BETTER

20-21 JUNE
2023

AUT, TIRANA ALBANIA

Book of abstracts

Preface

The COST action CA20103 titled "Biosecurity Enhanced Through Training Evaluation and Raising Awareness" (https://better-biosecurity.eu/) aims to reduce the risk of infectious disease introduction and spread by improving the implementation of biosecurity measures in animal production systems.

The 2023 Annual General Meeting of the COST action BETTER was held in Tirana, Albania, on the 20th and 21st of June. In addition, a call for the latest research on the topic "Challenges on implementation of biosecurity in smallholder farms" was set. Hereby, we present you the book of abstracts of the research that was presented in this event.

On behalf of the COST BETTER action,

Alberto Allepuz & Ilias Chantziaras

Contents

Preliminary data on Dairy cattle Biosecurity in Albania using Biocheck.UGent score system

Kledis Çela, Maksimiliano Lleshaj, Frejla Cami, Anita Koni, Majlind Sulçe, Geral Muça, Rezart Postoli, Pëllumb Zalla, Xhelil Koleci*

Biosecurity is vital to livestock health and productivity, and it is based on the implementation of a set of procedures to prevent disease entry and transmission inside a farm or animal community. The Biocheck.UGent score system, developed by Ghent University in Belgium, provides a standardized framework for evaluating agricultural biosecurity policies and processes. In the last ten years, infectious endemic disease outbreaks on dairy farms (such as bovine tuberculosis and bovine brucellosis) and transboundary animal diseases (such as bluetongue disease and lumpy skin disease) have been documented, with a lack of farm biosecurity implementation cited as the primary barrier.

On 21 dairy farms in Albania, we used the Biocheck.UGent score system to measure the quality of dairy farm biosecurity. Eleven biosecurity indicators were rated in all, and the average, standard deviations, and coefficient of variation for each of them were calculated.

The preliminary data indicate a large variety in biosecurity scores between farms, reflected on coefficient of variation and standard variation values.

The mean score for external biosecurity was 40.2, the mean score for internal biosecurity was 24.1, and the total score for dairy farm biosecurity was 32.3.

This is the first study to use a standardized strategy to evaluate farm biosecurity. This means that the Biocheck.UGent score system was established and used as a systematic technique to evaluating biosecurity on dairy farms in the study. Biosecurity is a complex topic, and collaboration among academics, veterinarians, agricultural extension agencies, legislators, and other stakeholders can aid in the design and implementation of successful biosecurity initiatives.

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Fish Quality Assurance And Quality Control

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Quality Assurance (Q.A) consists of all those planned and systematic actions necessary to provide adequate confidence that a product or service will satisfy given requirements for quality. In other words it is a strategic management function which establishes policies, adapts programmes to meet established goals and provides confidence that these measures are being effectively applied. Quality Control (Q.C) on the other hand consists of the operational techniques and activities that are used to fulfill requirements for quality. It is a tactical function which carries out the programmes established by Q.A. The objective of quality control is to ensure that fish and fish products are unadulterated, have a high nutritional value true to their nature, and produce desired results. Product quality encompasses physical aspects such as freshness and appearance, and organoleptic properties as well as nutritional quality. Proper handling of fish between capture and delivery to the consumer is a crucial element in assuring final product quality. Standards of sanitation, method of handling and the time/temperature of holding fish are all significant quality factors. With a few exceptions, fish are considered free of pathogenic bacteria of public health significance when first caught. The presence of bacteria harmful to man generally indicates poor sanitation in handling and processing and the contamination is almost always of human or animal origin.

Keywords: Fish, Quality Assurance, Quality Control

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Backyard Poultry in Serbia: Diseases and Biosecurity

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Due to the increasing demand for poultry products from traditional farming systems, the growing trend for keeping chickens in alternative production systems has also been observed worldwide. Different types of extensive systems such are organic production, low-input production systems, and free-range systems have experienced significant growth in response to this trend in our country. The Government of the Republic of Serbia, within the framework of the Program for the Preservation of Autochthonous Genotypes, supports the development of extensive rearing systems for poultry in the form of significant annual subsidies. We have three types of backyard farming systems: permanent confinement, free-range, and mixed confinement. Mixed confinement is the most frequent system and implies, the birds scavenge freely in the courtyard of the farmer's house during the day, and at night they are kept in an improvised house (hennery or chicken coop). These rearing systems often consist of free, native, unselected breeds of various ages, mixed with different poultry/bird species in the flocks. They are less standardized than intensive-rearing systems. In addition, not enough attention is paid to the need to protect backyard poultry. Most of these birds are kept outdoors where the birds forage around the house or in the backyard during the day. Access to the outdoors brings poultry into contact with wild birds and other animals that can carry various diseases. The results from our laboratories showed that due to poor or absent disease control strategies and inadequate hygiene, in the last 7 years, the most frequent cause of outbreaks and high mortalities of backyard poultry in Serbia were pathogens such as bacteria (E. coli, Clostridium perfringens), viruses (Marek's disease virus, Avian leucosis virus), fungi (Aspergillus spp.) and parasites (Ascaridia galli, Eimeria spp, Dermanyssus gallinae). Vaccination against Marek's disease virus is not legally binding; therefore, this disease was found as a cause of death in 41,61% of backyard poultry. Infrastructure prevents the implementation of adequate biosecurity measures and lacks a vaccination strategy against infectious diseases. Since the emergence of HPAI subtype H5N8 infection in Serbia was recorded in wild birds, backyard poultry is at a higher risk of HPAI infection, especially those near large still-water surfaces. Farmers should be trained and advised to set external and internal biosecurity measures that are financially, and technically feasible, and acceptable.

Keywords: Backyard Poultry, Serbia, Diseases, Biosecurity

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Salmonella in Tunisian broiler breeding farms: Risk Factors, Antimicrobial Resistance and Molecular Characterization

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In the present study, a total number of 143 farms were sampled in northern Tunisia; Salmonella isolates were identified by the alternative technique VIDAS Easy Salmonella. The susceptibility of Salmonella isolates was assessed against 19 antimicrobials using the disk diffusion method on Mueller–Hinton agar using antimicrobial discs. Some antimicrobial resistance genes were identified using PCR. The prevalence rate of Salmonella infection, in the sampled farms, was estimated at 21.7% (70/322). Moreover, a total number of 13 different serotypes were identified. High rate of resistance was identified against nalidixic acid (86.85%), amoxicillin (76.25%), streptomycin (75%), and ciprofloxacin (63%). Alarming level of resistance to ertapenem (12.5%) was noticed. A total of 83.9% (52/62) of isolated strains were recognized as MDR. Three MDR strains were extended-spectrum β-lactamases (ESBL)-producers and three MDR strains were cephalosporinase-producers. The blaCTX-M gene was amplified in all the three ESBL strains. The qnrB gene was not amplified in fluoroquinolones-resistant strains. The tetA and tetB genes were amplified in 5% (2/40) and 2.5% (1/40) of tetracycline-resistant strains, respectively. The dfrA1 gene was amplified in five of the 20 trimethoprim-resistant strains. The mcr-1, mcr-2, mcr-3, mcr-4, and mcr-5 genes were not amplified in any of the phenotypically colistin-resistant strains. In terms of integrase genes int1 and int2, only gene class 2 was amplified in 11% (7/64) of analyzed strains. Risk factors, such as the poor level of cleaning and disinfection, the lack of antimicrobial treatment at the start of the breeding, and a crawl space duration lower than 15 days, were associated with high Salmonella infection in birds. These data should be considered when preparing salmonellosis control programs in Tunisian broiler flocks.

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Extensive pig production sector in Serbia – biosecurity concerns and diseases transmission

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In Serbia, there are different animal production systems, including extensive ones, which are common and traditional in Serbia. Nowadays, extensive pig production with very low or almost no biosecurity measures plays an important role in the spread of ASF and other infectious diseases. Extensive farming systems are traditionally practiced in villages, hamlets, and forests, usually near riverbanks. In Serbia, there are different types of extensive production systems: small farms, backyards, semi-free-range, free-range, and a small percentage of organic pig production units. In traditional systems, pig production can also be divided into indoor and outdoor housing. However, it is not easy to make a clear distinction between extensive indoor and outdoor units. In traditional backyard housing systems, pigs are not confined to the units at all times, and often there is no complete fencing. According to Serbian law, disease surveillance is mandatory in all pig production. However, local veterinarians are mainly focused on the control and diagnosis of transboundary infectious diseases such as ASF and CSF. For these reasons, many other parasitic, bacterial, and sometimes viral infections are detected but underestimated. In 2019-2023, we retrospectively analyzed the most common diseases in pigs from traditional extensive husbandry necropsied in the Institute of Veterinary Medicine of Serbia and the Scientific Veterinary Institute "Novi Sad". Among the most common parasitic diseases in pigs in extensive husbandry are ascariasis and trichurosis. As for bacterial pathogens, Escherichia coli and enteric clostridial infections, Pasteurella multocida, Haemophilus parasuis, Streptococcus spp., and Salmonella spp. were the most frequently isolated bacteria from various organs of the examined pigs. The viral pathogens most commonly detected were suid herpesvirus 1 (Aujeszky's disease) and porcine parvovirus (PPV), in addition to ASF, which was confirmed in infected counties nationwide. Low biosecurity measures or lack of external biosecurity measures in extensive swine production farms pose a high risk for transmission of various pathogens, including not only diseases caused by conditionally pathogenic microorganisms, but also notifiable diseases that can have a significant negative impact on the country's economy.

Keywords: extensive pig sector, swine diseases, Serbia

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As happy as a pig in muck: addressing the challenge of improving hygiene as an internal biosecurity action in the indoor pig sector

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'Pigs' and 'muck' are synonymous. There is evidence of thermoregulatory benefits to pigs from wallowing . The lay perspective is that "happy pigs are dirty" and a muddy environment is natural and will be conducive to pig welfare , although attitudes to dirt in indoor pig units may be different .   Hygiene practices have been identified as 'common sense' but not associated with disease risk by farmers in England but also as having the most potential for improved efficiency and to reduce costs in the intensive pig production sector . Perceptions of the benign effect of dirt is likely to influence attitudes to hygiene practices in pig units. Shifting these attitudes and encouraging adoption of more stringent hygiene protocols has the potential to reap rewards in relation to productivity and animal health. A protocol is being developed to promote hygiene will be supported by a communication strategy using visual indicators. In future, we aim to test effectiveness by monitoring disease and production indicators for units which adopt the protocol.

Keywords: Hygiene, Internal Biosecurity, Disease Risk, Perception, Behaviour Change

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Quantitative Risk Analysis as a Tool to Improve Biosecurity on Cattle Farms

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Implementing effective biosecurity measures on cattle farms can be challenging, both because of doubts about their effectiveness among farmers and a lack of consensus among veterinarians. The European BIOSECURE project aims to address these challenges by quantifying the impact of biosecurity practices on infection prevention. To achieve this, a quantitative risk assessment model is being developed to measure the risk of disease introduction to farms based on their specific biosecurity measures and animal movements. This model considers multiple pathways of disease introduction and uses two types of inputs: farm surveys and epidemiological parameters from literature reviews and experimental studies. A stochastic approach is used to account for uncertainty in the parameters. To estimate the probability of disease introduction through animal purchase, the model calculates the probability of purchasing an infected animal from a farm, considering the disease prevalence in the region and whether the farm has a disease control plan in place. If animals are tested before transport, the probability that an animal is a false negative is calculated. The probability of infection during transport, either by direct or indirect contact, is also assessed. For indirect contact, the time between transport and the cleaning routines of the vehicle are used to estimate the survival of the pathogen, considering the rate of inactivation on different surfaces and the effectiveness of cleaning. If the farm quarantines the purchased animals, quarantine duration and diagnostic tests can reduce the risk of introduction of infected animals. Finally, the probability of introduction by fomites is calculated based on quarantine routines. By quantifying the impact of specific measures and accounting for uncertainty, the model can help inform farmers decision-making and improve biosecurity practices. The next step will be to validate the model on real farms and extend it to other diseases, introduction pathways and livestock species.

Keywords: Biosecurity Assessment, Quantitative Risk Analysis, Cattle Farm Biosecurity

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Risk-Based Dairy Management Approach For Clinical Mastitis Control

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Clinical mastitis (CM) is the most prevalent health disorder in dairy farms that causes poor milk quality and decreased milk yield. A one-year cross-sectional longitudinal survey was carried out to evaluate udder-related risk factors for CM occurring in dairy herds. The databases were used from three dairy farms. The research was divided into four calendar seasons. Cows with clinical mastitis were detected by clinical examination of the udder and determination of abnormalities in milk. The quarter milk samples were screened using California mastitis test (CMT) for the detection of abnormal milk secretion (AMS) and microbiological methods for the detection of intramammary infections (IMI). The isolated mastitis pathogens were grouped as contagious: Streptococcus agalactiae and Staphylococcus aureus; or environmental: Enterococcus spp., Pseudomonas aeruginosa, Escherichia coli and Aspergillus niger. The annual prevalence of clinical mastitis was 34,13% at the cow level, and 30,07% at the lactation level. The annual lactation incidence risk (LIR) for the entire population of cows was 45.86%. The prevalence of clinical mastitis and LIR tended to increase with increasing cow parity. Management of farms, the season of calving, and udder level factors entered in the regression model were significantly linked with the occurrence of CM. The odds ratio of CM increased significantly, as udder morphology was worsened, teat ends were flat and the distance from teat ends to the floor decreased. Hygiene scores of cows were significantly associated with CM prevalence. The ten-point mastitis control program is based on hygiene and includes teat disinfection, antibiotic therapy, and culling of chronically infected cows. Periodically screening protocols for monitoring udder health is another approach for preventing the spreading of mastitis in dairy herds. Positive CMT reaction may be a good indicator for IMI; there was a significant association between the frequency of isolation of major pathogens and the CMT score in milk samples. Developing and following good biosecurity plans takes time and planning, but the cost to the farm enterprise for not having these plans can be considerable.

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Evaluation of biosecurity on fish farms

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Generally, WOAH (formally known as OIE) defines Biosecurity in aquaculture as a set of management and physical measures designed to reduce the risk of introduction, establishment and spread of pathogenic agents to, from and within an aquatic animal population. Infectious diseases in aquaculture are becoming more critical for ensuring the growth and sustainability of aquaculture, particularly as many consider aquaculture production to be a solution to feeding the rapidly growing human population and alleviating poverty in many countries. Developing biosecurity programs that prevent, control, and eradicate diseases in aquaculture operations are therefore imperative. The experiences showed that in many cases, the owners/managers of aquaculture operations are already familiar with the diseases that cause (or have caused) problems on the farms. It is therefore advisable for the producer to collaborate with a veterinarian and government official to draw up a list of diseases that are of highest concern. This list can then be prioritized, based on the respective likelihood of introduction and the impact thereof on the farms. During the autumn of 2022, the idea to establish the subgroup "Biosecurity in Aquaculture" within the COST action BETTER was proposed during a discussion between veterinarians, researchers in aquaculture, and experts in aquatic animal health. Nowadays it consists of 15 members from 9 countries: Albania, Croatia, France, Germany, Greece, North Macedonia, Norway, Serbia and Turkey. The purpose of this paper is to present the frame of basic survey regarding the presence and assessment of biosecurity measures in certain aquaculture production facilities. It was designed based on on material for terrestrial animals in the WG-3 of COST action "BETTER" and a comprehensive survey designed to evaluate and quantify biosecurity measures in Mediterranean farmed seabass. Taking into account how complex and comprehensive job is in front of us, we focused on two areas of freshwater fishes: Cyprinid ponds (mainly Common carp, Cyprinus carpio) and Salmonidae fish farms with majority of Rainbow trout (Oncorhynchus mykiss). In addition to these two groups, marine productions of Atlantic salmon (Salmo salar) is included based on experiences in Norway. In the survey we oriented on most important questions: which of a.m. three categories (Cyprinid ponds; Trout farms; Atlantic salmon production) is it used and what are the main objectives of the biosecurity assessment i.e.: certification, improving biosecurity or focusing on specific disease. Although it is a neglected topic in aquaculture we asked about the proper use of antimicrobials. Thereafter, who developed the biosecurity assessment method in fish farm and how is the data on biosecurity practices collected during the assessment? Although there is no universal tool for assessment of biosecurity measures on fish farms, we can conclude that the described survey could substantially contribute to the enhancement of existing biosecurity plans.

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Evaluation of the biosecurity compliance in poultry production in Poland

Artur Żbikowski*, Karol Pawłowski, Krzysztof Adamczyk, Joanna Nerc and Piotr Szeleszczuk

Biosecurity in poultry production is acknowledged as the appropriate answer for preventing disease spread but the compliance of the practices is still not optimal. In the frame of the H2020 Netpoulsafe project, the qualitative assessment of biosecurity compliance in poultry production in Poland was performed. The 26 farmers and 23 advisors from different production types: enclosed broilers, turkeys, breeders, and layers were interviewed with a semi-closed questionnaire with a focus on 38 specific biosecurity measures, and the frequency of implementation of each measure and the reasons for non-compliance were assessed. Among the 38 biosecurity questioned measures as "always" implemented in the farms only 12 practices were mentioned by 100% and 5 practices by more than 90% of farmers. Advisors indicated only 4 practices in 100% and 8 by more than 90% as "always" implemented in the farms. Interestingly, some differences between the opinions for measures of farmers and advisors were observed. "Washing of the hands before entering the house by personnel" in the advisor's opinion was "always" performed in about 22% of farms while in farmer's opinion in 73% of farms. Among "the least always used measures" in farmers' and advisors' opinions were "showering before entering the house - by visitors" (11% and 0% respectively) and "showering before entering the house - by personnel" (19% and 0% respectively). The study showed that in general, the main reasons for non-compliance were: "not enough trained", "not enough advice", "it takes too much time", "too expensive", and "not knowing risks/advantages". To fulfill most of these gaps and needs the implementation of supporting measures such as biosecurity trainings, educational programs, support by biosecurity advisors, etc., may help to improve the compliance of biosecurity on the farms by increasing the knowledge and skills of farmers.

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Netpoulsafe Project Study: What are the biosecurity scores of Spanish poultry farms?

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The Netpoulsafe project aims to improve biosecurity compliance in the poultry sector by compiling, validating and disseminating supporting measures (SMs). Spain selected coaching as the SM to validate its effectiveness in improving compliance in poultry farms and also used the Biocheck.Ugent scoring tool to quantify the level of biosecurity before and after the coaching sessions. The Biocheck.UGent questionnaire consists of a series of questions (biosecurity measures) which are divided into external and internal biosecurity and further subdivided into different subcategories (different according to species and production types). For each category and subcategory, a score between 0 (no compliance) and 100 (full compliance) is obtained. In this context, biosecurity audits were carried out using Biocheck.Ugent on 22 farms (from different types of poultry production).The overall, external and internal biosecurity scores before coaching are shown in the present work: in broilers (n=7) the overall average score is 80% (79% external and 82% internal), in turkeys (n=3) the overall average score is 85% (81% external and 93% internal), in ducks (n=2) the overall average score is 55% (57% external and 50% internal), in laying hens (n=5) the overall average score is 77% (70% external and 83% internal), in free range layers (n=2) the overall average score is 76% (72% external and 86% internal) and finally in breeders (n=3) the overall average score is 85% (85% external and 85% internal). The results reflect higher compliance in breeders and turkeys production, when compared to ducks. The results of the Biocheck.Ugent after the coaching process will help to determine the effectiveness of "Coaching" in improving biosecurity compliance in the participating Spanish poultry farms.

Keywords: Biosecurity, Coaching, Supporting Measures, Audits, Biocheck.Ugent.

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Consideration of the questionnaire for the assessment of biosecurity measures on pig farms

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The poster presents a biosecurity assessment questionnaire that was created in the project of the Veterinary Administration of the Ministry of Agriculture, Water Management and Forestry of the Republic of Serbia in 2011 and was used to assess biosecurity on pig farms of different capacities in the period until today. The questionnaire consists of 15 indicators (in brackets are the numbers of parameters that are evaluated in each individual indicator): 1. pig breeding and rearing facility (5), 2. farm isolation (12), 3. quarantine (8), 4. health status of the farm population (19), 5. movement and traffic control (15), 6. attitude towards visitors (8), 7. nutrition and water supply control (8), 8. manure management (7), 9. removal of dead animals (12), 10. presence of other species of animals on the farm (4), 11. rodent population control (5), 12. insect population control (4), 13. bird control (3), 14. sanitation (18) and 15. farm's attitude towards the environment (4). The parameters within the indicator are rated from grades 0 to 5 as : Insufficient, but without the potential to improve the biosecurity in the foreseeable future – 0; Insufficient, but with the potential to improve the biosecurity in the foreseeable future – 1; Sufficient – 2; Good – 3; Very good – 4 and Excellent - 5. In the analysis of biosecurity levels and risks, grades 0 and 1 are considered separately (0 - insufficient, no resources for improvement and 1 - insufficient, there are resources for improvement). In addition, a SWOT analysis is applied for a more detailed overview of the possibilities for reducing the negative aspects and improving the positive aspects of biosecurity on farms and completing the final audit. The poster also discusses the methodology and elements of the biosecurity assessment of the above with other questionnaires in order to improving the relevance.

Keywords: Pig Farms, Biosecurity, Assessment, Questionnaire, Indicators, Parameters, Comparison

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Some Experiences From Workshops On Biosecurity Measures Intended For Domestic Animal Breeders

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Starting in 2003, primarily motivated by the re-emergence of brucellosis in small ruminants after several decades, several workshops were held on the topic of how breeders can reduce the risk of introducing various infectious diseases in their farms. The later outbreaks of different diseases maintained the interest of breeders in the topic of biosecurity and protection of their breeding from infectious diseases. The goal of the lecture was not for breeders to know the characteristics of certain diseases, but to become aware of their existence, the risks for their breeding and what they can do to reduce the risk of introducing them into their breeding. Our experiences are: 1. breeders should know the health status of their herds, not only in terms of diseases that are necessarily controlled by state surveillance programs, a breeder whose herd is free from other infections pays more attention to measures to protect his herd; 2. it is not reasonable to believe that farmers will accept all recommendations at once, it takes time to accept and understand the significance; 3. the acceptance and embracing of new knowledge are less likely from older breeders (in terms of age) and those who have small-scale production; 4. for the breeder, the level of investment is critical to the adoption of new biosecurity measures, it is desirable that the lecturer knows the basics of financial movements in a particular branch of animal production in order to better understand the possibilities of the breeder, and that he does not set too high requirements, because then the breeder will be excluded from the measures that are easier to implement.

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Evaluation of the biosecurity compliance in poultry production in Poland

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Biosecurity in poultry production is acknowledged as the appropriate answer for preventing disease spread but the compliance of the practices is still not optimal. In the frame of the H2020 Netpoulsafe project, the qualitative assessment of biosecurity compliance in poultry production in Poland was performed. The 26 farmers and 23 advisors from different production types: enclosed broilers, turkeys, breeders, and layers were interviewed with a semi-closed questionnaire with a focus on 38 specific biosecurity measures, and the frequency of implementation of each measure and the reasons for non-compliance were assessed. Among the 38 biosecurity questioned measures as "always" implemented in the farms only 12 practices were mentioned by 100% and 5 practices by more than 90% of farmers. Advisors indicated only 4 practices in 100% and 8 by more than 90% as "always" implemented in the farms. Interestingly, some differences between the opinions for measures of farmers and advisors were observed. "Washing of the hands before entering the house by personnel" in the advisor's opinion was "always" performed in about 22% of farms while in farmer's opinion in 73% of farms. Among "the least always used measures" in farmers' and advisors' opinions were "showering before entering the house" – "by visitors" (11% and 0% respectively) and "showering before entering the house - by personnel" (19% and 0% respectively). The study showed that in general, the main reasons for non-compliance were: "not enough trained", "not enough advice", "it takes too much time", "too expensive", and "not knowing risks/advantages". To fulfill most of these gaps and needs the implementation of supporting measures such as biosecurity trainings, educational programs, support by biosecurity advisors, etc., may help to improve the compliance of biosecurity on the farms by increasing the knowledge and skills of farmers.

Keywords: Biosecurity practices, compliance, poultry production, Poland

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Current status of biosecurity legislation in the European poultry sector

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Using a participatory research design, a specific questionnaire was developed to collect information on intensive poultry farms, comprising broilers, layers, ducks, turkeys, breeders, and other minor species. It was composed of 56 questions that addressed the biosecurity measures (BMs) implemented based on regulation and legal recommendation enforced in the Country either at national and/or at regional level. Each question contained four answer options: YES (mandatory), YES (recommended), PARTLY, and NO. When a BM was implemented in all poultry categories, the option ALL was selected; when a BM did not apply to all, the option PARTLY was chosen. The questionnaire was sent to country focal points (CFP) (as previously assigned for the needs of BETTER). The role of CFPs was to ensure that the questionnaire was correctly filled in by poultry experts (e.g. government officials) working in the respective countries. Prior the dissemination of the questionnaire to all the CFPs, a session of training was conducted online. CFPs were asked to compile the questionnaire between December 2022 and May 2023. After the submission, an individual meeting was organised with every CFPs to validate the contents collected in the questionnaire and to solve potential misunderstandings. Out of 45 Countries participating in the BETTER Cost Action, CFPs from 18 EU Countries, one COST Partner Member and one Near Neighbor Country submitted the questionnaire (Figure 1). All countries reported information on legislation implemented at national level, with none declaring any specific rule at regional level. Regarding the number of legislations in force concerning biosecurity in each Country, it varied between one and five. Some countries reported to have a national legislation on biosecurity. The majority of countries included biosecurity-related measures as part of legislation on specific diseases (e.g. Avian Influenza, Salmonella), health, welfare or a combination of them. Validation of data is ongoing.

Keywords: biosecurity, legislation, Europe

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Antibiotics Use and Biosecurity Practices in Commercial Broiler Farms: Insights from a Research Tour in Punjab, Pakistan

Q. Mahmood, I. Chantziaras, J. Dewulf

This abstract presents the study design, outcomes and objectives of a research tour conducted in Punjab, Pakistan, focusing on antibiotics usage and biosecurity practices in commercial broiler poultry farms. The tour covered 30 districts in the province, with data collected from 100 broiler farms through on-site visits and structured questionnaires. The tour involved extensive fieldwork, including personal visits to each selected poultry farm. Farm owners, managers, and personnel responsible for antibiotics administration and biosecurity measures participated in the study by completing structured questionnaires. The questionnaire on antibiotics usage gathered information on product names, active substances, concentrations, used and recommended doses, administration routes, number of treated animals, treatment duration, actual weight at treatment, age at treatment, and purpose of using antibiotics. Biosecurity measures were assessed using a separate questionnaire developed by Biocheck.UGent. The collected data is currently undergoing analysis and interpretation. The analysis aims to identify trends, patterns, and factors influencing antibiotics use in commercial poultry production. Additionally, the effectiveness of biosecurity practices implemented on these farms will be assessed. The findings will provide comprehensive insights into prevalent antibiotics usage patterns, potential challenges, and areas for improvement in promoting responsible antibiotics use and enhancing biosecurity measures. The research outcomes are expected to significantly contribute to understanding antibiotics use in commercial broiler poultry farming in Punjab, Pakistan. The study will inform policy-makers, industry stakeholders, and public health authorities on best practices and areas requiring attention to promote sustainable and responsible antibiotics use. The research findings will be disseminated through scientific publications and presented at conferences and seminars to facilitate knowledge exchange and encourage evidence-based interventions in the poultry industry.

Keywords: Antiobiotics, Biosecuity, Commercial Broiler, Biocheck.ugent, Pakistan

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African swine fever – the main biosecurity challenges identified in backyards pig production (Serbia)

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African swine fever (ASF) is currently the most important viral disease affecting domestic pig production worldwide. The first case of ASF in Serbia was confirmed in 2019 in a backyards domestic pig population. From the first case it was clear that the observed epidemiological ASF pattern is associated with the backyards where keeping represents an important meat source and traditional heritage. Backyards are considered particularly susceptible to ASF introduction and are of interest in disease prevention and control. The most important biosecurity challenges related to the domestic pig backyard production in Serbia were analyzed in the period 2020-2022. In Serbia, more than 50% of the domestic pig production is located in sector with low biosecurity measures. Rearing backyard pigs is a common, traditional practice in country rural areas. However, beside personal consumption, backyards can be also the commercial. For that reason, one the main characteristic of backyards is existence of breeding animals and natural mating practice in the villages. The mixed backyard systems are common, with different livestock and agricultural cropping systems. Home-slaughtering represent a type of a cultural and sociological phenomenon. Backyard pig production is oriented frequently also on different meat product specialties, as additional income and tradition in some provinces. In Serbia, swill-feeding is forbidden by the law but it is quite challenging for the control in distant, rural areas. Today, traditional, culture-related aspects were found to be very important obstacles in ASF control. The identified risky human-related activities in the villages need to be strictly addressed in the future in order to prevent further ASF spread in pig production sector. By applying biosecurity measures in extensive production, we protect the population of domestic pigs on commercial farms (intensive production) in the country.

Keywords: African swine fever, backyards, biosecurity, Serbia

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Investigating the Impact of Wildlife and Pests in Transmitting Pathogenic Agents to Domestic Pigs

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The processes of globalization, human activities, and the growing popularity of outdoor ecological pork production contribute to increased interactions between domestic pigs and wildlife. Wild animals and pests can carry harmful pathogens that pose a threat to domestic pigs, resulting in economic losses at the local, national, and global levels. However, our understanding of the specific pathways through which these pathogens are transmitted between these animals is limited. This study has collected and examined information on the diversity and extent of pathogens spread from various wild animals and pests to domestic pigs. Overall, 1250 peer-reviewed manuscripts published in English between 2010 and 2022 were screened through the PRISMA framework using PubMed, Scopus, and WoS databases. A total of 84 studies reporting possible transmission routes of different pathogenic agents were included. Approximately 65.5% of the included studies described possible risks/risk factors for pathogens' transmission based on quantitative data, whereas 31% of the articles only presented a hypothesis or qualitative analysis of possible transmission routes or risk factors and/or contact rates. Only 3.5% of studies presented evidence-based transmission routes from wildlife to domestic pigs. A majority of the studies (80%) focused on the role of wild boars in the transmission of pathogenic agents to pig farms. Studies involving the role of rodents (7%), and deer (6%) were the next most frequent, whereas the role of insects (5%), wild carnivores (5%), wild birds (4%), cats (2%), and badgers (1%) were less available. Farms with low biosecurity levels, particularly in extensive rearing systems, were identified as higher-risk farms. Based on these findings, it is recommended to implement proper farm biosecurity measures, strong fences, and control programs for rodents, pets, and insects, particularly in high-risk areas. It is also crucial to monitor wildlife and raise awareness among farmers about the risks associated with disease transmission.

Keywords: Biosecurity; Pigs farming; Wild boars, African swine fever; Risk factors.

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Quantify farm biosecurity levels with the Biocheck.UGent tool

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Introduction In the control of animal diseases, biosecurity is pivotal. High biosecurity standards can reduce the occurrence of disease and therefore also the need for using antimicrobials. Although biosecurity is getting increased attention, data from certain regions is still scarce. Materials and methods In 2008 the first version of the Biocheck.UGent scoring system for measuring biosecurity levels was developed at Ghent University (Belgium). Since then, the tool has been extended to other animal species and became part of national legislation/quality systems in different European countries. Based on the answers given in species-specific surveys, the tool provides a report including all relevant aspects of both external and internal biosecurity. The system is risk-based, meaning it takes into account the importance of different transmission routes of infectious diseases within a particular animal species. The report highlights biosecurity pitfalls (low scores) and strengths (high scores) specific to the farm. The Biocheck.UGent tool has over 50,000 entries, with the majority of the data coming from European countries. The tool is freely available on the website biocheckgent.com. Results Corresponding to the location of the BETTER meeting in Tirana, we looked into the biosecurity data which was available from farms of Albania, as well as the neighbouring Balkan countries. There was no data available for Bosnia and Herzegovina, Kosovo, or Montenegro. When the total amount of entries within an animal species was below 40, this animal species was excluded as well. The external biosecurity level on both pig and dairy cattle farms was higher than levels of internal biosecurity. There were large variants in the biosecurity level between countries. However, overall the same category scored the best across countries and animal species (purchase policy).   Discussion and conclusion Although there is an increasing awareness of biosecurity in livestock production in general, we still have limited data of the investigated countries. The more monitoring of biosecurity is done, the better insights are into a country's biosecurity status and the better improvements in preventive measures can be established.   Biocheck.Gent supports people in the field with additional features and services.

Keywords: Biosecurity, pig, dairy, measuring tool

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Extensive pig production sector in Serbia – biosecurity concerns and diseases transmission

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In Serbia, there are different animal production systems, including extensive ones, which are common and traditional in Serbia. Nowadays, extensive pig production with very low or almost no biosecurity measures plays an important role in the spread of ASF and other infectious diseases. Extensive farming systems are traditionally practiced in villages, hamlets, and forests, usually near riverbanks. In Serbia, there are different types of extensive production systems: small farms, backyards, semi-free-range, free-range, and a small percentage of organic pig production units. In traditional systems, pig production can also be divided into indoor and outdoor housing. However, it is not easy to make a clear distinction between extensive indoor and outdoor units. In traditional backyard housing systems, pigs are not confined to the units at all times, and often there is no complete fencing. According to Serbian law, disease surveillance is mandatory in all pig production. However, local veterinarians are mainly focused on the control and diagnosis of transboundary infectious diseases such as ASF and CSF. For these reasons, many other parasitic, bacterial, and sometimes viral infections are detected but underestimated. During 2019-2023, we retrospectively analyzed the most common diseases in pigs from traditional extensive husbandry necropsied in the Institute of Veterinary Medicine of Serbia and the Scientific Veterinary Institute "Novi Sad". Among the most common parasitic diseases in pigs in extensive husbandry are ascariasis and trichurosis. As for bacterial pathogens, Escherichia coli and enteric clostridial infections, Pasteurella multocida, Glaesserella parasuis, Streptococcus spp., and Salmonella spp. were the most frequently isolated bacteria from various organs of the examined pigs. The viral pathogens most commonly detected were suid herpesvirus 1 (Aujeszky's disease) and porcine parvovirus (PPV), in addition to ASF, which was confirmed in infected counties nationwide. Low biosecurity measures or lack of external biosecurity measures in extensive swine production farms pose a high risk for transmission of various pathogens, including not only diseases caused by conditionally pathogenic microorganisms, but also notifiable diseases that can have a significant negative impact on the country's economy.

Keywords: Keywords: extensive pig sector, swine diseases, Serbia

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Using the Awareness, Desire, Knowledge, Ability, and Reinforcement Model to investigate the influences on biosecurity control and farmer decision-making

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Knowing 'where' farmers stand in terms of attitudes can help to facilitate improving actions through tailored strategies. Farmers are more inclined to change in response to information that is tailored to their individual circumstances. The ADKAR® (Awareness, Desire, Knowledge, Ability and Reinforcement) is a profiling technique to identify the key elements that block change (biosecurity compliance in this case). Poultry farms (n=134) from Belgium (n=18), the Netherlands (n=16), France (n=21), Spain (n=23), Italy (n=26) and Hungary (n=30), part of the Netpoulsafe project (GA 101000728), were the subject of a longitudinal study. Enclosed broiler (n=36), enclosed layer (n=17), free-range layer (n=11), free-range broiler (n=4), turkey (n=16), breeder (n=20), ducks (n=23), and hatcheries (n=7) were among the categories represented. The farmers' were scored on the first four elements (A-D-K-A). Each component of a farmer's attitude toward biosecurity was given a score between 1 and 5 using the ADKAR scale. It is believed that the acceptance of any change will be impacted by a score of three or less. The mean ADKA scores for the participating farms were 4.1 for Awareness, 4.0 for Desire, 3.8 for Knowledge and 4.0 for Ability. We have observed 10% of poultry producers with a lack of awareness (score =<3), and we suppose that it could constitute a barrier to change in terms of biosecurity compliance. Knowledge was the limiting barrier for 24.6% of the farmers, while lack of desire or ability was the limiting factor for 17.0% and 19.0% farmers, respectively. Advisors must also take into account the farmer's attitude toward disease prevention, the level of implementation control they think is necessary, and whether a biosecurity practice is already a key priority for the farmer. These findings indicate that the poultry farming community has a diverse approach toward biosecurity. The driving forces behind these elements should be investigated deeper in order to implement biosecurity measures more regularly for disease prevention.

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Biosecurity in small animal practices in Belgium and The Netherlands: A survey

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The main goal of a biosecurity program in a small animal practice is to protect healthy and hospitalized patients from (re)-infection, to break transmission cycles, to optimize hygiene and to protect the personnel and owners. Although, biosecurity in small animal practices is important, information on the implementation is limited. Therefore, a survey was conducted in small animal practices in Belgium and The Netherlands to get an idea on the implementation rate of biosecurity measures, more specific personal hygiene measures. In total 60 completed surveys were received. Seven responses came from single-person practices, 33 from group practices and 20 from practices integrated in a bigger company. Among the respondents 36 were veterinarian and 23 para-veterinarian. In 64% of the practices a personal hygiene protocol for personnel was present but significantly (p=0.03) more often in integrated practices (75%) compared to single person practices (29%). Work-specific clothes were always worn in 82% of the practices and in 72% it was always changed when visible contamination was noted. Hands were always washed with water and soap after visible contamination, contact with body fluids and/or after visiting the toilet by most respondents (87-95%) but only 65% always cleaned their hands before eating or drinking. However, 10% of the respondents declared to never disinfect hands between patients. Overall there were no statistically significant differences between veterinarians and para-veterinarians in performing good hand cleaning and disinfection. In general, biosecurity measures regarding personal hygiene are implemented in most small animal practices and by a large percentage of the respondents. However, there is clearly still room for improvement, especially for some aspects such as hand disinfection.

Keywords: biosecurity - small animal practice - personal hygiene

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Investing in Biosecurity Measures in Farrow-to-Finish Pig Units

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Performing a financial evaluation of the implementation of biosecurity measures in farrow-to-finish pig units is key to maximize their uptake. The Biocheck.UGhent questionnaire is often utilized to identify the various biosecurity measures implemented within farrow-to-finish pig units. These measures are categorized into variable costs, fixed costs, transaction costs, investments in equipment, and investments in infrastructure. Furthermore, considering the potential impact of biosecurity on pig performance, including reduced piglet mortality, increased farrowing rate, decreased sow mortality, and improved feed conversion rate, we propose a theoretical investment model. The model aims at determining the optimal investment times for implementing biosecurity measures and investigating the effect of such investments on the intertemporal array of net benefits accrued by the farmer post-investment. The model introduced in this paper contributes to a deeper understanding of the economic aspects of biosecurity in farrow-to-finish pig units. By considering the identified costs and potential performance effects, farmers and/or investors can evaluate the financial feasibility of implementing (a set of) biosecurity measures. This research highlights the importance of strategic investment planning in biosecurity and provides valuable insights into the intertemporal dynamics of net benefits. Ultimately, it offers guidance to farmers seeking to enhance their biosecurity practices while optimizing their financial outcomes.

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Biosecurity in cattle transport: profiles among cattle transporters

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The transmission of pathogens between farms through animal transport vehicles is a potential concern; however, there is limited available information regarding driver routines and the biosecurity measures implemented during transport. Given the above, the aim of this study was to examine and characterize the prevailing practices and biosecurity measures adopted by cattle transport drivers. The main topics covered within the survey were characteristics of the drivers, their travels, biosecurity practices during loading and unloading of animals and cleaning and disinfection practices of the vehicles. This survey was piloted with a few drivers and modifications were made. 82 drivers were surveyed via face-to-face or remotely (e.g., telephone and/or virtual meetings). All the drivers surveyed were volunteers and the contact was made by personal contacts, visits to slaughterhouses and snowball sampling. The interviewed drivers were from nine Spanish Autonomous Communities, 52% of them reported working with beef and dairy farms indistinctly, while 48% only with one type of farm. Out of the total 82 drivers, 62 drivers stated that they typically completed one trip per day, although they had the capability to undertake up to four trips if necessary. Only 13 drivers indicated that they specialised in a specific type of trip. During a single trip, drivers reported making stops to load animals at multiple farms, with the most commonly shared trip types being the slaughterhouse and culling. During the vehicle cleaning process, 75.9% of the drivers reported frequently performing cleaning and disinfection of their vehicles. When inquired about the specifics of their cleaning and disinfection practices, 32.1% of respondents stated that they solely used disinfectant without applying any detergent beforehand. Using the same dataset, a multiple correspondence analysis (MCA) was performed retaining 10 categorical active variables and 5 supplementary variables. Three dimensions out of the 13 generated were retained for further analysis, which contained 39.83% of the accumulated variance. The first dimension was associated with practices employed during animal loading and unloading, the second dimension pertained to hygiene measures implemented by drivers, and the third dimension incorporated variables from the first two dimensions. Utilizing the outcomes of the first three MCA dimensions, we identified four clusters. These clusters aggregated comparable responses regarding both active and supplementary variables. Based on these findings, it is advisable to reassess certain animal transport practices in order to mitigate the potential transmission of pathogens between farms.

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A review on the level of implementation of biosecurity measures in poultry production in Europe: preliminary results

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This review aims to provide a comprehensive overview of the percentage (%) of biosecurity measures being implemented in poultry farms in European countries. To this purpose, a systematic search was conducted in three major databases, including MEDLINE (PubMed), CAB abstracts (EBSCOhost) and Web of Science (WOS). The general concept of the search strategy included [Poultry] AND [Biosecurity] AND [Implementation] AND [Geographic area], according to the following PICO elements: (1) Population: broilers, layers, turkeys, breeders, ducks, minor species; (2) Intervention: biosecurity measures; (3) Comparator: countries; and (4) Outcomes: implementation level (%). The systematic search yielded 1,196 scientific articles (PubMed = 189, CAB abstracts = 453 and WOS = 554) in the timeframe of approximately 10 years (2012 to present). References have been uploaded in Zotero for deduplication. Title and abstract screening (1st phase) and full text (2nd phase) screening are being conducted in Rayyan according to the following eligibility criteria: 1) language: publications in English; 2) publication types: journal articles and any other form of research publication that provides results of original research; 3) publication date: from 2012 to date; and 4) geographical location of studies: Europe.

Keywords: Implementation level; Biosecurity; Poultry; Europe.

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The importance of biosecurity in Aquaculture production in relation to food safety

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Aquaculture has long been the fastest growing food production sector. Its development is very important especially when we take into account all health benefits of fish in human's diet. The development of aquaculture is also very important for the economic development of a country, as well as for the improvement of food security for the population. It is very important to develop standardized protocols and measures aimed to minimize possible biological and other risks during fish farming. Viral, bacterial and parasitic fish diseases, improper use of antibiotics and other medications are the most important risks during production in aquaculture and deserved particular attention. The development of biosecurity measures on fish ponds and the transfer of technologies improves the health of fish, which is very important from the point of view of the safety of final product and consequently the preservation of the health of the population. Consumers expect that fish should be safe, to be of good quality and to be healthy during production. Only aquaculture products that meet food safety standards and international trade standards can ensure real economic benefits for producers. Solely by applying adequate and comprehensive biosecurity measures on the pond can you get products from aquaculture that are free from pathogenic microorganisms, antibiotic residues, and other contaminants. It is necessary to focus on the entire production chain in aquaculture, from the pond to the table. Bearing all this in mind, it is very important to identify the main deficiencies and needs in each country and region when it comes to fish health management, quarantine facilities, laboratory capacities, professional staff and their continuous training and improvement.

Keywords: biosecurity measures, food safety, fish production chain, microbiological hazards, contaminants, antimicrobial resistance, standards

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