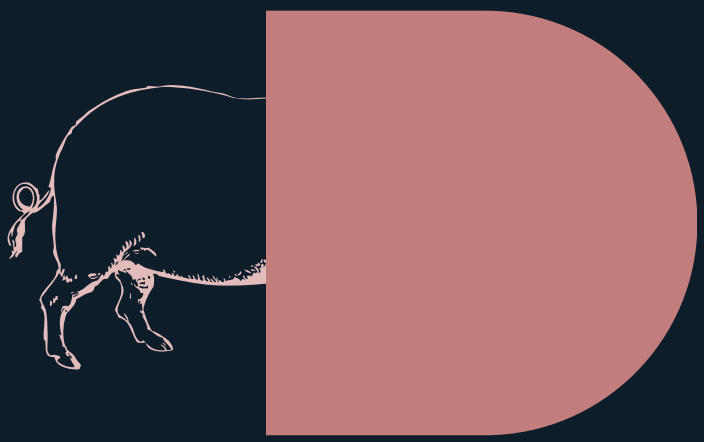
USAM SuLei
One Health in Action

Estação Zootécnica Nacional | Santarém

USAM SULEI WORKSHOPS
Swine Production

Integrated Best Practices for Antimicrobial Use and Animal Health

CONFERENCE PROCEEDINGS



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JUNE 27th . 28th | 2025

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Estação Zootécnica Nacional
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Conference Proceedings

June 27th . 28th | 2025

Santarém, 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
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Ana Oliveira Neves

Marta Gonçalves

USAM SuLei
One Health in Action

27 JUNHO | 2025

Estação Zootécnica Nacional | Santarém

Morning| Lecture Session

Auditorium 3

08:30	Registration and Check-in
09:00	Morning Opening Session | Susana Pombo DGAV . Ana Sofia Santos FeedInov
09:15	European Strategies and Policies on Antimicrobial Use in Animal Production | Joana Pessoa Technical University of Denmark
09:45	Alternative Strategies to the use of Antimicrobials in Swine Production | Lis Alban Danish Agriculture and Food Council
10:15	Presentation of the HubRAM Project | Andrea Cara d'Anjo DGAV
10:45	**Coffee Break**
11:15	Economic Analysis in Animal Health: Disease Costs and Decision-Making Tools | Sara Babo . João Sucena Afonso GBADs - University of Liverpool UK
11:45	Systems Thinking to Identify Barriers and Strategies for Improving Antibiotic Prescribing Practices among Danish Swine Veterinarians | Joana Pessoa Technical University of Denmark
12:15	Roundtable Discussion | João Niza Ribeiro ICBAS
12:45	Lunch Break

Afternoon | Lecture Session

Auditorium 3

14:00	Presentation of the USAM SuLei Project | João Niza Ribeiro ICBAS
14:15	Disease Indicators, Antimicrobial Consumption, and VetRAM | João Niza Ribeiro ICBAS . Miguel Lopes Jorge Sociedade Científca de Suinicultura
14:45	Action Plans: Structure | Miguel Lopes Jorge SCS
15:05	Strategies for AMR Detection on Swine Farms | Paulo Martins da Costa ICBAS
15:30	**Coffee Break**
16:00	Integrated Best Practices in Swine Production | João Niza Ribeiro ICBAS
16:20	Support App for Veterinary e-Prescriptions | Miguel Lopes Jorge SCS . Rui Barros MitMyNid
16:50	Roundtable Discussion | João Niza Ribeiro ICBAS
17:30	Closing Session | FPAS . SCS

USAM SuLei
One Health in Action

JUNE 28th | 2025
Estação Zootécnica Nacional | Santarém

Morning | Hands-on Session

Room 4

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

SPEAKERS

Andrea Cara d'Anjo

Graduated in Veterinary Medicine from the Faculty of Veterinary Medicine of the Technical University of Lisbon, with a postgraduate diploma in Food Safety and HACCP from NISQA – Egas Moniz University.

Currently at the General Directorate of Food and Veterinary with internal assignments in the domain of the One Health approach, in the areas covered by the DGAV's mission, aiming for a strategic definition and operationalization of the One Health approach. Coordination of a multidisciplinary group created for the articulation of cross-cutting areas at an internal and external level, seeking the implementation of policies and programs within the scope of the One Health approach.

Presently also coordinator of the PRR – HUBRAM – a multidisciplinary project in the domain of antimicrobial resistance.

Representative for Portugal/animal sector in the European Commission's AMR (Antimicrobial Resistance) One Health Network since 2017. FAO focal point for AMR and sectoral focal point for the WHO within the scope of TRACSS (Country AMR Self-Assessment).

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.

ORCID

Marta Maria Carvalho Gonçalves

Marta Maria Carvalho Gonçalves completed her Bachelor's Degree in Biochemistry at the Faculty of Sciences of the University of Porto (FCUP) and the Institute of Biomedical Sciences Abel Salazar (ICBAS-UP) in July 2023. She continued her academic path in the field of Molecular Medicine and Oncology at the Faculty of Medicine of the University of Porto (FMUP).
Currently, she works as a Superior Technician at ICBAS, contributing to the project One Health for the Safe Use of Antimicrobials in Swine and Bovine Milk Production (N. º 13/C05-i03/2021 – PRR-C05-i03-I-000173). Her academic background includes five first-author publications in peer-reviewed journals, as well as participation in scientific conferences.

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

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.

Alternative Strategies to the use of Antimicrobials in Swine Production

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Abstract
Antimicrobials (AM) are commonly used in pig production to treat infections. However, AM use (AMU) will inherently lead to the development of antimicrobial resistance (AMR), which in turn might lead to treatment failure. Therefore, prudent AMU is recommended and focusing on alternatives to AM is needed to ensure that treatment will be effective also in the future.

In Denmark, actions to reduce AMU and AMR in the pig sector have been in place for more than 25 years. Due to a tradition of collaboration across actors, several initiatives have been put in place, either by the competent authorities or the pig industry. An example of the first is the Yellow Card System, setting limits to AMU in pig herds. The challenge for the pig vets is to comply with legislation setting limits to AMU, while at the same time ensure animal health and welfare and the pig producer's productivity. To investigate that, we undertook a survey among Danish pig vets regarding their views and behaviours on AM prescription and the effectiveness of stewardship strategies, including alternatives to AM (1). In this presentation, the focus will be on the alternatives to AM, mentioned by the respondents, including their feasibility and costs.

A total of 42 out of the 75 Danish pig vets answered the survey. In general, diagnostics, vaccination and biosecurity were identified as effective alternatives to AM. According to the pig vets, several infections can be kept at bay effectively using vaccination. Regarding biosecurity, focus was equally on external aspects, e.g. use of optimal policies and quarantine when purchasing gilts, as on internal aspects, e.g. use of all-in/all-out and minimizing cross-fostering. Additionally, 1) indoor heating in winter, 2) proper washing, disinfection and drying between batches, and 3) optimal feeding were mentioned as examples of good farm management that would lead to a lower need for AMU. However, diagnostics, vaccines, indoor heating, hygiene and high-quality feed are all expensive, and cross-fostering is used to ensure that pigs are of equal size, which is a requirement for all-in/all-out production. In conclusion, alternatives are available, but they come with a cost, either economically or in the form of more work to be done daily. Hence, pig vets seem to be key in assisting pig producers in identifying where and how to use alternatives to AM and thereby in meeting legislative requirements, while also ensuring animal health and welfare and making a profitable business.

Keywords: pig production; biosecurity; vaccination

Acknowledgements/Funding
This research received no external funding. Marianne Sandberg and Vibe Dalhoff Andersen from DTU-Food are acknowledged for their contribution to the study.

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1. Pessoa, J., Alban, L., Andersen, V.D., Sandberg, M. Identifying barriers and strategies to improve antimicrobial stewardship in pig production using a bottom-up approach among Danish pig veterinarians. 2025. Proceedings from Society of Veterinary Epidemiology and Preventive Medicine, 26-28 March 2025, Berlin, Germany.

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.

Acknowledgements/Funding

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

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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

Acknowledgements/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.

A Systems thinking approach to identify barriers and strategies to improve antimicrobial stewardship among Danish pig veterinarians

Joana Pessoa[1*], Lis Alban[2,3], Vibe Dalhoff Andersen[1], Marianne Sandberg[1]
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Abstract
Antimicrobial resistance is a global concern, largely driven by antimicrobial use (AMU) in both human and veterinary medicine. Understanding the drivers and barriers to AMU in the Danish pig sector is crucial for developing effective reduction strategies without hampering pig health and welfare and productivity. Knowledge gaps exist on factors influencing the prescribing behaviours of Danish pig veterinarians and their recommendations to farmers on strategies to improve pig health and reduce AMU. Therefore, we gathered input on their views and practices on antimicrobial (AM) prescription and the effectiveness of AM stewardship strategies to understand the interrelatedness of drivers and barriers to lower AMU (1).
A survey was distributed to all 73 registered Danish pig veterinarians, achieving a 58% response rate (n = 42). The questionnaire addressed current AMU practices, changes over time, and perceived enablers and obstacles to reducing AMU. Quantitative data were analysed to identify correlations between working experience and continued education against practices in AMU. Open-ended responses were processed using Grounded Theory. A systems thinking model was developed to illustrate the interrelationships between internal (e.g., veterinary decision-making, farm management) and external (e.g., legislative, economic) elements affecting AMU practices.
Results show that 87% of respondents adjusted their AMU practices over time, predominantly influenced by legislative restrictions, such as the ban on therapeutic zinc oxide and Danish policies attributing higher weighting factors for colistin and tetracyclines. These measures influenced AMU patterns, unintentionally increasing the use of aminoglycosides and macrolides.
Key barriers to further reducing AMU included financial constraints, lack of effective alternatives to AMs, farm management, and costs of improved housing and feed quality. Our findings emphasise veterinarians' pivotal role in implementing AM stewardship, bridging legislative frameworks and on-farm practices. Future efforts should focus on enhancing the feasibility and effectiveness of AMU reduction strategies, ensuring they are supported by robust scientific evidence and considering the realities of pig farming.

Keywords: Qualitative research methods; Pig production; antimicrobial consumption; Legislative frameworks

Acknowledgements/Funding
This research received no external funding. The pig veterinarians who participated in the interviews are acknowledged for their contributions. Frede Keller from DANVET is acknowledged for comments on the questionnaire during its development and for ensuring communication with the different pig veterinary practices in Denmark, increasing the number of responses.

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1. Pessoa, J., Alban, L., Andersen, V.D., Sandberg, M. Identifying barriers and strategies to improve antimicrobial stewardship in pig production using a bottom-up approach among Danish pig veterinarians. 2025. Proceedings from Society of Veterinary Epidemiology and Preventive Medicine, 26-28 March 2025, Berlin, Germany.

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 SCS (Scientific Society of Swine Production), ANABLE (dairy farmers improvement association), 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 pig farms

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Abstract

Monitoring disease, antimicrobial consumption, and antimicrobial resistance in pig farms is pivotal to achieving sustainable reduction in antimicrobial use (AMU), improving efficiency and sustainability of farms and the competitiveness of the 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 processes and key operations, disease incidence, veterinary prescriptions are collected and analyzed. MoniCA presents data, in terms of critical KPI. MoniCA also presents prescription data in a detailed way, producing and integrated perspective of the farm performance regarding AMU and disease management. AMU is reported using DDDvet and DCDvet and mg/PCU, after EMA classification. Farm-level benchmarking is also available in MoniCA.

The permanent update of farm data in WePlat is achieved using interoperability facilities embedded, which enable data recovery from the digital systems and data sources installed on farma (mainly software data existent in management software systems). Interoperability with official (DGAV) databases like MEDVET, PEMV or IDIGITAL is also enabled.

A mobile phone application to be installed in the farm technicians and veterinarian's mobiles was developed to allow farm level events to be reported and uploaded to WePlat, as happens. The application intends to be the "buttler" of the farmer and was baptized as Ambrosio. It collects data from feed consumption, clinical disease and mortality. Ambrosio also enables quick and accurate connection between the farmer and his veterinarian in the case of clinical disease onset, allowing rigorous communication and registration to takeplace.

Farm's antimicrobial resistance patterns need to be available for evidence-based prescription. A web-based application named VETRAM, was developed for that purpose. VETRAM collects AMR data from surveyance system processes and from clinical sources. The surveillance system focuses on two indicator bacteria (*E. coli* and *Enterococus* spp.). Additionally, AMR from clinical isolates and matrices are provided by veterinary laboratories. After processing, information about antimicrobial resistance patterns at the farm is retrieved to guide 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 pig farms creates an improved environment for monitoring disease patterns, antimicrobial prescription and antimicrobial resistance in pig farms. This will contribute to reduce AMU and to improve efficiency and sustainability of farms and the competitiveness of the pig sector in Portugal

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

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Action Plans: Structure

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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 pig 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.

Keywords: Action Plan; Herd Health; Antimicrobial Use

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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 swine 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 swine production settings.

Methods: Two swine sample types were analysed: swine faeces and effluents. 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 353 *E. coli* isolates were recovered from swine faeces and 283 from effluents. Cefotaxime resistance was most frequent in faecal (approximately 20%), with ampicillin resistance showing moderate consistency across both samples (70-80%). Ciprofloxacin resistance followed a similar trend in faecal and effluent samples as well (20-25%). *Enterococcus* spp. were also isolated: 197 from swine faeces and 218 from effluents. Ampicillin resistance was approximately 7% in faecal samples and 15% in effluent samples. Vancomycin resistance was observed at around 15% of isolates from faecal samples and approximately 6% of isolates from effluent samples. Ciprofloxacin resistance was notably higher in effluents (23.4%), with lower rates in faeces (16.8%). These findings highlight the differential distribution of antibiotic resistance profiles among swine-derived *E. coli* and *Enterococcus* spp., emphasizing 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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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 pig farms. Several systems have been developed and are available. Documented procedures associated with the systems are available and some of them are implemented. Our purpose is to perform a revision of the status of implementation, in the Portuguese pig 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 on farms.

Status
Private schemes operating in Portugal are the FILPORC developed by FPAS and FILPORC, and the Welfair® standard, developed by IRTA and certified by AFNOR. The FILPORC scheme recognized by DGADR, and the Welfair standard operates under the European Accreditation umbrella. The main retail companies operating in Portugal accept the products labeled after these certification schemes. DGAV developed inspection procedures which were compared to verify agreement/overlapping with the private schemes.
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 pig 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 pig 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 on farms.

Keywords: Animal welfare, biosecurity, use of antimicrobials

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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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