



**Scientific Conference and Annual General Meeting
2022**

HYBRID EVENT

***Food Safety and Animal Health in
times of crises: a syndemic perspective***

Proceedings

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Hellenic Pasteur Institute • Athens, Greece

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Welcome message

Dear colleagues

*It is a privilege, being in a position, to welcome you all at the **ECVPH AGM & Annual Scientific Conference 2022**. It is because after three years from the original proposal to run a Meeting in Athens and avoiding for the last two years physical meetings, due to conditions created by the covid-19 pandemic, we are eventually look forward to see you in Athens. We therefore extend a most warmly welcome to those who are able to join us here and experience once more collegial getting togetherness.*

We are proud that for the first time this Meeting is organised as hybrid, giving a choice to potential participants for physical or on line participation, facilitating those who for various reason are not able to be physically present. We believe this is very important hoping that might positively influence an enlarged participation and activate more interest for the Meeting. Perhaps one could note without reason, consider the new hybrid organization, after having the experience of two Meetings run only online, as sizing an opportunity and benefit from the covid-19 crisis. It might signal that ECVPH AGM & Annual Scientific Conference is moving to a possibly new era.

Enjoy the Meeting and for those physically participating also their stay in Athens.

Nikos Solomakos & Apostolos Rantsios

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Lecture abstracts

Crises and opportunities: A life`s long practice of Veterinary Public Health or was it One Health

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As senior of the 5th Gymnasium of Thessaloniki an Institution ahead of its time I was unsure which direction to go in life. One day someone told me about the recently established first Veterinary School in Greece at Aristotle University. He informed me that there are very few Vets in Greece, and they make good money. That was enough for me to spend the rest of my professional life serving animals and human wellbeing.

While in the Veterinary Corps of the Greek Army I came across a scholarship announcement by The State`s Scholarship Foundation for graduate studies abroad in the field of Food Hygiene.

I ended up in California, a place like Greece, at the main Agricultural Studies campus of the University of California in Davis before it took off to a distinguished future of excellence and rewards. The very small town of Davis was most appropriate for the newly wed and the nearly dead at the time! Social attractions could be exhausted in a 20 minutes` walk. Yet, intensive academic "fermentations" were taking place in the UC Campus to change it into an all-purpose university. Personally, I went from one surprise to the next. My major professor Walt Sadler offered me a desk in his office for the next 3 years! Apart from a small core of graduate courses required of all students in the field of Comparative Pathology the world was open to me to attend any additional course I wanted from any school and any department on the campus! What a change from the canned curricula of a Greek university where just a thesis, a successful defense of your findings and you were out as a Dr specialist! In What?

Applying a concept taught to me by my father that in life one should always carry the tools of the latest technologies I nearly exhausted available courses offered by departments such as Public Health, Microbiology, Bacteriology, Food Science, dairy Science, Poultry Science and Biochemistry. Even later in life as a professor before initiating a new research project along with my distinguished colleague Sir Hans Riemann I audited appropriate courses in the cutting edge of science to boost our research output and quality. When the first professional degree program in Epidemiology and Preventive Medicine in the World was advanced by Calvin Schwabe (considered the father of Veterinary Epidemiology and the forefather of One Health), Hans Riemann and Charlie Franti in the late 1960`s I audited the program and boosted my thinking in epidemiology and Population Health. That exposure led me to initiate foundational research approaches (pioneering work according to the late professor Tom Mc Meeking of Australia) in predictive microbiology to quantify in a predictable way

microbial interactions with the food processing and preservation environment, so important to risk assessment.

Overall, my multifaceted educational preparation in sciences, biology, microbiology, comparative medicine, preventive medicine and food science allowed me to face academic, research, professional and social challenges in a holistic and more effective way. It allowed me to become member of the U C wide Graduate groups in Comparative Pathology (easily to be name today Comparative Medicine and One Health) Microbiology, Food Science and Ecology, develop appropriate to the group courses and guide and mentor my over 80 graduate students and post- doctoral scientists in these areas. My research and professional activities were practical in nature, solution oriented but fundamental in their approach. They are defined by an effort to develop a total quality control/management system for foods at the pre-harvest and post-harvest level which starts at the farm, goes through the processing stage, the supermarket and food service industry and ends at the consumer table. This activity is well documented in the diversified publications, academic teaching, continuing education, public service, and consulting record.

Administratively I have never been assigned the duty of a risk manager. I participated in brain storming gatherings to offer science-based recommendations frequently supported by my own research findings. When a food safety crisis appeared, I was anxious to jump onto the action, secure research funds with appropriate rationalization and start generating data to fill the gaps of lacking knowledge before “others” get into the competition! My multicultural graduate student team was always there to tackle emerging and challenging issues, chance for more “surviving” funds and a brighter future due to the expanded connections.

My attitude toward potential donors to support research was to emphasize in scientific terms what is in for them and not for me and the benefits in meeting effectively the ...competitors! At times I could not change their fanatic sticking to their dogmas. In such cases I simply change my mind about them, gave them a smile for free and place their dogmas on a shelf to collect dust.

I should emphasize also that I am not all science. To maintain my own health and peace of mind I have been involved in many athletic activities, love the outdoors, and love to dance even in the hotel rooms when I am alone!

Today in my presentation I will tell you diversified stories from my long professional and social adventure. Hopefully they will verify most of the above statements as events which happened and not as FAKE NEWS!

Can you follow my model? You cannot repeat my life and style of life, but you can use my model as a compass!

How can ECVPH engage in One Health and other integrated approaches to health? VPH and One Health in the face of climate change, biodiversity loss and social unrest

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Veterinary Public Health (VPH) was founded as contribution of Veterinary Medicine to Public Health and derives mostly from the visionary perception of J. H. Steele at the United States Public Health Service in the late 1940s. Steele was in close contact with Calvin Schwabe, who coined the Term "One Medicine". VPH emphasized disease intelligence and epidemiology but also food safety, comparative pathology and laboratory medicine. As such, it remained a contribution of veterinary medicine to public health and not the reverse.

We understand One Health as added value of a both way, closer cooperation between animal and human health and related disciplines in terms of animal and human health, financial savings and environmental sustainability that could not be achieved without such a cooperation.

New methods are required to prove the benefits of a closer cooperation between the two medicines in a linear and dynamic way. For example, it can be shown that the societal benefits of brucellosis control, including animal and human health are three times higher than the cost of mass vaccination of livestock, while considering public health benefits alone, the intervention would not be profitable. Similarly, the cumulative cost of post-exposure prophylaxis against rabies in an African city are more costly than the cumulative cost of dog mass vaccination and PEP after ten years. One Health pays off and even the G7 buys in.

The potential engagement of ECVPH in One Health is large and can probably not be exhausted. Most stage two zoonoses could be eliminated world-wide in an effort of global cooperation. For example a game theoretical analysis of rabies elimination in Africa shows large human capital effects. Integrated environmental-animal-human surveillance systems with improved biosecurity and animal welfare are central for pandemic prevention. Similarly integrated socio-ecological surveillance of antimicrobial resistance (AMR) allows to identify key drivers of distribution and spread as evidence base of effective AMR reduction. We are probably at dawn of a revolution of the digitalization of One Health including blockchain. One Health will play also a central role in the preservation of biodiversity loss, global health security and the mitigation of the effects of climate change.

The current epidemiological situation of African swine fever with emphasis on the north-eastern European region and involving hunters in surveillance and control activities through participatory epidemiology approach

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African swine fever (ASF) was first described by Montgomery in 1921. After the first transcontinental jump to the Iberian Peninsula in 1957, the disease also emerged in Central and South America. Except of Sardinia, where ASF became endemic, it could be eradicated from affected countries outside of Africa.

In 2007 however, ASF was re-introduced to the European continent. Introduced to Georgia, ASF spread across the Caucasus. When ASF reached the European Union in 2014 with the Baltic countries and Poland, efforts to deepen the knowledge about ASF and intensify control strategies increased significantly. Over the years, the disease spread not only within the initially affected countries but also beyond.

In the current epidemic wild boar play a key role in the spread of the disease. In the Baltic countries, the course of ASF in the wild boar population was similar. After an initial increase of ASF virus prevalence, an increase in the seroprevalence could be observed. After several years, the ASF virus prevalence decreased again and so did the wild boar population density. In Estonia, no virus-positive wild boar was detected for 18 months, which raised the hope that the disease could have been eliminated. However, after the re-occurrence of virus-positive animals, the difficulties to eliminate ASF from the wild boar population successfully and the need of alternative approaches to combat the disease became once again evident.

Participatory epidemiology aims to include affected groups of persons in the design and the implementation of control measures. Using participatory methods showed, that hunters support but also refuse certain ASF control measures. Including a transdisciplinary approach and having the courage to implement real participation could be a chance to ensure the support of hunters in the control of ASF in the long term and thus to increase the chance of successful disease elimination.

An overview of Bayesian methods for the evaluation of diagnostics and disease prevalence estimation

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Bayesian latent class methods (BLCMs) have allowed epidemiologists to overcome the practical constraints faced by traditional diagnostic test evaluation methods, which require both a gold standard diagnostic test and ample numbers of appropriate reference samples. For the past 40 years, BLCMs have been used for the evaluation of diagnostic tests and the estimation of true prevalence using imperfect tests in a variety of complex data structures and scenarios, including the emergence of novel infectious diseases. The objective of this presentation is to provide an overview of recent developments in BLCMs, as well as general guidance and links to practical guides for applying BLCMs to the evaluation of diagnostic tests and true prevalence estimation, including proof of disease freedom. Given the increasing need for advanced analytical methods to evaluate diagnostic tests for newly emerging diseases, BLCMs is a promising field of research and application in both the veterinary and medical disciplines.

Risk-based food safety management

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Classical hazard-based approaches to food safety relying heavily on regulatory inspection and sampling regimes cannot sufficiently ensure consumer protection. It is now generally accepted that a modern food safety management system should link the hazards to public health and be based on prevention rather than end product testing and control. The last decade food safety management at international level has been moved towards a more risk-based approach to food safety control with regulators around the world adopting the Risk Analysis framework as the basis for their decision-making. This review presentation provides an overview of the structure and function of a risk based food safety management and the interaction between risk managers, risk assessors and stakeholders. The presentation also focuses on the elements of a food safety emergency response process for assessing the risk, making risk management decisions, and communicating risk in the face of time constraints, lack of data and knowledge gaps characterizing a food crisis.

Food security, safety and sustainability in times of crises, getting the trade offs right

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To feed 10 billion persons 2050, we need to get the trade-offs right between sustainability, food security, food safety, and make better use of food already produced. In this context one should recall limited additional land available for food production and impacts of climate change. Of the cereals produced 50% eaten, 40% fed animals, and 10% for non-food agricultural products - biofuels and seeds. The conversion of feedstuffs to animal protein and energy represents a 90% reduction. The food waste is 30-50% of food produced and is claimed sufficient to feed > 1 billion people). Hence wasted foods or animal origin a major challenge.

This presentation explores the trade-offs inherent when aiming at triple goals of sustainability, food security, and safety. Source reduction, redistribute and reprocess foods, recycle as animal feeds, are strategies to improve future food security.

A sustainable future requires control of antimicrobial resistance. If one avoids that cycles of nutrients become cycles of pathogens and/or hazards, circular food production systems will a major contribution to the future sustainable food security. To get the trade-offs right we should note the experiences from the use of antimicrobials to intensify food production and from the outbreak of bovine spongiform encephalopathy (BSE) in terms of circular food production

Source reduction i.e., limiting food losses and waste appears to the strategy most promising for achieving sustainability. By using intelligent packaging and sensors instead of best before dates, major progress is possible, with the added benefit of better control of food fraud.

Poster abstracts

20 years of social veterinary epidemiology

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Background. Social sciences have gained in popularity in the field of animal health as they can lead to a better understanding of the needs of end-users and to identify socioeconomic factors that influence animal health. This can be taken into account when innovating or formulating policies.

Objective. Our aim with this work is to characterize the field of socioeconomics of animal health for which we suggest the name “Social Veterinary Epidemiology” (SVE)

Materials and Methods. To date, over 189 peer-reviewed papers published between 2001 and 2021 have been identified in common search databases. Although the literature search is still ongoing, most of the identified papers have already been analysed by using a heuristic framework developed to characterize the “Social Veterinary Epidemiology” field.

Results. Our preliminary results have shown that:

- Most studies focus on zoonosis, antimicrobial resistance, or diseases with economic impact in European pig and cattle production
- Farmers and veterinarians are the main subjects of the identified studies
- Individual behavior is often analyzed in relation to one specific disease or the implementation of biosecurity measures against a whole range of diseases
- Intervention studies were scarce
- The use of participatory approaches were underrepresented and more common in developing countries

Discussion and Conclusion. Based on our preliminary results, we recommend that new research:

- Emphasizes on understanding the systems in which farmers and others are embedded by applying a system thinking approach, as opposed to a conceptualization of behavior as being determined on an individual level and disconnected from the system;
- Applies a more holistic conceptual view on behavioral change by looking beyond communication and education to further explore other avenues to behavioral change such as economic incentives, provisions, regulations and social norms;

Focuses more on behavioral and experimental intervention studies.

Deciphering the Interaction of *Salmonella enterica* subsp. *enterica* with Ready-to-eat Melon

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Background. *Salmonella enterica* is one of the most important foodborne pathogens worldwide and salmonellosis was the second most commonly reported zoonosis in 2019. Infection mainly results from the consumption of contaminated food and to cause disease, *S. enterica* needs to survive or even grow in the food matrix.

Objective. Understand the molecular mechanisms behind the resilience of *S. enterica* towards the stress conditions in ready-to-eat melon.

Materials and Methods. In this study we screened *S. enterica* serovar Typhimurium, Enteritidis and Newport barcoded transposon mutant Libraries and analyzed the fitness effects of both individual genes and the associated metabolic pathways for the interaction at room (22 °C) and storage (8 °C) temperature during 24 hours and 5 days, respectively. The barcoded transposon insertions were amplified and identified using Illumina sequencing. The counts of each barcode were compared among sampling points.

Results. Considering genes that were underrepresented by >2-fold with a corrected *p* value of <0.1, there were at 22 and 8 °C, respectively, 244 and 161 genes in Typhimurium, 116 and 71 genes in Enteritidis, and 52 and 150 genes in Newport, most of which were observed in two or all three strains.

Discussion and Conclusion. Flagellar genes were negatively selected when compared with the wildtype. Two flagellar genes in which deletion had the highest fitness effect, *fliH* and *flgG*, were selected as examples for further analysis. For genes involved in metabolism, cell surface structure and the transcriptional regulator *emrR*, deletion was deleterious for growth on melon. Positive selection occurred in mutants with deletions in genes encoding several regulatory proteins and enzymes, as well as the DNA-binding transcriptional regulator *oxyR*. Representative genes were selected for further analysis on a competition assay between the wildtype and single deletion mutants.

Perspectives: Further comparative analysis of *S. enterica* serovars in representative food matrices.

Farm biosecurity measures associated with delivering hepatitis E virus negative batches of pigs to slaughter – a case-control study

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Background. Hepatitis E virus (HEV) genotype 3 is a zoonotic virus with pigs as main source for human infection, and almost every group of pigs at slaughter (batch) is HEV seropositive. Reducing the number of HEV infected pigs at slaughter is necessary to lower human exposure but how to realize this is unknown.

Objective. To identify which biosecurity measures are protective for delivering HEV negative (HEV⁻) batches of pigs to slaughter.

Materials and Methods. A retrospective case-control study was performed in the Netherlands and 144 farms identified based on a prevalence study. Case farms had delivered at least one batch to slaughter that was both ELISA and PCR negative (pooled serum), whereas control farms delivered the highest number of batches both ELISA and PCR positive (HEV⁺). Information on farm management and biosecurity was gathered by an interview and audit (resp. 200; 80 questions). Both farmer and researcher were blind for the farms HEV status. Grouped logistic LASSO (least absolute shrinkage and selection operator) regression was used, to consider the relative number of HEV⁻ batches, and select variables while corrected for all other variables in the model. Odds ratios (OR) with 95% confidence intervals (95%CI) were determined.

Results. Thirty-five cases with 10 to 60% HEV⁻ batches, and 38 controls with 50% HEV⁺ batches participated. Rubber and steel floor material in fattening pens were selected by LASSO most often and increased the odds of an HEV⁻ batch (OR 5.87 (95%CI 3.03-11.6) and 7.13 (95%CI 3.05-16.9) respectively). Cleaning driving boards frequently (OR 1.99 (95%CI 1.07-3.80)), fly control (OR 4.52 (95%CI 1.59-13.5)) and a fattening period below 105 days were other protective factors in the final model.

Discussion and Conclusion. Cleanability of floors and cleaning materials that are used for multiple groups of pigs, need to be considered for HEV control within farms. Yet, the effects of implementation need validation in intervention studies.

Prevalence of *Listeria monocytogenes* in a variety of meat products and the meat processing environment

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Background. *Listeria monocytogenes* remains as one of the most important zoonotic foodborne pathogens, causing serious health issues, especially in children, elderly, immunocompromised people, and pregnant women, with high mortality. Data about human listeriosis in Kosovo are lacking. As the meat processing industry is constantly growing and aiming to expand market presence, monitoring of *Listeria monocytogenes* in processed meat products using established microbiological criteria and regulatory guidelines, becomes paramount.

Objective. The objective of this study was to evaluate the prevalence of *Listeria monocytogenes* in selected meat products, including sausage, minimally processed, cured meat, precooked and cooked and fast-food meat products as well as environmental samples.

Materials and Methods. In total, 107 samples, including 22 minimally processed meat samples, 12 sausage samples, 10 cured meat samples, 8 precooked and cooked meat, samples, 25 burger samples prior and after heat treatment and 30 environment samples were taken from meat processing facilities. Samples were tested using the ISO 11290 method and confirmation followed 18 R *Listeria* (Lioflichem).

Results. Nine out of 107 samples were confirmed to be contaminated with *Listeria monocytogenes*. Specifically, 4 in fresh meat and minimally processed meat samples, 2 processing environment samples, and 3 samples obtained from fast food facilities were confirmed as positive.

Discussion and Conclusion. This study shows that fresh meat and fresh meat products marketed in the country are routinely contaminated with *L. monocytogenes*, serving as likely vehicles for human listeriosis, especially when coupled with improper heating. Positive environmental samples indicate deficiencies in cleaning and sanitation. The study provides ample evidence of the presence of *L. monocytogenes* in meat processing facilities with potential for transfer to meat products.

Perspectives. Meat processors are committed to implementing and validating Good Manufacturing Practices, including proper cleaning and sanitation programs. Development and adequate monitoring of critical control points during slaughter, processing, and fast-food chain, have to be applied and documented.

Prevalence of *Mycobacterium bovis* in milk on dairy cattle farms: An international systematic literature review and meta-analysis

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Background. Bovine tuberculosis, caused by *Mycobacterium bovis* (*M. bovis*), is a globally distributed chronic disease of animals. The bacteria is transmitted to humans by consuming unpasteurised (raw) milk, thus representing an important public health risk.

Objective. To investigate the risk of zoonotic transmission of *M. bovis* via raw milk, we systematically reviewed published studies to estimate the prevalence of *M. bovis* in on-farm bulk-tank-milk (BTM) and individual cow's milk (IM) by meta-analysis.

Materials and Methods. In total, 1,339 articles were identified through seven electronic databases and initially screened using titles and abstracts. The quality of 108 potentially relevant articles was assessed using full texts, and 67 articles comprising 83 studies (76 IM and 7 BTM), were included in the meta-analysis. The prevalence of *M. bovis* in IM and BTM was summarised according to the diagnostic test used, and the tuberculin skin test (TST) infection status of the individual cows (for IM) or herds (for BTM). Heterogeneity was quantified using the I-squared statistic. Prediction intervals (95% PIs) were also estimated.

Results. For IM, the overall prevalence was summarised at 5% (95%CI: 3%–7%). In TST positive cows, prevalence was summarised at 8% (95%CI: 4%–13%). For BTM, the overall prevalence independent of individual herd TST infection status was summarised at 5% (95%CI: 0%–21%).

Discussion and Conclusion. Considerable heterogeneity was evident among the included studies and PIs were wide. Inconsistency in the quality of reporting was observed resulting in missing information, such as the TST infection status of the individual animal/herd. No study reported the number of *M. bovis* bacteria in test-positive milk samples. Several studies reported the detection of *M. tuberculosis* and *M. africanum* in milk.

Perspectives. Despite international efforts to control tuberculosis, this study highlights the risk of zoonotic transmission of *M. bovis* via unpasteurised milk and dairy products.

Parameter estimates to support future risk assessment of *Mycobacterium bovis* in raw milk cheese

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Background. Zoonotic tuberculosis, caused by *Mycobacterium bovis* (*M. bovis*), is linked to consumption of raw milk from infected cows. Speciality raw-milk cheeses present a potential risk of zoonotic transmission of *M. bovis* via dairy products produced using raw milk originating from *M. bovis* infected herds.

Objective. This study aimed to determine parameter estimates to support the future risk assessment of *M. bovis* in raw milk cheese.

Materials and Methods. This study was informed by the principals and guidelines for the conduct of microbiological risk assessment from Codex Alimentarius. The hazard was identified as viable *M. bovis* organisms in raw milk cheese. Parameters of interest related to exposure assessment and hazard characterisation. The pathway for exposure assessment was visualised using a conceptual framework describing how *M. bovis* may be transferred from an infected animal(s) through manufacturing to the final cheese product.

Results. Estimation of most parameters for exposure assessment and hazard characterisation was undertaken using systematic literature reviews. Estimates could be derived for many parameters, but not all. In particular, the number of *M. bovis* organisms excreted in the milk and present in the faeces of infected cattle are unknown. There is zero-tolerance for *M. bovis* in foods of animal origin destined for human consumption in European legislation.

Discussion and Conclusion. This work highlights important knowledge gaps, and areas for further research, particularly relating to the number of *M. bovis* bacteria excreted in milk and present in the faeces of *M. bovis* infected animals. A systematic literature review is suggested to quantify the faecal contamination of bulk-tank-milk. For each of the parameters where estimates are available, we outline the types/sources of uncertainty as reflected in the literature.

Perspectives. In any future application of these parameter estimates, care will be needed to reflect the uncertainties associated with these elements of exposure assessment.

Prevalence of Serogroups and Virulotypes of Shiga toxin-producing *Escherichia coli* (STEC) in human stools in northern Italy

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Background. Shiga toxin-producing *Escherichia coli* (STEC) are responsible for acute gastroenteritis and the most frequent cause of pediatric hemolytic uremic syndrome (HUS). The infection is due to their ability to produce different Shiga toxins (Stx1 and Stx2) and other virulence factors such as intimine (*eae*). Virulent STEC mostly belong to few serogroups, especially O157 and O26.

Objective. This study aimed at evaluating the prevalence of the main STEC serogroups in humans in northern Italy, and the carriage of the major virulence determinants (*stx1*, *stx2* and *eae* genes).

Materials and Methods. Stool samples collected between 2020-2022 by the Center for HUS Prevention Control and Management (Milan) were analyzed according to the European Union Reference Laboratory VTEC Method. In particular, we amplified the extracted DNA by a Real-Time PCR targeting the *stx1*, *stx2*, and *eae* genes, along with the genes associated with common serogroups causing HUS in Europe (O157, O26, O103, O111, O145, and O104).

Results. Fifty-seven stool samples tested positive for STEC. The most common serogroup was O157 (28%), followed by O26 (14%), O103 and O145 (9%). Overall, O157 and O26 represented 42% of the cases. As for virulotypes, the most frequent gene combinations were *stx2+ / eae+* (42%), *stx2+ / stx1+ / eae+* (23%), and *stx2+ / eae-* (16%). Both O157 and O104 always harbored *stx2*. Except for one isolate, all O26 carried that gene too.

Discussion and Conclusion. In line with literature, STEC O157 and O26 were the most common serogroups associated with cases of bloody diarrhea in our geographical area. The prevalence of virulotypes agrees with European data reported by EFSA-EDCD (2021), supporting the importance of Stx2 in the disease.

Perspectives. Since contaminated water, dairy products, and beef are the main sources of STEC infection for human outbreaks, a comparison of strains from food, animal and human samples is fundamental to understand the epidemiology of STEC.

Assessment of antimicrobial use in swine farms in Castilla y León, Spain

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Background. The use of antimicrobials is the major driver for the emergence of resistant bacteria and accordingly a more prudent veterinary use of these drugs is being implemented in European countries. Among food producing animals, pigs are under the spotlight since they consume above 30% of the overall veterinary antimicrobials sold in Europe.

Objective. Our purpose was to monitor the use of antimicrobials in swine farms in Spain over a period of 24-30 months, just before the entry into force of the European legislations governing the use of antimicrobials in food producing animals (EU Regulation 2019/6 and 2019/4).

Materials and Methods. Within the framework of the Operational Group “*Rational and prudent use of antibiotics in pig production*”, a total of 55 pig farms in Castilla y León, Spain, were monitored. Each farm was investigated twice, in 2018 and in November-December 2021, recording antimicrobial use in the previous four-month period, expressed in mg/PCU. A Wilcoxon signed-rank test was performed to evaluate the trend in antibiotic use in the evaluated period.

Results. A significant reduction in the use of quinolones, third-generation cephalosporins and lincosamides over the period studied was demonstrated. No farm reported the use of polymyxins at the final questionnaire. In contrast, a significant increase of penicillins and sulphonamides use was observed.

Discussion and Conclusion. According to our results, critical antimicrobials, classified by EMA as category B (restricted use), are being replaced in swine farms of Castilla y León, Spain, by category D antimicrobials (prudent use). However, more efforts are needed in order to reduce the global use of antimicrobials among swine farms in the region.

Perspectives. Further monitoring of antimicrobial use in the region should be carried out in order to determine its trend and to evaluate the effect of recent legal limitations or bans on the use of antimicrobials.

Does cleaning and disinfection affect the attack rate of neonatal diarrhoea? A pilot study

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Background. Neonatal diarrhoea is a common disease on commercial swine farms, usually associated with increased mortality, decreased growth rate, antimicrobial use and treatment costs. Several infectious agents are involved in diarrhoea outbreaks in suckling piglets together with non-infectious factors such as stress or poor management and facilities.

Objective. The purpose of this research was to evaluate the influence of cleaning and disinfection (C&D) in the attack rate of neonatal diarrhoea in a small exploratory study.

Materials and Methods. A total of 14 pens of a farrowing unit in a pig nucleus breeding farm were monitored after C&D, immediately before the entry of the sows. Hydrated sponges with neutralizing buffer (3M) were used to swab a total surface of 0.3 m² per pen, distributed in four different locations: nipple, feeder, heating plate and floor. Total aerobic bacterial counts were determined on triptone soy agar (TSA, Scharlau) plates. Diarrhoea was daily evaluated in the litters housed in the tested pens during the first 10 days of life of the piglets.

Results. Mean number of aerobic bacteria (log UFC/ml) was higher in pens housing litters with diarrhoea as compared with pens without diarrhoea (8.29±0.31 versus 7.66±0.53, p=0.034). Litters housed in highly contaminated pens (bacterial concentration ≥ 8.0 UFC/ml) have a higher risk (OR = 14, CI 95% 0.94-207.61) of neonatal diarrhoea than those housed in low contaminated pens.

Discussion and Conclusion. According to our results, a good hygiene in the farrowing unit can be a key tool in the management of neonatal diarrhoea. C&D of the facilities where newborn animals are housed can reduce the infection pressure and prevent endemic infectious diseases on swine farms.

Perspectives. Good C&D procedures can reduce the impact of neonatal diarrhoea on swine farms. Accordingly, the efficacy of C&D should be periodically monitored in farrowing units from swine farms.

Effect of detergents and disinfectants on bacterial growth of resistant strains in household cleaning sponges

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Background. Kitchen sponges can be colonized by pathogenic and non-pathogenic microorganisms that may be resistant to antimicrobial agents. The use of commercially available detergents and disinfectants may act as a selective pressure for the development of resistant bacteria and for the acquisition or transfer of antimicrobial agents between the microorganisms.

Objective. To investigate the effect of commercially available, proprietary detergents-disinfectants on the development of antibiotic-resistant bacteria.

Materials and Methods. Sponges were inoculated with co-cultures of sensitive and resistant strains of *Escherichia coli* (ESBL) and *Enterococcus* spp. (vancomycin resistant). A protocol that simulated the use of sponges and commercial detergents in dishwashing (proprietary lactic acid detergents, sodium hypochlorite disinfectants, quaternary ammonium compounds) and a protocol of microwave sanitation according to the USDA procedure were applied.

Results. The population of the colonized resistant strains of *E. coli* was higher compared to the population of resistant strains of *Enterococcus* spp. Microwaving and the use of proprietary lactic acid detergents had little effect on the population of the considered microorganisms. Sodium hypochlorite disinfectants and quaternary ammonium compounds significantly reduced the bacterial population. However, an increase in the population of resistant strains of *E. coli* after the third week was observed.

Discussion and Conclusion. Sodium hypochlorite disinfectants and quaternary ammonium compounds were the most effective disinfectants against the resistant strains. Mechanisms of adaptive response of *E. coli* and *Enterococcus* spp. to disinfectants include the activation of chaperons, transcriptional regulators and efflux pumps, as well as biofilm formation. The increase in the population of resistant strains of *E. coli* after the third week implies the selective effect of hypochlorite disinfectants and quaternary ammonium compounds on these strains.

Perspectives. Good Hygiene Practices could be re-evaluated and properly implemented in order to prevent the growth of resistant bacteria in-house habitats.

Regular personalised reports on antibiotic consumption for farmers – an output of the ReLait project

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Background. The ReLait project aims to help farmers reduce antibiotic consumption in dairy production. Farmers select strategies to tackle problems on their farm, e.g. mastitis, reproduction or calf health problems. Farmers are then supported in implementing the selected strategies.

Objective. We aim to produce quarterly reports for each farmer of the project showing them the amount of antibiotic consumption on their farm as well as temporal developments and a comparison with the other farms of the project.

Materials and Methods. Data (e.g. treatment journal, animal population) from different sources (e.g. Swiss breeding associations) is collected within the ReLait project. We use R and R Markdown to automatically generate reports from these data.

Results. Currently, we are generating reports for 141 farms. An example report will be presented on the poster at the conference.

Discussion and Conclusion. Seeing temporal trends and a comparison with other farmers might boost the farmer's motivation to tackle existing problems. Having a better overview of all treatments might also shed light on problems that farmers have not yet perceived as such. For farms with a low number of treatments, temporal trends are difficult to describe. Nonetheless, the comparison with other farms will confirm their good management.

Perspectives. The personalised reports are supposed to raise farmers' awareness and improve their understanding of antibiotic treatments on their farm, which will hopefully lead to reduced antibiotic consumption.

Meat juice as an alternative sample to Tuberculosis serology in hunted animals

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Background. One of the most used methods of post-mortem diagnosis of Animal Tuberculosis (TB) is the serology. However, for its accomplishment, samples of good quality serum are needed, which in the case of hunted animals such as wild boar and red deer, is extremely difficult to obtain.

Objective. The main objective of this study is to evaluate meat juice obtained from hunted animals as a feasible alternative sample to perform a serology for the diagnosis of TB.

Materials and Methods. Between 2017 and 2022 in Portugal and Spain, were collected 156 paired samples (serum + meat juice) from 78 hunted animals (11 red deer + 67 wild boar), after the initial examination *in loco*. The detection of specific IgG antibodies against TB was performed using an in-house indirect ELISA test (INgezim multispecies Tuberculosis DR). Cohen's kappa coefficient (κ) was used to measure the agreement between the two parallel assays (ELISA test in sera + ELISA test in meat juice), using the EpiTools platform.

Results. Seropositivity was obtained in both serum and meat juice in samples obtained from 21 animals. 47 were seronegative for both samples, and 5 animals were positive for one of the samples but negative for the paired sample. The Kappa value was 0,71, what is considered a good agreement score for the tests performed.

Discussion and Conclusion. Since post-mortem blood samples taken from hunted animals are difficult to obtain in good condition, this essay showed that an easily obtainable sample such as meat juice (muscle piece that after collection is frozen and thawed) can be a feasible alternative for screening TB infection.

Perspectives. With these results, it is expected that in the future, meat juice can be routinely used as a sample for TB serology in hunted animals.

Why setting up One health Surveillance? A qualitative study exploring the drivers for collaboration between antimicrobial resistance surveillance programmes in France

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Background. Antimicrobial resistance (AMR) is a major public health issue, against which international organisations and governmental bodies are calling for the implementation of integrated surveillance, also known as One Health, between surveillance programmes involved in human, animal and environmental sectors. Collaborations between programmes are the primary feature of an integrated surveillance system and deserve to be supported. However, little is known about the factors that can foster collaborations between surveillance programmes.

Objective. The aim of this study was to provide a better understanding of factors and role-players' influence on setting-up intersectoral collaborations between AMR surveillance programmes in France.

Materials and Methods. We performed a qualitative study based on semi-structured interviews with 36 programmes' coordinators and 15 key-informants involved in AMR surveillance. Thematic analysis was used to analyse the transcripts.

Results. The implementation of collaboration between sectors was multifactorial: we identified 42 determinants grouped into 6 categories (i.e. characteristics of the AMR surveillance system, features of the programmes within the system, profile of the actors involved, characteristics of the collaboration itself, context, and AMR research). Collaborations were mainly fostered by the quality of relationships between actors, their awareness of AMR issues, their knowledge of other surveillance programmes and their interest in transdisciplinary aspects. Limited resources and the lack of visibility of the AMR surveillance system hindered collaboration. Paradoxically, coordinators generally did not perceive collaborations as a cost-saving or resource pooling tool due to their limited knowledge on potential collaborative activities and their benefits.

Perspectives. Considering that most drivers identified were not specific to the AMR context, these results could be generalized to other surveillance systems in other countries. Ultimately, our findings provide a better understanding of coordinators' motivations and stakeholders' influences driving integration within AMR surveillance system, to help researchers and managers promoting global approaches, in a One Health perspective.

Evaluation of acceptability of Meat Preparations – Effect of type of establishment

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Background. Meat and meat preparations are a significant part of the diet for the majority of the Portuguese population. The microbiota within these food kinds is, on one hand, responsible for the deterioration processes that reduce their useful life and, on the other hand, food inherent microbiology is always a potential vector of pathogenicity with an important impact on human and animal public health, being a potential cause of foodborne diseases for humans.

Objective. In this study, the microbiological acceptability of meat preparations obtained from hypermarkets and small traditional local shops in northern Portugal were evaluated.

Materials and Methods. In this study, collection of 51 samples were evaluated for levels of Mesophiles, Lactic Acid Bacteria (LAB), Enterobacteriaceae, *Pseudomonas* spp., Moulds/Yeasts, *E. coli*, *Salmonella* spp. and *L. monocytogenes*.

Results. The highest values in Mesophiles, LAB, *B. thermosphacta* and *E. coli* were obtained in Meatloaves. Meat puffs had the highest counts of Enterobacteriaceae. Hamburgers and Meatballs were the ones that presented the highest values of *B. thermosphacta*, *Pseudomonas* spp., Yeasts/Moulds. *L. monocytogenes* was detected in a Meat puff at 2 log cfu/g.

E. coli levels were higher in small local businesses. In terms of acceptability, all types of products obtained acceptable ratings for their concentration of Moulds/Yeasts, LAB and *E. coli*. Hamburgers and meatballs were the only product with an unacceptable classification of *Pseudomonas* spp. Meat puffs were the only products not acceptable in *L. monocytogenes*.

Discussion and Conclusion. This study exhibits the need in microbiological quality improvement, reinforcing the need to continue to implement upgrades in the quality control of products, specially from traditional local commerce.

Perspectives. Monitoring of the handling and manufacturing conditions of small establishments is needed to improve the acceptability of these products.

Melanocytic tumours in cattle – a case report

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Background. Melanocytic tumours occur spontaneously in several species, namely in man, cattle, horses, pigs and dogs, however, in animals, their aetiology and pathogenesis are not fully understood. Despite the differences between species, melanomas present similarities, namely regarding histological features, metastasis pathways and molecular mechanisms involved. In cattle, melanomas are rare, representing 5-6% of all tumors, especially in Aberdeen Angus breed or animals with gray, black or red fur. Melanomas can be congenital or arise due to other factors, such as exposure to chemical agents, UVA/UVB ultraviolet rays.

Objective. In this study, the animals from two farms in Northern Portugal were assessed for health parameters and animal welfare and to detect lesions compatible to neoplasia under the oneHCancer project (CECAV, UTAD).

Materials and Methods. The animals' condition was assessed; The mass was excised; fixed in 10% buffered formalin, and sent to the LHAP-UTAD for histopathological study, and a fresh sample was collected for genetic parameters.

Results. During the physical examination of animals at farms, a 7-year-old Holstein-Frisian, a 10.5 cm mass suspicious of melanoma was found, where cutaneous melanoma was confirmed. Macroscopically, tumour was constituted by black tissues, brilliant with firm consistency, apparently without evidence of capsule. Microscopic observation revealed the proliferation of round to fusiform cells, with abundant melanic pigment. The sample was bleached to observe the cytonuclear characteristics, and moderate atypia and several mitoses lower than 3 per field of high magnification were observed. After excision, the animal was monitored and it was verified that it increased its weight and milk production, being in perfect condition.

Discussion and Conclusion. After excision, the animal was monitored and it was verified that it increased its weight and milk production, being in perfect condition.

Perspectives. Further studies are needed to understand the etiology, pathogenesis, and modalities of evolution of melanomas in cattle.

Tail docking and tail-biting lesions in piglets – slaughterhouse findings in Portugal

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Background. Tail-biting is a welfare problem in swine production, in fattening although also during weaning. Tail docking seems to decrease the tail-biting incidence; however, EU legislation forbids its systematic use.

Objective. To evaluate tail-biting and tail docking in piglets and associate it with meat inspection in Portuguese slaughterhouses.

Materials and Methods. Piglets were observed during 58 non-consecutive days in 6 slaughterhouses. Tail lesions, docking and carcass condemnation were recorded during post-mortem inspection. Tails were evaluated (docked/undocked) and lesions were scored on a 3-point scale.

Results. 20722 piglets from 497 batches were assessed, of which 6939 were docked (33.5%). In total, 15813 (76.3%) were from Portuguese herds and 4909 (23.7%) from Spanish herds. Tail lesions had a prevalence of 17.9% (11.3% mild and 6.6% severe). From the undocked tail sample, 22.8% had lesions, a higher prevalence compared with 8% of lesions in docked piglets ($P<0.001$). Moreover, Spanish data presented a lower prevalence of lesions than Portuguese ($P<0.001$). A total of 104 (0.5%) carcass condemnations were recorded in which arthritis/polyarthritis (38.5%), melanoma (22.1%), peritonitis (21.2%) and abscesses (6.7%) were the most frequent findings. Total condemnations were more common in piglets with tail lesions than with no lesions (0.78% vs 0.54%, $P=0.007$). In carcass condemned with tail lesions, 13.8% presented abscesses of which 21.4% had severe lesions ($P=0.047$).

Discussion and Conclusion. In this study, the predominance of lesions in undocked piglets identifies docking as effective in preventing tail-biting lesions. The lower prevalence of lesions in Spanish batches it's presumably due to the high prevalence of docked tails (71.3%; 4.4% lesions). An association between tail lesions and carcass condemnations, especially with the development of abscesses in piglets with severe lesions, suggests a relationship between tail infections and septicaemia.

Perspectives. Studies are needed within the pre-weaning/weaning periods as it's an underrated animal welfare concern.

Using scenario tree modelling for targeted flock sampling to substantiate freedom from disease after the 2021-22 HPAI epidemic in Italy

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Background. The 2021–2022 H5N1 highly pathogenic avian influenza (HPAI) epidemic appears to be one of the largest HPAI epidemics ever occurred in domestic poultry in Italy, with the large majority of 317 cases concentrated in the densely populated poultry area (DPPA) in the north-eastern part of the Country.

A strict surveillance scheme was implemented since February 2022 for recovery of free from disease status while allowing a gradual and safe restocking of poultry farms. It comprised a periodic virological representative sampling in fattening turkeys, broilers and pullets/laying hen farms in the further restricted zone (FRZ), and the continuous process of farmers' reporting system in the rest of the country.

Objective. The aims of our study were to estimate the population sensitivity of our surveillance for the detection of HPAI in commercial poultry industry, and the current probability that the population is free of disease as specified by a chosen design prevalence P^* (0.03).

Materials and Methods. We used a stochastic scenario tree modelling approach, which, for each time period (2 weeks), combines the updated risk of introduction (P_{Intro}) of the disease in the population and the ability of the surveillance system to detect infection if present (system sensitivity SSe).

Results. Preliminary results of the ongoing surveillance show that the median SSe and median confidence of freedom increased after 3 time-periods exceeding 0.95 after 2 months.

Discussion and Conclusion. Results add weight to evidence that HPAIv infection has been successfully eradicated from the Italian poultry industry supporting the conclusion that targeted surveillance is a highly effective tool for the detection of HPAI in commercial poultry holdings.

Perspectives. Assessing a post epidemic targeted surveillance could be highly useful to support decision-making towards a more risk-based approach and contribute to Country's claim of freedom from disease as part of a self-declaration.

Occurrence of truncated InIA in *L. monocytogenes* isolates from food, food processing plants, and clinical cases in Italy

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Background. *Listeria monocytogenes* is a foodborne pathogen responsible for listeriosis. The main virulence factor of *L. monocytogenes* is Internalin A (InIA) which facilitates the internalization of the bacterium into intestinal cells. The presence of premature stop-codons (PMSC) in *inIA* leads to truncated protein which is correlated to attenuated virulence of *L. monocytogenes*. Nowadays, literature reported 29 *inIA* mutations leading to a PMSC.

Objective. The aim of this study is to assess the prevalence of PMSC in *L. monocytogenes* strains isolated from food, food processing environments and clinical cases.

Materials and Methods. A total of 725 isolates collected between 2013-2022 during routine surveillance in the Lombardy, Tuscany, and Lazio Regions were selected considering origin and Sequence Type (ST). More than half of the isolates were food associated, 33% were from clinical cases and 12% of isolates were collected from food processing plants. All isolates were characterized using MLST or WGS and *inIA* was analysed to evaluate the presence of PMSC.

Results. A total of 224 isolates presented PMSC, of which 44% were isolated from food, 51% from food plants and only 2% from clinical cases. All isolates with PMSC belonged to serotype 1/2a and serotype 1/2c. Most food isolates harbouring PMSC belonged to ST9 and ST121, while in food processing environments ST325 isolates were predominant. Among clinical isolates, 80% of those with PMSC belonged to ST9.

Discussion and Conclusion. Consistently with literature, in our findings the presence of PMSC in *inIA* was more frequent in food and food processing plants than in clinical strains. Most isolates harbouring PMSC belonged to STs adapted to survive in food and food plants with a secondary role in clinical cases.

Perspectives. Even if truncated InIA confers attenuated virulence, severe clinical manifestations in fragile individuals are reported, suggesting the need to investigate additional factors involved in pathogenicity.

Presence of bacteria in modified atmosphere packed raw chicken meat and their effect on shelf life and sensory characteristics – A microbiological and sensory evaluation

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Background. Around 30% of all food produced for human consumption is estimated to be discarded, in many cases due to the foods having reached best-before date. One way to reduce food waste could be to extend shelf life, e.g. by using dynamic food labelling based on gas indicators which react at a certain gas level in the package (produced by spoilage bacteria) when the meat is no longer good to eat (e.g. Innoscentia). An important step for this innovation is to find a point of spoilage based on bacterial counts.

Objective. The aim was to evaluate if the shelf life of chicken breast fillet packed in modified atmosphere can be extended by analysing bacterial levels and sensory characteristics.

Materials and Methods. Chicken breast fillets were analysed at the day of expiration, 2 days past expiration and 4 days past expiration date (at 4°C/8°C) to observe changes in growth of Total aerobic counts (TAC), *Enterobacteriaceae* and *Lactobacillus*. In addition, sensory evaluations were performed to evaluate flavour, odour and texture at these time points.

Results. The highest population of TAC (8 log CFU/g) was found in chicken breast fillets stored at 8°C for 4 extra days after expiration date. Chicken breast fillets stored at 4°C and analysed at expiration date had the lowest TAC levels (6.5 log CFU/g). However, the sensory evaluations showed that none of the chicken breast fillets tested was significantly different to the other.

Discussion and Conclusion. Extended shelf life had no significant effect on sensory parameters of cooked chicken meat compared to when the meat was consumed at expiration date.

Perspectives. Further research is needed to establish a point of spoilage and the usefulness of dynamic food labels in order to develop applicable labels for fresh and perishable foods such as chicken meat.

There's more work to do – New Zealand Dairy Farmers understanding of One Health, Antimicrobial Resistance and the Restricted Veterinary Medicines process.

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Background. The development of antibiotics is believed to be one of the most important advances of modern medicine. However, antimicrobial resistance (AMR) threatens this progress and presents significant risks to both human and animal health. Historically, dairy farming has involved surplus use of antibiotics. Better management of antibiotic usage requires taking steps to preserve the continued effectiveness of existing antimicrobials, and attempting to eliminate their inappropriate usage, especially where they are used in high volumes, such as intramammary dry cow therapy.

Objective. To generate a pilot set of data on the opinions and understanding of New Zealand Dairy Farmers with regards to 'One Health', 'Antimicrobial Resistance' and access to 'Restricted Veterinary Medicines'.

Materials and Methods. 55 question questionnaire focusing on dairy farmer understanding of: One Health,

AMR, access to veterinary drugs, Off label treatments and veterinary interventions, was designed and disseminated to dairy farmers.

Results

- One farm reported having heard of One Health, none could define the discipline.
- 73% of interviewed farms were aware of antimicrobial resistance and could attempt to define it, yet only 50% would consider it when using antibiotics.
- 53% of farmers interviewed were completely unaware of the existence of the New Zealand antimicrobials 'Traffic Light' system
- 33% consider following the traffic light system when considering antibiotic treatment or requesting veterinary intervention.

Discussion and Conclusion. Overall, farmers interviewed in this study found the discussing antibiotic usage with their vet of use to their farm; providing opportunity for clinical veterinarians to communicate the key themes of One Health and Antimicrobial Resistance to receptive clientele.

Perspectives. This study has laid the groundwork for future research into farmer opinions of AMR and One Health, has improved client relations in the host practice and has highlighted gaps in farmer knowledge regarding this important global health threat.

Orbivirus Screening from Imported Captive Oryx in the United Arab Emirates Stresses the Importance of Pre-import and Transit Measures

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Background. From 1975 to 2021, the United Arab Emirates (UAE) imported more than 1300 live Arabian oryxes (AOs) and scimitar-horned oryxes (SHOs) for conservation programs. All ruminants are susceptible to Bluetongue virus (BTV) and epizootic hemorrhagic disease virus (EHDV) and both viruses are reported in Texas and in the Arabian Peninsula.

Objective. The objective of this study was to estimate the prevalence of orbiviruses BTV and EHDV in AOs and SHOs from captive herds in the UAE.

Materials and Methods. Between October 2014 and April 2015, 16 AOs and 13 SHOs originating from Texas (USA) and 195 out of about 4000 SHOs from two locations in the UAE were blood sampled to be tested by indirect enzyme-linked immunosorbent assay (ELISA) and real-time reverse transcriptase polymerase chain reaction (RT-qPCR) assays.

Results. Eight imported AOs (50% CI [24.7 - 75.4%]) and eight imported SHOs (61.5% CI [31.6–86.1%]) were found BTV seropositive, in contrast with three out of 195 SHOs (1.5% CI [0.3–4.4%]) from the Emirates. BTV-2 genome was detected in 6/16 of the Arabian Oryx, and amongst those, one out of six was seronegative. None of the tested samples was found positive for EHDV.

Discussion and Conclusion. Our results illustrate the wide local variation regarding BTV seroprevalence in domestic and wild ruminants in the Arabian Peninsula. These results stress the need for pre-import risk assessment when considering translocation of wild ruminant species susceptible to orbiviruses not only in the country of destination but also where transit happens.

Perspectives. We would suggest avoiding stopovers of live ruminant shipments in countries where competent orbiviruses vectors were reported or at minimum vector control in resting areas inside airports.

In addition, we recommend *Culicoides* biological surveys and BTV and EHDV virus surveys in all susceptible species to be carried out within the UAE.

Removal of pathogenic bacteria by cleaning and disinfection in slaughterhouses

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Background. Cleaning and disinfection (C&D) are critical elements for slaughterhouses when it comes to production of safe food. Deficient C&D in food premises have caused outbreaks of among others *Listeria monocytogenes*, *Campylobacter* spp. and *E. coli* O157:H7.

Objective. The purpose of the project was to study the survival and elimination of *Campylobacter* spp., *Listeria monocytogenes* and ESBL *E. coli* on surfaces by C&D procedures used in the slaughterhouses.

Materials and Methods. Surfaces at two slaughterhouses in Sweden were sampled before and after C&D at six occasions. Detection of *Campylobacter* spp., *Listeria monocytogenes* and ESBL *E. coli* was performed according to standardized methods.

Results. *Campylobacter* was identified before C&D at least once from 80% of the surfaces at the broiler slaughterhouse and 36% at the cattle and swine slaughterhouse. No *Campylobacter* was isolated after C&D. *Listeria monocytogenes* was mainly detected in the wells before C&D in both slaughterhouses. At one occasion, *Listeria monocytogenes* was detected after C&D in a well in the cattle and swine slaughterhouse. *Campylobacter* spp. and *Listeria monocytogenes* were detected before C&D on food contact surfaces (FCS) in both slaughterhouses. ESBL *E. coli* was not identified in any of the samples.

Discussion and Conclusion. The presence of the same *Listeria monocytogenes* strain in the cutting facility in the cattle and swine slaughterhouse on two separate sampling occasions indicated presence of a house flora and C&D have to be improved. The presence of pathogenic bacteria on FCS indicates a risk of cross-contamination of the meat during production.

Perspectives. Control measures at the farm are crucial to reduce the prevalence of *Campylobacter*-positive broilers at slaughter.

Listeria monocytogenes could persist in food premises and there is a need of improved C&D methods to efficiently remove this bacterium.

Case report: Actinomycosis in wild boar. Challenges at the initial examination of wild game on the spot.

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Background. In Slovenia, 80,000 wild animals are placed on the market for human consumption annually. Most often wild boar, roe deer, red deer, chamois, fallow deer, and European mouflon. Among the 21,000 Slovenian hunters, there are 1530 trained persons for the initial examination of wild game on the spot, 91 of them are trained veterinarians.

Objective. In March 2022, wild boar was culled on the hunting ground near Ljubljana. The hunter stated that the boar was limping on the hind leg. At the initial examination, we found swelling of hock joint. At the post-mortem, we found adult lungworms in trachea, larva in the caudal lung lobes, and large abscess-like lesion in the liver. Heart, spleen, and kidneys had no visible changes.

Materials and Methods. The organs were sent to the Veterinary Faculty, University of Ljubljana for pathomorphological examination. Paraffin tissue sections of organs were stained with haematoxylin and eosin, sections of liver were also stained with Gram and Ziehl Neelsen and examined under light microscope.

Results. The gross examination of organs confirmed findings from the post-mortem examination on the spot. Histopathologically, the centre of abscess contained gram-positive, acid-fast-negative bacteria, surrounded by eosinophilic Splendore-Hoeppli material. The findings were highly suggestive of infection by *Actinomyces* spp.

Discussion and Conclusion. This case report describes a case of hepatic actinomycosis in wild boar. Actinomycosis usually affect lower jaw, but less frequently lesion can be found in internal organs as liver. The case shows the importance of histopathology in post-mortem examination of the wild animals.

Perspectives. In such cases, it may be difficult for the person performing examination to determine whether the meat is fit or unfit for human consumption. Veterinary faculty University of Ljubljana offers help in diagnosis and determination of diseases. However, too few hunting families take advantage of our help.

Biosecurity Enhanced Through Training Evaluation and Raising Awareness (BETTER): a Cost Action project to improve biosecurity implementation at farm level

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Background. Biosecurity is of paramount importance to prevent the introduction and spread of pathogens and, consequently, to preserve the health of farmed animals. Despite these benefits, the implementation of biosecurity measures is limited by different factors including lack of knowledge and of trained professionals. To approach these challenges, the “BETTER” COST Action has recently emerged (November 2021).

Objective. The overall aim of the Action is to reduce the risk of infectious disease introduction and spread by improving the implementation of biosecurity measures in animal production systems.

Materials and Methods. The project objectives will be achieved from a transdisciplinary group where Early Career Investigators will play a key role in their attainment. The Action will specifically perform a comparison of existing methods used to evaluate biosecurity. Exploiting these tools will promote the development of tailored options in farms based on the evaluation of their risks for disease introduction, on the feasibility of selected biosecurity measures and on their economic benefits. Moreover, the Action will identify training needs through the evaluation of existing training materials and will develop new courses, increasing therefore the number of trained professionals.

Results. The BETTER project started only recently, and no scientific results are available yet. At present, the Action is composed of 213 participants from 41 different countries including non-EU countries (e.g. Australia, Argentina, Canada and New Zealand). In addition, stakeholders from government bodies, the industry or international organizations such as FAO and OIE have also joined the Action.

Discussion, Conclusion, Perspectives. Knowledge generated through project activities will act as the baseline upon which adequate communication and training on biosecurity will be developed. In addition, the Action will recommend priority research areas for future biosecurity improvement in livestock production systems and will stimulate initiatives to go beyond the state of the art on biosecurity in livestock.

Cross-contamination in the kitchen: modelling and magnitude estimation for Quantitative Microbial Risk Assessment

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Background. In the kitchen, two main transmission routes are relevant for QMRA (Quantitative Microbiological Risk Assessment): the *cross-contamination (CC) route*, where a pathogen may evade heating by transmission from contaminated food to hands, kitchen utensils, and other surfaces (e.g. the cutting board), contaminating another food product consumed raw, and the *heating route*.

Objective. The aim of the research was to estimate the magnitude of cross-contamination in the kitchen and to assess the effect of interventions.

Materials and Methods. After defining the CC routes, determining the variability sources, and estimating the bacterial transfer fractions, a model was designed to stochastically simulate a realistic preparation of a 'meat and salad' meal, in a domestic kitchen, in 8 steps; including bacterial transfer from a contaminated 'raw meat' to several surfaces (i.e. tap, kitchen counter, dishcloth). The model was implemented in @Risk and 32 scenarios were simulated.

Results. Among the three main CC routes identified (route via contaminated 'hands', 'knife' or 'cutting board'), the 'cutting board-salad' route proved to be dominant and the salad plays a major role in the final exposure compared to the 'finger-to-lip' exposure. 'Cutting board and knife replacement after cutting meat' was the most effective intervention, followed by 'washing hands, cutting board and knife with soap and hot water'. 'Next meal' scenarios, in which the contaminated sources were kitchen equipment, showed that cross-contamination can then be substantial.

Discussion and Conclusion. Acknowledging the uncertainty of the estimates and the variability of bacterial transfer, the application of QMRA methodology provides valuable insights into the CC magnitude in the kitchen. In particular, the model was able to estimate the relative importance of the CC routes previously identified and compare the effectiveness of the interventions.

Perspectives. QMRA methodology contributes to the estimation of the effect of potential interventions on public health, supporting science-based recommendations and policies to reduce the risks of foodborne diseases.

Meat juice seroprevalence and presence of *Salmonella* spp. and *Yersinia enterocolitica* in tonsils of slaughtered pigs

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Background. *Salmonella* spp. and *Yersinia enterocolitica* are a priority public health threat in pork safety.

Objective. The aim of this study was to determine the prevalence of *Salmonella* spp. and *Y. enterocolitica* by microbiological examination of tonsils and serological analyses of meat juice from slaughtered pigs from different farming systems.

Materials and Methods. Ninety-one samples of tonsils and meat juice from the same pigs were analyzed, of which 54 samples were from 18 large farms and 37 samples were from 18 family farms. The presence of *Salmonella* spp. and *Y. enterocolitica* in pig tonsils was tested using standard culture methods, and suspect isolates were identified using MALDI-TOF mass spectrometry. The presence of IgG antibodies in meat juice was determined using pigtype *Yersinia* Ab ELISA kits with inactivated antigen.

Results. The overall prevalence of *Salmonella* spp. and *Y. enterocolitica* in tonsils was 9.8% and 6.5%, respectively, with no significant differences ($p > 0.05$) between large farms and family farms. *Salmonella* spp. was more prevalent in large farms with lower biosecurity ($p < 0.05$). The seroprevalence of *Salmonella* spp. was 48.35% and of *Yersinia* 13.18%, without significant differences ($p > 0.05$) between farm types and biosecurity categories. A total of 63.8% of farms were serologically positive for *Salmonella* and 27.7% for *Yersinia*. Correlation of findings of *Salmonella* spp. or *Y. enterocolitica* in tonsils with seroprevalence was not found ($\phi_c = 0.121$, $p = 0.420$; $\phi_c = 0.027$, $p = 0.718$, respectively). A higher recovery rate of *Salmonella* spp. and *Y. enterocolitica* from the tonsils is expected in seropositive pigs (OR 1.56 - 2.36), but without statistical significance ($p > 0.05$).

Discussion and Conclusion, Perspectives. The results of this study suggest a need to improve farming and slaughter practices and to include serological surveillance of *Salmonella* spp. and *Y. enterocolitica* in pigs in the risk categorization of farms in Croatia, which would increase safety throughout the meat chain.

Evaluation of sternal bursitis during *post mortem* inspection of free-ranged chickens

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Background. During MI of 314417 free-ranged chickens (FRC) it was found that sternal bursitis was the 6th most common cause of total condemnation (TC) during meat inspection (MI) and there were no records of this lesion as cause of partial condemnation (PC). Furthermore, no Portuguese studies were found regarding this topic.

Objective. Detailed analysis of sternal bursitis in FRC as a cause of total and partial condemnation.

Materials and Methods. A total of 71660 FRC from 29 flocks (13 ♂ 16 ♀) were followed during MI and each sternal bursitis that led to TC or PC was classified using a severity score ranged from 1 to 3. For each flock, we registered gender, age, weight average and the presence of foot-pad dermatitis (FPD), as potential explanatory variables.

Results. A total of 761 (1.6%) of sternal bursitis was observed. From those, 723 (95%) and 36 (4.73%) were scored as 1 and 2, respectively, leading to PC. Score 3 was observed in 2 (0.26%) carcasses that were totaly condemned. Only gender revealed significant differences ($p = 0.001$), being sternal bursitis more frequently found in males (1.69%) comparatively to females (0.40%).

Discussion and Conclusion. In this study sternal bursitis was responsible for considerable economic losses especially due to PC of the breast muscle (the muscle with more economic value), highlighting the importance to record this cause of PC during meat inspection. Furthermore, particular attention should be paid to male chicken flocks to try to mitigate the occurrence of sternal bursitis and concomitantly improve animal welfare and the economic losses associated with abattoir condemnations.

Perspectives. More studies should be developed to investigate the reason why sternal bursitis affects mostly free-ranged male chickens.

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The combined ultrasound and hot water washing effects of a novel non-chemical abattoir intervention in reducing the load of *Campylobacter spp.* and *Enterobacteriaceae* on broiler carcasses

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Background. Poultry meat is often the culprit of food borne zoonoses, with *Campylobacter* being top on that list. The work presented evaluates a highly innovative non-chemical abattoir intervention using hot water wash and ultrasound bath.

Objective. The main aim of the study was to investigate the impact of the broiler chicken slaughter process in reducing the load of *Campylobacter* and *Enterobacteriaceae* on broiler carcasses, with particular emphasis on the use of a novel non-chemical abattoir intervention combining the effects of ultrasound and hot water washing.

Materials and Methods. Samples of neck skin were taken at various stages of the slaughter process and have been used to quantify bacterial load in carcasses for *Campylobacter spp.* and *Enterobacteriaceae*.

Results. In comparison to other steps in processing of broiler meat this intervention is where the reduction in *Campylobacter* load was highest, up to 0.84 log₁₀ CFU/gr (p<0.01). In relation to *Enterobacteriaceae* however, the biggest reduction in bacterial load was seen post air chilling with the decrease observed being up to 0.93 log₁₀ CFU/gr (p<0.05).

Discussion and Conclusion. The nature of poultry processing and the bacterial load of the chickens when alive lead to very high levels of *Campylobacter* in the final product. Interventions used by some countries outside Europe include chemical interventions and are a highly debated issue. The use of non-chemical interventions like ultrasound, will likely pose less of a risk to the consumer than chemical decontaminants and benefit both the industry and the consumer. In addition, consumers are generally more reticent to chemical interventions so their use could affect the industry economically.

Perspectives. If further work continues to show the efficiency of such intervention, it will likely incentivate other commercial slaughter premises to use it and ultimately impact public health, potentially leading to food policy changes.

Design of formative assessment for both professionals and undergraduate students

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Background. Formative assessment (FA) allows for the participant to learn whilst tackling a challenge in a supported manner. This “enjoyable” challenge makes the activity more engaging and the anonymity removes worries of outside judgement. In addition, following feedback, the participant can assess their own knowledge build up and/or determine the areas where they would benefit from further study.

Objective

- 1 Provide training (formative assessment)
- 2 Investigate the engagement with teaching tools
- 3 Investigate the performance of students (undergraduates only) that uptook the formative assessment

Materials and Methods.

(A) Background info in paper and digital format.

(B) Picture based formative assessment –which included online questionnaires, model answers and feedback.

Results. Preliminary results show that students which carried out the FA during the semester had on average higher marks on the final summative assessment (Mean 55.7% vs 62.3%).

Discussion and Conclusion. VPH is historically a subject veterinary student do not relate well with because it is not perceived as being a clinical subject. Increasing the practice on decision making when accompanied by meaningful feedback helps build on the reasoning process, which is the ultimate aim of any teaching activity. Professionals are often reticent to take training either because they do not feel they need it or because of time constraints. The variability in backgrounds of those involved in official controls in abattoirs could lead to inconsistent reporting and affect surveillance data. The FA as shown, is easily deliverable to large cohorts and the no face-to-face attendance means it is flexible for the participant and more affordable for the provider.

Perspectives. The versatility of this FA design is shown by its use in different target audiences highlighting the reproducibility and benefit of the tools used.

Thermography for Disease Detection in Livestock

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Background. Infra-red thermography (IRT) offers potential opportunities as a tool for disease detection in livestock. Despite considerable research in this area, there are no common standards or protocols for managing IRT parameters in animal disease detection research.

Objective. We investigate parameters that are essential to the development of IRT as a tool for disease detection and make recommendations for their use based on the literature found and the veterinary thermography guidelines from the American Academy of Thermology.

Materials and Methods. We analyzed a defined set of 109 articles concerned with the use of IRT in livestock related to disease and from these articles, parameters for accurate IRT were identified and sorted into the fields of camera-, animal- or environment-related categories to assess the practices of each article in reporting parameters.

Results. This review highlights the inconsistencies in practice across peer-reviewed articles and demonstrates that some important parameters are completely unreported while others are incorrectly captured and/or under-represented in the literature. Further to this, our review highlights the lack of measured emissivity values for live animals in multiple species, which are essential for accurate temperature measurements.

Discussion and Conclusion. We present guidelines for the standards of parameters that should be used and reported in future experiments and discuss potential opportunities and challenges associated with using IRT for disease detection: (i) disease types; (ii) absolute versus relative temperature estimations; and (iii) individual vs. herd measurements. We also contemplate the necessary components of an on-farm IRT system and processing/storage requirements for thermal imagery.

Perspectives. An IRT system to continuously monitor housed livestock as a group or individuals may be the natural next step, with due consideration given to farm layout, animal identification and specific diseases that are important to detect.

Five-year survey of *Yersinia enterocolitica* in foods in Northern Italy

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Background. *Yersinia enterocolitica* (Ye) is the etiological agent of yersiniosis, a foodborne disease widespread in Europe. Ye is a gram-negative entero-bacterium growing in a wide range of temperatures (0-45 °C), and able to produce a thermostable toxin in cooling conditions without spoilage signs in foods, thus posing a risk for consumers.

Objective. The aim of this work was to evaluate the presence of pathogenic Ye in foods in Northern Italy from 2018 to 2022, to gain insight on its spread and risk of foodborne infection.

Materials and Methods. Samples were processed using the ISO10273:2017 and ISO/TS18867 methods. Briefly, after a microbiological enrichment, Real-time PCR was performed to detect the *ail* gene (specific for all Ye biotypes associated with disease). Colonies isolated from positive samples were confirmed by Real-time PCR. Prevalence and 95% confidence intervals (CI95%) were calculated.

Results. A total of 220 samples were collected within the food categories frequently affected by Ye contamination (including meat products, fruit and vegetables, and dairy products). Nine samples were *ail* positive (4.09%, CI95% 2.17-7.59), one was a turkey meat sample, and all others were swine meat samples. Colonies were isolated from 3 samples, and in two samples of swine meat the presence of pathogenic Ye was confirmed (0.91%, CI95% 0.25-3.25).

Discussion and Conclusion. Our results are in accordance with recent studies reporting contaminated swine meat as the main source of human infections. In spite low prevalence found in the 5 year-survey in Northern Italy, food monitoring is crucial. Prevalence data represent the basis to build effective surveillance systems along the food supply chain, to estimate the current microbiological risk associated to food consumption.

Perspectives. In a One Health perspective, pathogenic Ye survey in humans, animals, and environment can clarify the human exposure risk, given that yersiniosis is the fourth most common bacterial enteric disease in Europe.

Transmission dynamics for the introduction and spread of bovine Tuberculosis in a disease hotspot in the Low TB Area Wales

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Background. Bovine tuberculosis (TB) is the most significant animal health issue in Wales. The Low TB Area Wales (LTBA) historically had annual herd incidence of <1.5%. Unprecedented increases in TB incidents occurred in the Denbigh/Conwy region of LTBA 2017-2020; isolates share a common ancestral whole genome sequencing (WGS) clade.

Objective. This study explores the introduction and spread of TB in this hotspot.

Materials and Methods. Welsh TB data were obtained from the Animal and Plant Health Agency software used for the administration of TB testing in Great Britain (Sam). Field epidemiology data was sourced from Disease Report Forms stored on Sam. WGS analysis examined the genetic relatedness of hotspot isolates. Network analysis used cattle movement data provided by Welsh Government. Poisson regression analysed the effect of herd predictors on rate of breakdowns in the hotspot. Network and regression analyses were performed in R Studio for Windows.

Results. WGS analysis identified clustering within the monophyletic clade. Field epidemiology highlights business links and cattle-cattle interactions which may have caused spread within the hotspot and the wider LTBA. Network analysis indicates potential transmission routes between holdings in the hotspot as a result of cattle movements. Herd size ($p < 0.001$) and high-risk purchases ($p < 0.05$) were significantly associated with the rate of confirmed breakdowns.

Discussion and Conclusion. Business links and cattle movements were the initial driver of infection and transmission within this hotspot and other LTBA regions. Isolates share a monophyletic clade and clustering is evident within this. The rate of confirmed breakdowns in 2020-21 in long-term TB free herds is significantly increased by high-risk cattle purchases. Complex and indirect movement patterns visualised by network analysis indicate a strong association with TB hotspot incident locations.

Perspectives. This study hotspot has highlighted the significance of cattle movements. Altering purchasing behaviour by farmers may prevent similar hotspots occurring.

Evaluation of animal welfare (AW) in broilers' at farms and at slaughterhouse

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Background. All flocks of chickens destined to slaughter are subject to a systematic evaluation of AW at slaughterhouse that consists of monitoring parameters (e.g. foot pad dermatitis, transport mortality rate) relating to management and conditions during production. Subsequently, the Official Services, monitor the farms at risk to improve AW.

Objective. The aims of this study were to carry out a systematic evaluation of AW in 3 broilers' slaughterhouses and in cases of warnings indicative of decreased AW, the most at-risk farms were visited to monitor intensive broiler farms under the plan "Control of chicken protection at the place of rearing" of Directorate-General for Food and Veterinary (DGAV, Portugal).

Materials and Methods. At slaughterhouse, AW indicators were classified using scoring scales of 3-degree for dirty-feathers (DF), footpad dermatitis (FPD), hock burns (HB), absence/presence of breast burns (BB). It was also considered dead on arrival (DoA) and total rejection rates, and condemnation' causes.

At farms, structure, management, environmental and health parameters were evaluated. The pavilion's areas, the drinking and feeding systems, density, litter quality, management and light programs were checked. Ammonia concentration, lux intensity, temperature and humidity were controlled.

Results. It was possible to verify a positive association between HB2, FPD2 and BB1, confirming that severe burn lesions are grouped. Pathologies as emaciation and ascites showed a higher probability of simultaneous occurrence. An unsatisfactory result for FPD indicator was obtained by 50% of the evaluated flocks, being these results suggestive of low level of AW in the farm. A fraction of the target survey pavilions showed excess humidity levels in litter and insufficient air circulation.

Discussion and Conclusion. The results show the close correlation between AW conditions at farm and the evaluation at slaughterhouse.

Perspectives. The monitoring of environmental conditions should continue on farms, given its implications for poultry production and AW.

Low prevalence of zoonotic intestinal parasites in wild ungulates from Portugal

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Background. Gastrointestinal parasites can cause/predispose mostly wild ungulates to disease as they are neither dewormed nor receive veterinary care. From a One Health perspective, a growing overlap of habitats between domestic and wild ungulates can favor the spill-over of parasites between species and humans through environmental contamination. There are few studies on the occurrence of gastrointestinal parasites in wild ungulates.

Objective. The aim of this study is to assess the diversity and gastrointestinal parasite burden in wild ungulates from Portugal.

Materials and Methods. Between November 2021 and February 2022 fecal samples from wild ungulates (wild boar, red, fallow and unidentified deer) were collected in national hunting campaigns in the three regions of mainland Portugal. Samples were analysed using Mini-Flotac®.

Results. In total 263 samples were collected. The presence of parasites was identified in 19.0% (34/179), 45.0% (9/20), 22.8% (13/57) and 14.3% (1/7) of wild boar, unidentified deer, red deer and fallow deer, respectively. Eleven different parasites were identified, the most frequent being the strongylids (9.9%, 26/263) and *Metastrongylus* spp. (6.5%, 17/263). The zoonotic intestinal parasites identified were *Trichuris* spp. (n=4, and only 2 (1.1%) were from wild boar) and *Ascaris suum* (n=3, 1.7%). Concerning the parasite burden, it was also very low with the highest burden being 95 eggs of strongylids per gram.

Discussion and Conclusion. This epidemiological study allows us to obtain useful information to assess the health of these wild populations and potential risks in a One Health perspective. Although a considerable diversity of parasites was found, the burdens were low as well as the occurrence of zoonotic parasites.

Perspectives. In the future, it is important to keep this monitoring to be able to identify in the early beginning any potential risk that may emerge endangering animals (wild and domestic) and human health.

***Ascaris suum* in swine slaughtered in the North of Portugal: quo vadis?**

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Background. Parasitic diseases have a strong impact on swine production and welfare and some of them, such as ascariasis, are zoonotic. The occurrence of *Ascaris suum* – the adult parasite, their eggs or lesions - at slaughter must be monitored and can evidence exposure to risk both for handlers on farms or at the slaughterhouse, and for consumers.

Objective. The main aim was to assess the occurrence of *Ascaris suum* – the adult parasite, their eggs or lesions – in swine slaughtered in the North of Portugal.

Materials and Methods. Between October 2021 and April 2022, the slaughter of 58180 swine from a total of 142 farms from Portugal and Spain was followed. Data from meat inspection concerning rejections of livers with milk spots was collected. All the intestines were visually evaluated for the presence of adult parasites. Pools of faeces were collected to assess the presence of eggs (Mini-Flotac®).

Results. Milk spots have been identified in 87.3% (124/142) of the farms and 18.8% (10949/58180) of the livers. Adult parasites have also been identified in 4.9% (7/142) of the farms and 2.1% (1230/58180) of the intestines. In none (0.0%) of the 142 faecal samples *Ascaris suum* eggs have been identified.

Discussion and Conclusion. Currently the most effective way to assess exposure to *Ascaris suum* in swine and humans is the visual identification of milk spots in the liver after

slaughter. Thus, meat inspection can provide very important feedback in order to implement corrective and preventive measures. There is a high percentage of farms that have or had problems with roundworms in pigs, which, in addition to economic and animal health impact also constitutes a risk to Public Health.

Perspectives

It is important to sensitize pig farmers to good biosecurity practices as well as to the effective deworming of pigs.

Total bacterial counts of individual goats' milk around kidding: a longitudinal study

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Background. Total bacterial count (TBC) is an important milk quality parameter in goats' milk. Exceeding the bulk milk TBC limits will lead to price penalties for Dutch dairy goat farmers. Bulk milk TBC recordings show recurrent elevations around the kidding season, the cause of which is not fully understood. To understand the development of individual TBC, we conducted an observational study. But fluctuations of TBC might also be related to fluctuations in somatic cell count (SCC).

Objective. We described the variation in TBC and its correlation with SCC in individual goat's milk samples around kidding.

Materials and Methods. We visited 4 farms for 10 weeks around kidding (January-April 2020). During our weekly farm visits, we collected a total of 3,335 milk samples from both udder halves of 37 goats per farm, using the Bactoscan FC+[®] for TBC and the Fossomatic[®] for SCC measurement. Pearson's correlation coefficient was determined between the log₁₀ SCC and log₁₀ TBC.

Results. In the week around kidding, the mean log₁₀ TBC of 5.20, which was non-significantly different from the log₁₀ TBC in the three weeks before kidding. After kidding, the mean log₁₀ TBC decreased significantly to 3.94. We found a strong correlation between the log₁₀ TBC of both udder halves ($R^2 = 0.70$). Also, the TBC and SCC in individual goats' milk samples were strongly correlated ($R^2 = 0.71$).

Discussion and Conclusion. The strong correlation between TBC of both udder halves indicates that individual TBC is generally not a local process at udder half level. The strong correlation between the individual TBC and SCC suggests that TBC drives SCC (intramammary infections) or that SCC drives TBC or both are driven by an underlying factor. The TBC measured by the Bactoscan FC+[®] might be influenced by high SCC and should be further investigated.

Perspectives. Goats have high individual TBCs in late lactation which decrease shortly after parturition.

Brucellosis risk factors systematic review – a One Health problem in Portugal

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Background. Brucellosis is one of the most common infectious zoonotic diseases with significant impacts on public health worldwide. In Portugal it remains an endemic disease, many efforts have been made with the aim of controlling and eradicating this disease.

Objective. Our first objective is to understand, with a systematic review, the risk factors that contribute to the failure of brucellosis eradication in Portugal.

Materials and Methods. We followed the Preferred Reporting Items for Systematic Reviews and Meta-analyses guidelines when performing the literature search. Relevant studies were identified from three bibliographic search databases, Science Direct, PubMed and RCAAP - Open Access Scientific Repositories of Portugal. The search terms were Brucella OR Brucellosis AND farm AND risk factors AND Portugal.

Results. The initial search identified a total of 62 papers, but only seven from 1st January 2000 to 1st January 2022 were included in quality level assessment, which means that Portugal has few studies on brucellosis epidemiology.

Discussion and Conclusion. The results of this study highlight several risk factors and farming practices that might have contributed to the maintenance of a high prevalence of brucellosis, such as absence of animals vaccinated with Rev-1, no veterinary technical support, acquisition of animals from non-free brucellosis or unknown status herds, sharing pastures, dogs that feed on birth waste and aborted material. Risk factors associated with wildlife are rarely mentioned. These results could be used to adopt new approaches to improve the efficiency of brucellosis eradication programs.

Perspectives. Multiple studies have found seropositivity in animals and humans worldwide, indicating the need to have an One Health approach to control this disease. This study emphasizes the need to study brucellosis in Portugal in a One Health context.