exposure and from multiple sources. It is a key tool in the next generation chemical risk assessment further developed under the European Partnership for Assessment of Risks from Chemicals (PARC). In Luxembourg, the Department Health Protection of the Laboratoire national de santé is in charge of HBM in science-policy initiatives. In the recent HBM surveys, carried out under HBM4EU (2017-2022), Luxembourg participated in the 1st (Cd; bisphenols A, F and S; polycyclic aromatic hydrocarbons) and 2nd set of priority substances (deoxynivalenol, DON; acrylamide; UV-filters) for adults. Results showed substantial exposure to bisphenols, with the whole population exposed above the bisphenol A health-based guidance value; and to deoxynivalenol, with Luxembourg among countries with health quotient above 1. Aggregated exposure assessment frameworks, developed for the European regulators in PARC, stress the need of complementary efforts in human biomonitoring, environmental and food monitoring to come to action in a “one health” perspective. PARC puts forward indoor pollution as one of the priority domains that needs further investment. In addition, as food and food contact materials are one of the most likely and already known exposure routes for bisphenols and mycotoxins, like DON, the generation of food consumption data is the second next step for Luxembourg.

Biosketch

Ruth Moeller is working since 2023 at the Laboratoire national de santé (LNS) Department of Health Protection in Luxembourg being in charge of (inter) national Environmental Health science-policy initiatives. She coordinates the Luxembourgish contribution to the Partnership for the Assessment of Risks from Chemicals (PARC) and participates in multiple projects under the PARC initiative.

She is member of the Committee for Risk Assessment of the European Chemicals Agency since 2015. Previously she was working for the Luxembourg Institute for Science and Technology providing science-policy support to national administrations and developing RDI activities focusing on safe and sustainable by design.

Ruth Moeller has graduated as environmental scientist at the University of Trier where she also obtained her doctorate in molecular toxicology. She holds a Master of Science in Toxicology obtained at the Medical University of Vienna and is certified ERT.



Poster Abstracts

Human Biomonitoring: a tool to identify priorities for health protection and a driver for advanced in-depth chemical risk assessment – a Luxembourgish perspective

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Campylobacter jejuni is the leading cause of bacterial gastroenteritis around the world, but, unlike other foodborne pathogens, is not commonly reported as causing outbreaks. The population structure of the species is characterised by a high degree of genetic diversity but the presence of stable clonally derived genotypes persisting in space and time, and potentially leading to diffuse outbreaks, have recently been identified. The spread of these recurring genotypes could be enhanced by wild birds, suspected to act as vectors for a wide range of microorganisms that can be transmissible to other animals/humans. This study assessed the genetic diversity of *C. jejuni* carriage in wild birds and surface waters to explore a potential link between these environments and the persistence over years of recurring lineages infecting humans in Luxembourg. These lineages corresponded to over 40% of clinical isolates from 2018 to 2021. While mainly exotic genotypes were recovered from environmental samples, 4% of *C. jejuni* from wild birds corresponded to human recurring genotypes. Among them, a human clinical endemic lineage, occurring for over a decade in Luxembourg, was detected in one bird species, suggesting a possible contribution to the persistence of this clone and its multi-host feature. Whereas 27% of wild birds were carriers of *C. jejuni*, confirming their role as reservoir, only three out of 59 genotypes overlapped with recurring human strains. While direct transmission of *C. jejuni* infection through wild birds remains questionable, they may play a key role in the environmental spreading of stable clones to livestock.

The evolving relationship between SARS-CoV-2 cases and wastewater concentrations in Luxembourg

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From 2020 to 2023, Luxembourg monitored SARS-CoV-2 concentrations in wastewater alongside extensive testing and mandatory isolation. For this study we compared weekly counts of confirmed cases were compared with corresponding weekly viral flux concentrations of SARS-CoV-2 in wastewater from April 2020 to September 2023. Linear regression was used to develop predictive models estimating reported cases based on RNA concentrations in wastewater.

Our analysis showed a high concordance between wastewater data and reported case data, identifying various waves of SARS-CoV-2 variants. The ratio of reported cases to wastewater concentrations varied throughout the pandemic and seasonally. A peak was observed in the first quarter of 2022 with the emergence of the BA.1 variant. A significant reduction in test-seeking behaviour was suggested when the testing and isolation regimen ended in April 2023.

Despite low reported case numbers in the summer of 2023, the analysis indicates an 87% reduction in case ascertainment relative to the period 2020-2022. Our study demonstrates that wastewater-based assessment of SARS-CoV-2 RNA concentrations provides a valuable measure of population-level infection prevalence, independent of testing capacity, strategy, or public acceptance.

This event is organised by the Luxembourg Veterinary and Food Administration (ALVA) with the support of the European Food Safety Authority (EFSA).



LE GOUVERNEMENT
DU GRAND-DUCHÉ DE LUXEMBOURG
Ministère de l'Agriculture,
de l'Alimentation et de la Viticulture



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More information on <https://antigaspi.lu/>

