USAM SuLei
One Health in Action

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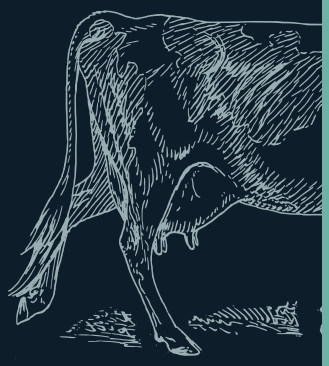
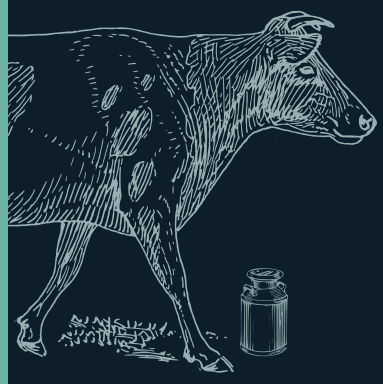
USAM SULEI WORKSHOPS

Dairy Farming

Integrated Best Practices for Antimicrobial Use and Animal Health



CONFERENCE PROCEEDINGS



JUNE 06th . 07th | 2025

More information at www.usamsulei.pt

Instituto de Ciências Biomédicas Abel Salazar | Porto

Proceedings of the USAM-SuLei Workshops: Dairy Farming
Held on June 6th - 7th, 2025
Instituto de Ciências Biomédicas Abel Salazar (ICBAS), University of Porto
Porto, Portugal

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Conference Proceedings

June 6th . 7th | 2025

Porto, Portugal

The Project Coordinator's Message

The organizing committee of the USAM SuLei workshop is pleased to welcome you to this meeting, held at a particularly important time for animal and public health.

The use of antimicrobials (AMU) in human and veterinary medicine contributes to maintaining health and well-being, but it simultaneously induces antimicrobial resistance (AMR). AMR is on the rise and has become one of the primary global threats to human, animal, and environmental health. Global measures, developed under the "One Health" approach, are necessary to contain the AMR pandemic. The phenomenon of AMR compromises the effectiveness of veterinary treatments and endangers not only animal welfare but also food safety and public health.

In 2017, the European Union adopted a "One Health" Strategic Action Plan to combat AMR. More recently, the "Green Deal" established a target to reduce antimicrobial use in the veterinary sector by 50% by 2030. The veterinary sector's contribution to containing AMR is essential and requires the involvement of all relevant stakeholders and interested parties.

The USAM SuLei project – Safe Use of Antimicrobials in Swine and Bovine Milk Production – aims to address this challenge by contributing to the sustainable reduction of AMU in both sectors. This project (No. 13/C05-i03/2021 – PRR-C05-i03-I-000173) is a consortium led by the University of Porto and was funded under the "Investment RE-C05-i03 – Research and Innovation Agenda for the Sustainability of Agriculture, Food, and Agri-industry": R&D+I Projects - Research and Innovation Projects - One Health agenda. The consortium includes FENALAC (National Federation of Milk Producer Cooperatives), FPAS (Portuguese Federation of Swine Farmer Associations), and over 50 producers from both sectors. Also part of the consortium are DGAV (Directorate-General for Food and Veterinary Medicine), INIAV (National Institute for Agrarian and Veterinary Research), SCS (Scientific Society of Swine Production), ANABLE (National Association for the Improvement of Milk Producers), FeedInov, and InovTechAgro.

USAM SuLei aims to develop a 4.0 system, based on a platform with various digital tools, and intends to create a methodology to empower veterinarians and farmers to make effective decisions regarding animal health and treatment. The guiding principles are: 1) a disease prevention-centered approach, 2) interoperability of existing digital systems, 3) continuous improvement, 4) process segmentation, and 5) evidence-based antimicrobial prescription.

The organizing committee is particularly committed to providing a high-quality scientific program and has therefore invited nationally and internationally renowned experts. We wish to express our sincere gratitude to all participants, speakers, and partners who make this event possible and contribute to the promotion of sustainable and responsible practices in the agricultural sector.

We hope this meeting will be inspiring and fruitful for everyone, paving the way for new partnerships and projects that promote a healthier and more sustainable future.

A warm welcome to all!

João Niza Ribeiro
General Coordinator of USAM SuLei

Scientific Committee

João Niza Ribeiro
Associate Professor with tenure, Instituto de Ciências Biomédicas Abel Salazar
Portugal

Lis Alban
Chief Scientist, Danish Agriculture & Food Council
Denmark

Ana Sofia Duarte
Senior Researcher, Technical University of Denmark
Denmark

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Andrea Cara d'Anjo
HubRAM Project Coordenator, Direção Geral de Alimentação e Veterinária
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Miguel Lopes Jorge

Katia Pinello

Helena Sofia Salgueiro

Emanuel Vieira

Marta Gonçalves

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JUNE 6th | 2025

Instituto de Ciências Biomédicas Abel Salazar | Porto

Morning| Lecture Session

Noble Room

09:00 Morning Opening Session | Susana Pombo DGAV . Henrique Cyrne ICBAS

09:15 European Strategies and Policies on Antimicrobial Use in Animal Production
| Ana Sofia Duarte Technical University of Denmark

09:45 Presentation of the HubRAM Project | Manuela Guerra DGAV

10:00 Economic Analysis in Animal Health: Disease Costs and Decision-Making Tools
| João Sucena Afonso GBADs - University of Liverpool UK

10:30 **Coffee Break**

11:00 Alternative Strategies to Antibiotic Use | Carlos Cabral ICBAS / SVA . Adelaide Pereira Segalab

11:30 The Danish System for Reducing Antimicrobial Use in Dairy Production
| Ana Sofia Duarte Technical University of Denmark

12:00 Environment and Health: Precision Livestock Farming | Luís Conceição . Rute Santos InovTechAgro / IPP

12:30 Roundtable Discussion | Luís Pinho ICBAS / SVA

13:00 Lunch Break

Afternoon | Lecture Session

Noble Room

14:00 Afternoon Session Opening | Paulo Ramalho CCDR Norte

14:15 Presentation of the USAM SuLei Project | João Niza Ribeiro ICBAS

14:30 Disease Indicators, Antimicrobial Consumption, and VetRAM | João Niza Ribeiro ICBAS

15:00 Strategies for AMR Detection on Dairy Farms | Paulo Martins da Costa ICBAS

15:15 Action Plans: Problem Identification and Corrective Actions
| Miguel Lopes Jorge Sociedade Científica de Suinicultura . Inês Rebelo Proleite

15:45 **Coffee Break**

16:15 Integrated Best Practices in Cattle Farming | João Niza Ribeiro ICBAS

16:30 Support App for Veterinary e-Prescriptions | Miguel Lopes Jorge SCS . Rui Barros MitMyNid

17:00 Roundtable Discussion | João Niza Ribeiro ICBAS

17:30 Closing Session | Fernando Cardoso Fenalac

USAM SuLei
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JUNE 7th | 2025

Instituto de Ciências Biomédicas Abel Salazar | Porto

Morning | Hands-on Session

Modular Units

09:00	Using VetRAM Net
10:00	The PEMV Support App: From Disease Detection to Veterinary e-Prescription
11:30	**Coffee Break**
11:45	Using the VetMoniCA Integrated Platform
12:30	General Discussion & Q&A
13:00	Closing Remarks

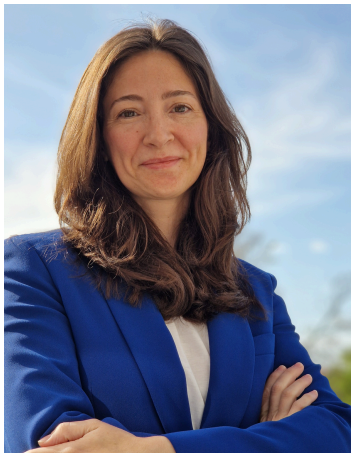
PRR Plano de Recuperação e Resiliência
REPÚBLICA PORTUGUESA
Financiado pela União Europeia NextGenerationEU

SPEAKERS

LinkedIn

Adelaide Pereira

Degree in Veterinary Medicine from FMV-UTL. I start my activity as a scientific research fellow in Antibiotic Residues and AFM HACCP Programs in Dairy farms. Since 1999, I develop my main activity in a private/cooperative laboratory - SEGALAB-, being responsible for the Milk Quality and Animal Health Programs. Actively collaborates with various entities (farms and farms associations, veterinary colleagues, pharmaceutical companies) and R&D projects.
Founding member of the Portuguese Society of Veterinary Epidemiology and Public Health; since 2017, President of the Portuguese Udder Health Council (CPSU); since 2024, Vice-President of the Northern Regional Delegation of the Portuguese National Veterinary Association (OMV).



ORCID

Ana Sofia Ribeiro Duarte

Ana Sofia Ribeiro Duarte is a veterinary epidemiologist, Senior Researcher at the Danish National Food Institute. Sofia is a reporting officer and a member of European Food Safety Authority's network for the EU program of harmonized monitoring of antimicrobial resistance in food-producing animals. She has co-managed the Danish national report on antimicrobial use and resistance in animals (DANMAP) since 2023.
She has participated in multiple European research projects, with her research focusing on the epidemiology and transmission of antimicrobial resistance. She presently co-leads a DANIDA project on risk assessment of human exposure to heavy metals and antimicrobial resistance in dumpsites in Kenya. Sofia is also an experienced educator, teaching courses on epidemiology, microbial risk assessment, and antimicrobial resistance.

LinkedIn

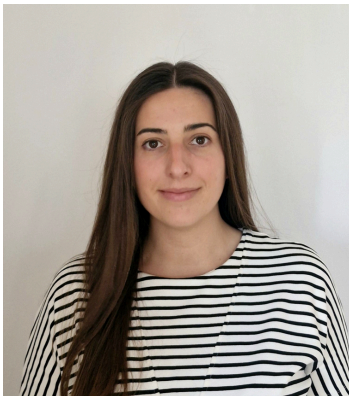
Carlos Cabral

Veterinary surgeon graduated in 1997 from the University of Trás-os-Montes and Alto Douro. Between August 1997 and July 1998, he was responsible for the reproductive programme of the dairy farms associated with LEICAR. In 2008, he completed a postgraduate degree in “Ruminant Clinic and Management” at Universidade Lusófona.
Currently, he has been part of the Associated Veterinary Services (SVA) since 1998 and has been an Invited Assistant Professor at ICBAS/University of Porto since 2015. Secretary of the Portuguese Buiatrics Association (APB) since November 2023. Vice-president of the Northern Regional Assembly of the Portuguese Veterinary Medical Association since 2024. He shows particular interest in the areas of Reproduction in Dairy Cattle, Neonatal Health and Management, and Respiratory Pathology in Dairy and Beef Calves.

LinkedIn

Inês Rebelo

Master’s degree in Veterinary Medicine from FMV-UTL in 2014. Since then, has been working in general practice, surgery, management, and reproductive monitoring at Proleite – Agricultural Cooperative of Milk Producers, CRL. Internal Animal Welfare Auditor since 2019. Member of the Board of CPSU – Portuguese Council for Udder Health.



ORBIT

Joana Pessoa

Joana is a Postdoc at DTU-Food. She is a veterinary epidemiologist, with her main research areas focusing on the transmission of AMR in a One Health context and the burden of foodborne diseases. She is co-editor of DANMAP (the Danish Integrated Antimicrobial Resistance Monitoring and Research Program) and is involved in the production of the EFSA/ECDC EU summary report on AMR in zoonotic and indicator bacteria from humans, animals, and food.
Joana is also a resident of the European College of Veterinary Public Health (ECVPH).

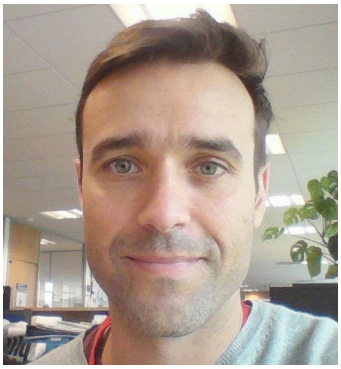
ORCID
Scopus

João Niza Ribeiro

João Niza Ribeiro, graduated in Veterinary Medicine (1986), has a postgraduate degree in food safety and a PhD in Veterinary Sciences at the Technical University of Lisbon. He is member and co-founder of the European College of Specialists in Bovine Health Medicine. He has training in Business Management by AESE, and Innovation by Nova SBE.

He is Adjunct Professor, with tenure, at ICBAS-Porto University, where he coordinates the Veterinary Epidemiology and Veterinary Public Health curricular units in the Master Course of Veterinary Medicine. Is member of the scientific commission of PhD in Veterinary Sciences (ICBAS-UP), the MsC in Public Health (ICBAS, FMUP-UP) and MsC on One Health (ICBAS, FEP-UP).

Throughout his career, he has consistently dedicated himself to the fields of animal health and food safety, placing a specific emphasis on public health related issues playing a pivotal role in leading efforts to eradicate ruminant epizootic or zoonotic diseases in the northern region of Portugal. He created in Portugal the Bovicontrol program, a certification system for IBR and BVD in cattle. Recently coordinated the creation of VetOnconet, dedicated to register the Portuguese Animal oncologic Registry. Recognizing the utmost importance of the issue of companion animal abandon, promotes the research on this issue in Portugal. It is the responsible for the USAM Sulei project and initiative, dedicated to the responsible use of antimicrobials in animal production.



ORCID

João Sucena Afonso

A veterinarian by training, I transitioned from individual to population health after completing the MSc in Veterinary Epidemiology at the Royal Veterinary College (2012), having worked internationally as a consultant in animal health projects.

Following my PhD in animal health economics (2022), I am currently a researcher at the University of Liverpool, contributing to the Global Burden of Animal Diseases (GBADs) programme, an international programme led by Jonathan Rushton. More specifically I co-lead the AMR burden assessment for a Fleming Fund project and collaborate on H2020-funded initiatives (ROADMAP, DECIDE, and AVANT).

ORCID

Lis Alban

Lis Alban graduated as a DVM from University of Copenhagen, from where she also holds a PhD degree in Veterinary Epidemiology. She is also a Diplomate of the European College of Veterinary Public Health (ECVPH). She has a dual position: First, she is a Chief Scientist at the Danish Agriculture Food Council (DAFC), which is an organisation that gives advise to farmers and food-producing companies.
Secondly, she is an Adjunct Professor at University of Copenhagen, which means that she teaches, supervises Masters, ERASMUS and PhD students, as well as participates in research projects with fellow colleagues from in- and outside Denmark. Moreover, she is actively publishing in popular and scientific journals. She has had this dual position for 14 years, which makes it possible for her to put the challenges of livestock production on the agenda of the university. The challenges relate among others to antimicrobial use, resistance and residues, as well as modernisation of meat inspection using new technologies. She is working in accordance with the socalled “Danish Model”, which implies that academia, competent authorities and livestock industry together search for cost-effective and feasible solutions to ensure food security and safety.

LinkedIn

Luís Conceição

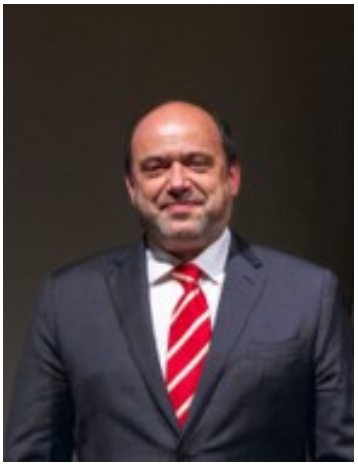
Luis Alcino da Conceição, Master in Animal Production (Lisbon) and PhD in Agri Engineering from the Technical University of Madrid (ETSIAAB), is currently Associate Professor at the Polytechnic Institute of Portalegre. He is an integrated member of VALORIZA Research Center and a collaborating member of MED (University of Évora).
He coordinates the National Competence Center InovTechAgro and the Rural Engineering Section of SCAP. With numerous publications in biosystems and smart farming, he received the 2019 “I&D que marca” award from Vida Rural magazine, and was nominated for the Agro Santander Sustainability Award. Guest lecturer for the master's in Precision farming at UPM (Spain) and University of Basilicata (Italy).

ORCID

Maria Manuela M. Guerra

BSc in Animal Science (Engenharia Zootécnica), MSc in Food Science and Technology, PhD in Animal Science and Technology. Professor at Escola Superior de Hotelaria e Turismo do Estoril (ESHTE) since 2008; internal mobility at DGAV (2023-2025).

Working and Research fields: food science & technology (processes, formulas, ingredients; innovation, sustainability); food & feed safety and microbiology; veterinary medicines & antimicrobial resistance and the One Health approach.



ORCID

Miguel Lopes Jorge

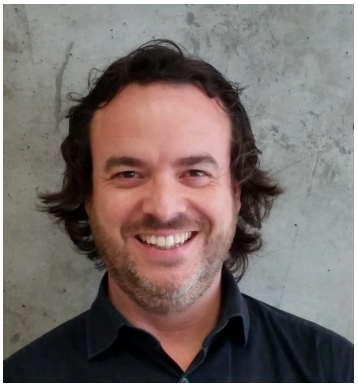
Graduated in Veterinary Medicine from FMV-UTL in 1994. From 1995 to 1996, dairy cattle, other livestock species and companion clinical practice in S. Jorge, Azores. In 1995, temporary coordination of animal health, health inspection and food safety at Serviços de Desenvolvimento Agrário de S. Jorge. Between 1996 and 1999, worked as veterinary and production consultant in pig farming.
From 1999 to 2021, worked in the animal health industry, as marketing and technical services manager for ruminants and pigs and responsible for pharmacovigilance. Currently works as a veterinary consultant and since August 2023 member of PRR USAM SuLei Project management committee.

Sigarra
ORCID

Paulo Martins da Costa

Paulo Martins da Costa, DVM and Doctor of Biomedical Sciences, is Professor and Director of the Microbiology and Food Technology Laboratory at the Instituto de Ciências Biomédicas de Abel Salazar (ICBAS) of the University of Porto.

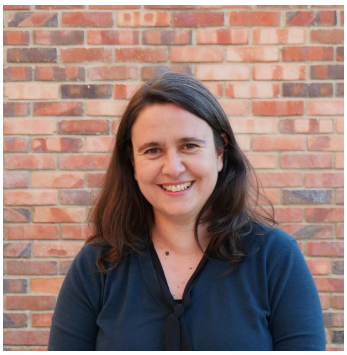
He has been involved in several studies aimed at the phenotypic and genotypic characterization of MDR bacteria distributed in different populations (humans, livestock, pets, wildlife) and intermingled ecological niches. In addition to antimicrobial resistance surveillance, he has also participated in the development of novel antimicrobial agents, resulting in six international patents.



LinkedIn

Rui Barros

Rui Barros is an informatics engineer with specific knowledge in software engineering. Over more than 20 years at INESC TEC, he did research and innovation with private companies and public administration and worked on more than 40 projects. Nowadays he is an entrepreneur and co-founder of MITMYNID, a private company developing sophisticated and innovative software-based solutions.
At the academy, Rui is an invited professor in the informatics department, teaching at the very first stage of graduation. The main objective is to stimulate students' interest in applying methodologies and standards in software development.



ORCID

Rute Santos

Rute Isabel Duarte Guedes dos Santos completed her PhD at the University of Córdoba (Spain) in 2008, her Master's degree in Equine Science in 2000 from the same institution, and her Bachelor's degree in Veterinary Medicine in 1996 from the University of Lisbon - Faculty of Veterinary Medicine.
She is the coordinator of the Bachelor's degree program in Equine Studies at the Polytechnic Institute of Portalegre, a Coordinating Professor, and Director of the Higher School of Biosciences of Elvas, at the same institution. She has published 25 articles in specialized journals, 7 book chapters, and 4 books. She has co-supervised 2 doctoral theses, supervised 1 master's dissertation, and co-supervised 3 master's dissertations. She participates and/or has participated as a researcher in 11 projects and was the principal investigator for 1 project. Her work is in the field of Agricultural Sciences, with an emphasis on Animal Science and Veterinary Sciences.

ORCID

Sara Babo Martins

Sara is a Research Associate at the University of Liverpool, where her work focuses on the assessment of the economic burden of Antimicrobial Resistance and Usage in livestock within the Global Burden of Animal Diseases Programme (GBADs).
She has focused her research and work on the One Health approach and how its added value can be both identified and measured. Sara has worked across various professional settings, including roles in academic institutions and intergovernmental organisations. A veterinarian by training, she is a former Marie Sklodowska-Curie Fellow and holds an MSc and a PhD from the Royal Veterinary College.

ABSTRACTS

European strategies and policies on antimicrobial usage in livestock production – the Danish perspective

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Abstract

Prudent antimicrobial use (AMU) in livestock production is at the forefront of the European Union's (EU) strategy to fight the public health and food security threats posed by antimicrobial resistance (AMR). The key to this strategy has been the stepwise implementation of coordinated surveillance systems and policy frameworks that facilitate monitoring and promote responsible AMU.

Over the last decades, the EU has strived to regulate AMU in the livestock sector, starting with restrictions and a subsequent ban on AMU as animal growth promoters in 2006. Since then, the EU has promoted several strategies among all Member States (MSs), which have included an action plan against AMR in 2011, followed by the EU One Health action plan against AMR in 2017 when MSs committed themselves to developing national action plans (NAP) aiming at reinforcing awareness, evidence, good practices, and governance of AMU. Legislative milestones include EU Regulation 2019/6 on veterinary medicinal products and EU Regulation 2019/4 on medicated feed, which enforce stricter controls on AMU and mandate harmonised monitoring across MSs. Currently, the EU aims at a 50% reduction of antimicrobials' sales for livestock by 2030 under the 2020 Farm to Fork Strategy (using 2018 as the reference year), however, no clear indications to achieve this target were given.

At the MS level, one of the most comprehensive national initiatives is the Danish Integrated Antimicrobial Resistance Monitoring and Research Programme (DANMAP), established in 1995. DANMAP exemplifies an (incomplete) One Health approach by integrating data on AMU and AMR across human, veterinary, and food sectors. AMU in Danish livestock has been monitored since 2000 through VetStat, the Danish veterinary medicinal products database. This monitoring tool allowed Denmark to launch the Yellow Card initiative in 2010, which aims to reduce excessive AMU at the farm level and set thresholds for acceptable use. Receiving a yellow card triggers mandatory corrective actions such as increased veterinary supervision to enable the farmer to reduce AMU. Thresholds are revised periodically to reflect national targets under the Danish NAP.

DANMAP's success has inspired similar programs across the EU, and all these initiatives have contributed to an overall reduction in AMU at the EU level. Still, improvements are needed to strengthen AMU monitoring systems further and enhance stakeholder engagement and collaboration across sectors and borders.

Keywords: One Health; Surveillance; Legislative framework

Acknowledgements/Funding

This research received no external funding.

HubRAM - New AMR big data platform

Andrea Cara d'Anjo*, Inês Almeida, Maria Manuela Guerra, José M. Costa and Susana Guedes Pombo.
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Abstract

Background: In the Portuguese context, data related to antimicrobial resistance (AMR) surveillance is generated by different public and private entities (reference laboratories, DGAV, Academia, General Health Directorate, Environmental Agency), each using different recording platforms, non-interoperable. Lack of proper tools difficult thorough impact analysis of the measures implemented to combat AMR. Aiming 50% reduction in the consumption of antimicrobials (AMC) in the animal sector by 2030, it urges the existence of platforms allowing data integration on surveillance management and monitoring including AM classified as critical by the WHO and the integration of AMR data, the epidemiological assessment of commensal microorganisms and zoonotic agents of interest. This means the creation of a platform that integrates all information regarding: prescription of medicines (including medicated foods), information regarding food safety, AMR surveillance and monitoring, animal welfare and health.

Methods: Project HubRAM (July 24 – September 25) includes 8 activities; 30 tasks in total, with 2 academic partners, 1 Ref. laboratory, 2 producer associations, 2 IT companies, 1 tech platform. Three activities are developing platforms: AMR Surveillance; electronic prescription improvement (PEMV 3.0) and HubRAM (integration interface system with national, European, and international databases). Development of automatic analysis tools is being done allowing the recommendation of intervention measures within AMR control. A system is being tested for monitoring AMR evolution over time on farms and to relate it to the profile of AM used in pilot farms. Training, education, and dissemination actions are being developed and put in place.

Results: Out of the 3 developing platforms, Veterinary Medical Electronic Prescription (PEMV) is an example of the importance of interchangeable information across different sectors – production, animal health and official authority. The existing mandatory electronic tool (implemented in Portugal in January 2022 by DGAV, after the entry of Reg (EU) Nº. 2019/6 which also has the ability of centralizing digital manual prescription activity, is evolving to a new version (3.0) within this project. This is based on the need not only to generate complete data to comply with the mandatory European monitoring system on AM consumption and use but also to be used as a tool to better help farm management and veterinary practice. Data provided from PEMV 3.0 also enables the creation of new interfaces to friendly help animal food producers in a daily basis (USAM Sulei).

Conclusions: HubRAM will allow the aggregation of Big Data within the scope of AMR stewardship properly integrated with similar platforms at national, European and international levels. PEMV, the global system in operation to date in Portugal covering all prescription acts for any animal species in the national territory, for any authorized medicine (Veterinary or Human Use) is an example of a platform being improved and integrated within HubRAM.

Keywords: Antimicrobial resistance; AMR stewardship; Big data; Interoperability; Electronic prescription.

Acknowledgments/Funding

This research was funded by Programa de Recuperação e Resiliência (PRR) - RE-C05-i03.01 – Agenda de Investigação e Inovação para a Sustentabilidade da Agricultura, Alimentação e agroindústria. Projeto n.º PRR-C05-i03-I-000199

Economic Analysis in Animal Health: Burden of Disease and Decision-Making Tools

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[2]Global Burden of Animal Diseases Programme, University of Liverpool, Liverpool, United Kingdom

[ǂ] These authors contributed equally to this work

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Abstract

Economic analysis is a crucial tool for understanding the impact of animal diseases and supporting informed decision-making in the allocation of resources, including the use of antimicrobials in livestock and the management of antimicrobial resistance. In this presentation, we will examine the various types of animal disease-related costs and discuss how measuring these costs can facilitate more effective and sustainable interventions in animal health.

We will cover the main categories of animal disease-related costs and key economic evaluation methods, including cost-of-illness analyses, cost-benefit analyses, and cost-effectiveness analyses. In the presentation, we will also examine the role of economic evidence in guiding decisions related to prudent antimicrobial use and antimicrobial resistance, showing how economic arguments can influence practices at the farm level, among veterinarians, and in policymaking.

Drawing on real-world examples and field experiences, this session will finalise by highlighting the challenges of applying economic methods and offer practical suggestions for integrating economic thinking into animal health planning and policy. Participants will leave with a clearer understanding of how economic tools can enhance decision-making and contribute to more sustainable animal health systems.

Keywords: disease burden; livestock production; antimicrobial resistance, animal health economics

Acknowledgments/Funding

Nothing to note.

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2. Martins, Sara Babo, et al. "The burden of antimicrobial resistance in livestock: A framework to estimate its impact within the Global Burden of Animal Diseases programme." One Health 19 (2024): 100917.

3. Sucena Afonso, João, et al. "Strategies to reduce antimicrobials in livestock and aquaculture, and their impact under field conditions: a structured scoping literature review." Journal of Antimicrobial Chemotherapy 79.1 (2024): 11-26.

Strategies for Reducing Antimicrobial Use in Bovine Respiratory Disease (BRD)

Carlos Cabral [1, 2]
[1] SVAExpleite Lda
[2] ICBAS-UP
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Abstract

Bovine Respiratory Disease (BRD) is a major cause of morbidity, mortality, and economic loss in cattle production, particularly affecting calves and young animals during early development. In response to the European Union's "Farm to Fork" strategy targeting a 50% reduction in antimicrobial use in food-producing animals by 2030, evidence-based strategies for BRD control are critical to reduce antimicrobial dependence.

The pathogenesis of BRD is multifactorial, involving complex interactions among viral (e.g., BRSV, PI-3, IBR, BVD) and bacterial agents (e.g., *Mannheimia haemolytica*, *Pasteurella multocida*, *Histophilus somni*, *Mycoplasma bovis*). These interactions are intensified by inadequate colostrum management, poor nutrition, poor environmental conditions and stress, that can cause immunosuppression or immune system impairment. Key contributors to antimicrobial treatment failure include biofilm formation, increasing resistance, inappropriate antimicrobial use, and disease-altered pharmacokinetics.

Preventive approaches focus on optimal colostrum management—emphasizing the 'Three Qs' (Quality, Quantity, Quickness)—adequate nutrition, and environmental management to support immune development and disease resilience. Monitoring of average daily gain (ADG), morbidity, and key environmental variables supports early intervention and continuous improvement in herd health protocols.

In conclusion, sustainable reduction in antimicrobial use for BRD requires a holistic approach that integrates early diagnostics, effective immunoprophylaxis, environmental control, and antimicrobial stewardship tailored to herd-specific risk profiles and local epidemiology.

Keywords: Bovine Respiratory Disease; antimicrobial reduction; colostrum; immune system; prevention

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Comparison of Antibiotic Use in 30 dairy farms over a 2 years period.

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Abstract

Mastitis is responsible for important losses in livestock production by increasing mortality, direct and indirectly and reducing productivity. The administration of antibiotics can help mitigate these negative effects but can raise antibiotic resistance. The purpose of this study was to perform a comparative analysis of intramammary antibiotic use over two years based on the size of dairy farms and the type of farm. The study covered a 2-year period and included 30 dairy farms, classified into four categories based on average dairy cows. The collected data involved intramammary tubes use, but also included milk production, days in milk, BMT somatic cell count, and others. The criteria used to categorize antibiotics into groups A, B, C and D were based on the EMA guidelines. The carried-out study showed that the medium dairy cattle farms had the highest antibiotic consumption. The use of restricted antibiotics was observed in the small and medium farms. Future studies should consider a larger number of farms, considering the given direction of cattle production.

Keywords: antibiotic consumption monitoring; intramammary; dairy farms

Danish system for the reduction of antimicrobial consumption in dairy production

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Abstract

Background: Denmark's dairy industry is a major contributor to the national economy and exports. Over recent decades, the sector has evolved into a system of fewer but larger, highly specialized farms [1]. This transformation has been influenced by national environmental regulations and a strong emphasis on efficiency. Antimicrobial resistance (AMR) in livestock has been a national concern for at least three decades. A comprehensive, stepwise strategy has been implemented to reduce antimicrobial use (AMU) in dairy cattle.
Objective: The objective is to present the Danish model for reducing antimicrobial use in dairy production, highlighting the roles of stakeholders, data systems, legislation, and voluntary industry initiatives in achieving sustainable AMU reduction.
Methods: The Danish approach to reduce AMU and control AMR includes 1) a strong collaboration between farmer and veterinarian associations, industry organizations and authorities; 2) regular herd health visits and advisory services focused on promoting biosecurity and health and reducing the need for antimicrobial use; 3) Centralized, curated, data systems that provide near real-time data on antimicrobial prescriptions (VetStat) and livestock demographics (Central Husbandry Register (CHR)); 4) Annual monitoring of AMR and AMU trends (DANMAP program), and national guidelines and action plans thatset AMU and AMR measurable reduction targets; 5) Voluntary, industry-led efforts including phasing out critical antimicrobials and promoting best practices in udder health and calf care [2].
Results: The efforts to reduce AMU in the dairy industry have already resulted in a significant reduction in the use of critical antimicrobials such as fluoroquinolones and 3rd/4th generation cephalosporins. The latest AMU targets are a 10% annual reduction in use of antimicrobials for treatment of calves and a 3% annual reduction for treatment of older cattle. The sector has also established voluntary targets for improvement of udder health, specifically reducing the proportion of milk producers with a high cell count (>200,000) [3].
Conclusions: Denmark's success in reducing antimicrobial use in dairy production is rooted in a holistic, data-driven, and collaborative approach. The integration of regulatory frameworks, real-time surveillance, and proactive industry participation demonstrates a viable model for other countries aiming to combat AMR in food-producing animals.

Keywords: antimicrobial use; dairy cattle; collaborative approach

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USAM SuLei - The project

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Abstract
The use of antimicrobials (AMU) in human and veterinary medicine contributes to maintaining health and welfare, but at the same time induces antimicrobial resistance (AMR). Antimicrobial resistance is growing and has become one of the major global threats to human and animal health and life. The adoption of global measures developed under the One Health (OH) approach is necessary to curb the AMR pandemic.
Veterinary contribution to contain AMR is required, and the complete involvement of the relevant stakeholders and actors is necessary. The European Union adopted in 2017 a Strategic OH Plan to tackle the AMR and the Green Deal established the reduction in 50% of AM use in the veterinary sector until 2030. Pig industry contributes with a relevant component of AMU and the dairy sector also uses AM. The USAM SuLei project aims to contribute to sustainable AMU reduction in both sectors by making relevant information available for decision-making in animal health practice at the farm level, for veterinarians and farmers.
USAM SuLei envisages to develop a web-based platform with several digital tools, as well as to create a methodology to empower veterinarians and farmers to take effective decisions regarding animal health and animal treatment ant farm level. The principles driving the development of the project tools and methodologies are: 1) disease prevention approach, 2) interoperability of systems, 3) continuous improvement coupled with 4) process segmentation and 5) evidence-based AM prescription.
The project is a consortium involving a diversity of partners representing the diversity of actors and stakeholders that need to be involved in a One Health model for AMU reduction. The production is represented trough FENALAC (the Portuguese federation of dairy farmers) and FPAS (the Portuguese federation of pig farmers) and three dairy farmers representing small farms. Veterinary authorities are present through DGAV (Portuguese veterinary authority) and INIAV (veterinary reference laboratory). Other relevant partners are ANABLE (dairy farmers improvement association), SCS (Scientific Society of Swine Production), FeedInov (colab) and InovTechAgro (centre of innovation competences).

The main results of the project, which will be separately addressed in this event and are summarized:
1. Monitoring systems: MONICA and VETRAM
2. Formal Action Plans to AMU reduction
3. A unified structure integrating different GXP: animal welfare, biosecurity and AMU.
4. An integrated system for disease detection, veterinary prescription and treatment

Keywords: antimicrobial use; antimicrobial resistance, cattle; interoperability, web-based platform

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MoniCA, Ambrosio and VETRAM: monitoring disease patterns, antimicrobial consumption and antimicrobial resistance in dairy farms

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Abstract

Monitoring disease, antimicrobial consumption, and antimicrobial resistance in dairy farms is pivotal to achieving sustainable reduction in antimicrobial use (AMU), improving efficiency and sustainability of farms and the competitiveness of the dairy sector. The legislative compliance is also relevant, since farmers are currently accountable for keeping high animal health and welfare standards, to ensure biosecurity and to adopt a prudent use of antimicrobials.

A web-based platform (WePlat) was developed to collect data and manage information necessary to empower farmers and their veterinarians to improve their performance. MoniCA – Monitoring Antimicrobial Consumption is a dashboard system using data from WePlat. In WePlat data from farm infrastructure, production, key operations, disease incidence, and veterinary prescriptions are collected and analyzed. MoniCA presents data in terms of critical KPI. MoniCA also presents prescription data in a detailed way, producing an integrated perspective of the farm performance regarding AMU and disease management. AMU is reported using DDDvet and DCDvet and mg/PCU, after EMA classification.

The permanent update of farm data in WePlat is achieved using interoperability facilities embedded in digital systems that are data sources from the farm (mainly software data existent in robotic or automated milking systems), from organizations like ANABLE/Bovinfor® and from official (DGAV) databases like MEDVET, PEMV, or IDIGITAL.

A mobile phone application to be installed in the farmer and veterinarian mobiles was developed to allow farm-level data to be uploaded to WePlat, as it happens. The application intends to be the “butler” of the farmer and was named Ambrosio. Ambrosio collects data from calf serum colostrum uptake and farm colostrum quality, replacement stock growth, producing cows' daily feed consumption, and clinical disease /death registration. Ambrosio also enables a quick and accurate connection between the farmer and his veterinarian in case of clinical disease onset.

Farm’s antimicrobial resistance patterns need to be available. A web-based application named VETRAM, was developed for that purpose. VETRAM collects AMR data from surveillance system processes and from clinical sources. The surveillance system focuses on two indicator bacteria (*E. coli* and *Enterococcus* spp.). AMR from clinical isolates and matrices comes from veterinary laboratories. After processing, information about antimicrobial resistance patterns at the farm is retrieved to guide the veterinarian’s prescription, enabling evidence-based and informed prescriptions. Benchmarking AMR patterns with similar farms is also available. In summary, the combined use of MoniCA, Ambrosio, and VETRAM in dairy farms creates an improved environment for monitoring disease patterns, antimicrobial consumption, and antimicrobial resistance in dairy farms, and to reduce AMU and to improve the efficiency and sustainability of farms and the competitiveness of the dairy sector in Portugal.

Keywords: Monitoring disease, antimicrobial consumption, antimicrobial resistance, dairy farms

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From concept to practice: methodological insights into monitoring AMR in livestock production environments

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Abstract

Background: Antimicrobial resistance (AMR) poses a significant health concern for both human and animal health. Livestock production environments – particularly bovine farms – are recognised as critical hotspots for the emergence and dissemination of resistant bacteria. Microorganisms such as *Escherichia coli* (*E. coli*) and *Enterococcus* spp. are widely used as bioindicators for AMR surveillance programs due to their ecological relevance (representative of the intestinal microbiota) and capacity to reflect resistance dynamics (high capacity to acquire and transfer resistance).
Objective: This work aims to present the conceptual basis for the selection of target bacteria and antibiotics (AB) in environmental AMR studies and to introduce key methodological considerations for the isolation and characterisation of resistant strains in bovine production settings.
Methods: Three bovine sample types were analysed: veal and cow faeces, and milk. A theoretical framework is provided for the use of selective culture media supplemented with AB to enhance the quantification and detection of resistant strains. The selection of AB classes was based on their clinical relevance and use in veterinary medicine.
Results: A total of 471 *E. coli* isolates was recovered from veal faeces, 325 from cow faeces, and 471 from milk. Ampicillin resistance was most frequent in veal isolates (73.5%), with cefotaxime resistance showing moderate consistency across samples (22.3% veal, 17.2% cow, 12.2% milk). Ciprofloxacin resistance followed a similar trend (30.8% veal, 24.9% cow, 10% milk). *Enterococcus* spp. was also isolated: 306 from veal, 183 from cows, and 81 from milk. Ampicillin resistance was 8.5% in veal, 0.54% in cow, and 12.3% in milk. Vancomycin resistance was observed at 10.8% (veal), 1.64% (cow), and 1.23% (milk). Ciprofloxacin resistance was notably high in veal isolates (59.2%), with lower rates in cow (12.6%) and milk (19.8%). These findings highlight the differential distribution of antibiotic resistance profiles among bovine-derived *E. coli* and *Enterococcus* spp., emphasising the importance of targeted surveillance in both animal and food matrices.
Conclusions: Understanding bacterial and AB selection, as well as selective isolation methods, supports AMR surveillance and veterinary decision-making, contributing directly to the AMR risk analysis framework, with direct implications for public health by limiting the emergence and spread of resistant pathogens along the food chain.

Keywords: antimicrobial resistance; livestock production; co-selection; surveillance methodology; risk analysis

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Action Plans: Identification of Problems, Corrective Actions and Implementation

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Abstract

One of the objectives of the USAM SuLei Project is the development of standardized Action Plans, adaptable to the specific characteristics of each livestock farm, for reducing antimicrobial use. These plans are based on applying the concept of a virtuous cycle of continuous improvement to holistic herd health management.

Based on information collected from initial characterization questionnaires for dairy farms, gathered on the web platform of the Integrated Decision Support System (SIAD), an assessment of the farm's health indicators and antimicrobial treatments is conducted against the benchmark of participating farms to identify potential problems. These are described in the Technical Farm Characterization Report, prepared by the veterinarian. The veterinarian pre-selects problems and potential areas for improvement, incorporating information gathered on the target farm's production processes, welfare, and biosecurity indicators, to discuss with the farmer/farm manager which issues will be addressed in the Action Plan.

The Action Plan is developed by the veterinarian in agreement with the farmer/farm manager and describes: the problem (including health and antimicrobial consumption indicators; estimated economic impact), end goals (for health and antimicrobial consumption), causes of the problem, measures to be implemented (preventive; therapeutic; across various dimensions), resources to be allocated (human; material; financial; training/capacity building), control measures (critical points; information to be collected; monitoring frequency; responsible person), an implementation timeline (implementation; control; progress assessment milestones; completion; final evaluation) and a final evaluation. Once finalized, the Action Plan is validated by the veterinarian and the farmer/farm manager.

To ensure continuous health improvement on a given farm, a completed Action Plan should be followed by a new one, focusing on the problems relevant to the farm at that time.

In a set of dairy farms within the Proleite universe, between 1 and 5 problems per farm were identified to be addressed by Action Plans. The most common problems were calf diseases (pneumonia and diarrea) and mastitis. The diversity of causes and contexts led to the adaptation of the Action Plans' various dimensions to the reality of each farm.

The following critical points were identified for the Action Plans' successful implementation: quality of data available on the farms for initial characterization and follow-up; open and constructive interaction with the farmer/farmer manager; adaptability to the reality of each farm; time and availability for follow-up; continuous motivation based on feedforward; promptness of implementation after the initial information gathering, considering the mutable nature of farm problems.

Keywords: Action Plan; Herd Health; Antimicrobial Use

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Integration of Good Management Practices

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Abstract

Animal welfare (AW), biosecurity (BS) and prudent use of antimicrobials (PUAM) are required in a comprehensive approach to Good Management Practices in dairy farms. Several systems have been developed and are available. Several models of those documents are available and some of them are implemented. Our purpose is to perform a revision of the current status of implementation, in the dairy sector, of certification schemes and of the official inspection procedures for compliance with EU law requirements. Based on this we intend to produce a report and a guidance document to be used at farm level containing a harmonized and independent assessment of the different perspectives and procedures adopted by the different bodies when they are conducting assessments in farms.

Current status
Animal welfare is monitored accordingly the Welfair standard, developed by IRTA and certified by AFNOR, based on the Welfare model modified afterwards. The Welfair standard is a private quality scheme, under the European Accreditation umbrella. The main dairy groups operating in Portugal – Lactogal, BEL, Pingo Doce and Parmalat - label their products with this certification scheme.
No biosecurity private assessments are currently being performed by certification bodies or equivalent. The Veterinary Authority (DGAV) is preparing auto assessment standardized questionnaires to perform BS assessments in dairy farms by the veterinarian practitioners responsible for the farms.
A general document recommending PUAM to farmers is available from DGAV site. DGAV currently performs inspections in dairy farms using a standardized confidential procedure. The official inspection procedures are not yet harmonized with the PUAM.

Scope of the harmonized document
A detailed assessment of the standards, involving representatives of the different stakeholders, is being undertaken to produce a harmonized document identifying the level of agreement, the gaps, the tensions and differences in concepts in AW. In BS a validation of the classification system is being undertaken. Regarding PUAM a document is being prepared with harmonized recommendations to allow the implementation of a compliant system in farms.

Keywords: Animal welfare, biosecurity, use of antimicrobials

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Smart Environmental Monitoring for Efficient Dairy Farm Management – a case study

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Abstract

Background: Heat stress is a growing concern in dairy production systems, especially in Mediterranean regions where climate change is intensifying thermal challenges. Its impact on milk yield and quality has been widely reported, but the adoption of digital solutions for real-time environmental management remains limited.
Objective: This study aimed to assess the relationship between the Temperature-Humidity Index (THI) and productive parameters in a dairy farm equipped with IoT-based environmental monitoring and automatic ventilation systems.
Methods: Over a one-year period, temperature, humidity, carbon dioxide, and ammonia were continuously recorded by Farmcontrol sensors installed in a commercial dairy farm in Elvas, Portugal. The data were integrated with daily milk yield, composition (fat, protein, urea), somatic cell count, and dry matter intake. Statistical analyses included multiple linear regressions using 7-day moving averages of THI and quadratic terms to explore non-linear effects.
Results: THI significantly influenced milk yield and composition. A non-linear relationship was observed, with milk yield peaking at a THI of 68.9 before declining. Fat content decreased until THI 70.3, after which a slight increase was noted. Protein content showed a continuous decline with increasing THI. Dry matter intake was the strongest predictor of milk yield. Despite generally mild THI values due to automated cooling systems, heat stress still affected performance, highlighting its cumulative and delayed effects.
Conclusions: IoT-based environmental monitoring proved effective in stabilizing housing conditions and minimizing heat stress effects. However, even sub-threshold THI variations can impair production. Integrating sensor-based data into decision-making is essential for climate-adaptive dairy management.

Keywords: precision livestock systems; sensor-based monitoring; data-driven decision making.

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PEMV Support Application: from Disease Detection to Electronic Veterinary Prescription

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Abstract

EU Regulations (EU) 2019/6 (veterinary medicinal products) and (EU) 2019/4 (medicated feed) standardized the minimum information that must be included in veterinary prescriptions. This obligation, along with the need to collect information on the prescription and use of antimicrobials in each EU Member State, led to the Direcção-Geral de Alimentação e Veterinária (DGAV) making the Electronic Veterinary Prescription (Prescrição Electrónica Médico-Veterinária - PEMV) platform available at the end of January 2022.

Interoperability with PEMV is one of the essential components for providing information to the web platform of the Integrated Decision Support System (SIAD) planned under the USAM SuLei Project.

Interaction with veterinarians from the Dairy Cattle and Swine Focus Groups, established within the scope of the USAM SuLei Project, allowed for the identification of specific needs in prescription preparation. These include, among others, the typing of animals/animal groups, standardization of conditions/disorders, information on antimicrobial resistance (AMR), therapeutic protocols, reproductive protocols, recording of clinical evidence, efficacy evaluation of implemented therapies, traceability and ethical obligations, as well as specific needs of farmers.

Meeting these needs of veterinarians and farm/farm managers led to the development of the USAM SuLei Support Platform for PEMV. This platform incorporates the functionalities described above, ensures compliance with legal obligations and good veterinary practices, and, through interoperability with DGAV's PEMV, enables the issuance of official prescriptions.

Additionally, the USAM Sulei Farm app was developed for use by farmers/farm managers. It is characterized by its intuitive use and the ability to collect diverse farm information in real-time, notably including the early detection of suspected disease and sending alerts with evidence to the attending veterinarian, who, after assessment, can proceed with issuing a prescription. This app also allows recording of treatments' efficacy.

The interoperability of the USAM SuLei Support Platform for PEMV with other platforms developed under the USAM SuLei Project—such as VetRAM Net (farm-level AMR information), VetMoniCA (farm characterization and AM use), SIAD (Action Plans), the USAM Sulei Farm app and with external platforms (e.g., Bovinfor)—promotes evidence-based antimicrobial prescription and their prudent use.

Keywords:Electronic Veterinary Prescription; Antimicrobial Use; Disease Detection; Interoperability

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