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У збірнику матеріалів конференції подано результати сучасних наукових досліджень за секціями: фундаментальні питання ветеринарної медицини; актуальні питання незаразної патології тварин; актуальні питання заразної патології тварин; студентська наука.

Розраховано на науково-педагогічних працівників, представників науково-дослідних установ, хімічних лабораторій, науковців, спеціалістів установ та компаній ветеринарного напрямку, аспірантів, студентів.

У разі повного або часткового використання матеріалів збірника посилання обов'язкове. Відповідальність за зміст поданих матеріалів, точність наведених даних та відповідність принципам академічної доброчесності несуть автори.

Відповідальний за випуск: В.А. Томчук

СЕКЦІЯ 3. «АКТУАЛЬНІ ПИТАННЯ ЗАРАЗНОЇ ПАТОЛОГІЇ ТВАРИН»

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ESCHERICHIA COLI: ITS DISTRIBUTION AND ANTIBIOTIC RESISTANCE, RISKS TO HUMAN HEALTH

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Food safety is one of the key components of public health, food security, and the prevention of foodborne infections. This issue becomes especially important in the context of the global spread of antimicrobial resistance. The “One Health” concept involves an integrated approach to assessing the connections between human health, animal health, and the state of the environment, since bacteria, resistant strains, and AMR determinants can circulate between different ecological niches and components of the food chain. In this regard, *Escherichia coli* is an important monitoring target, as it can simultaneously serve as a sanitary indicator microorganism, a potential pathogen, and an indicator of the spread of antimicrobial resistance [1–3].

Contamination of food raw materials and products with *E. coli* can occur at almost every stage of the “farm-to-fork” chain. Additional ways of spreading can include contaminated water, equipment, surfaces, staff, and the production environment. The prevalence of ESBL-producing *E. coli* varied significantly depending on the food category, standing at around 40 per cent in chicken, 5 per cent in pork, 3 per cent in beef, 5 per cent in minced meat, 2 per cent in seafood, 2 per cent in milk and 3 per cent in eggs. These differences indicate varying levels of microbiological and AMR risk across different stages of food production.

The research findings confirm the circulation of *E. coli* and the presence of AMR phenotypes amongst the isolated strains. During bacteriological analysis of feed samples, *E. coli* was isolated in 4 per cent of cases; amongst the isolates obtained, some exhibited the ESBL phenotype and the AmpC phenotype. No carbapenemase-producing isolates were detected [1]. During the analysis of raw milk, the presence of *E. coli* isolates resistant to certain antimicrobial agents, in particular ampicillin, tetracycline and doxycycline, was also established. These results confirm the circulation of resistant *E. coli* in various components of the agri-food chain; however, they cannot be directly used to assess the nationwide prevalence of AMR due to differences in the samples, sites and study designs.

The development of antimicrobial resistance in *E. coli* occurs both as a result of chromosomal mutations and through the horizontal transfer of genetic determinants between bacteria. Mobile genetic elements – plasmids, transposons

and integrons – are of particular epidemiological significance, as they facilitate the accumulation and spread of resistance genes amongst bacterial populations. From a “One Health” perspective, particular attention should be paid to monitoring the blaCTX-M, blaTEM, blaSHV, blaCMY and mcr genes, which are associated with resistance to clinically significant classes of antimicrobial agents. At the same time, the determination of an AMR phenotype or the detection of a specific resistance gene in a food-derived isolate does not in itself constitute proof of its direct transmission to humans. To confirm such links, it is necessary to combine epidemiological data with the results of molecular genetic typing and whole-genome sequencing.

The data obtained and summarised indicate that the prevalence of resistant *E. coli* in the food chain is complex in nature and cannot be regarded solely as a problem specific to a particular type of product or a specific stage of its production. The higher frequency of detection of ESBL-producing *E. coli* in chicken meat compared with other products of animal origin may be linked to the specific characteristics of industrial poultry farming, high stocking densities, the intensity of the production cycle and the potential for cross-contamination during slaughter and processing. At the same time, the detection of ESBL- and AmpC-producing *E. coli* in animal feed in Ukraine is of particular significance, as feed may act as an additional route for resistant bacteria and AMR determinants to enter the animal microbiota and the production environment. The resistance detected in *E. coli* isolates from raw milk further confirms that the problem affects various sectors of animal husbandry and different stages of the food chain. However, direct comparison of the results of individual studies requires caution due to differences in sampling protocols, sample sizes, bacterial isolation methods and criteria for interpreting antimicrobial susceptibility.

Conclusions. *E. coli* is of multifaceted importance to the food safety control system, as it can be used as a sanitary indicator microorganism, act as a foodborne pathogen, and serve as an indicator of the spread of AMR within the “human–animal–environment” system. Among the food categories analysed, chicken is the most significant reservoir of ESBL-producing *E. coli*, which justifies the need for enhanced control specifically in this segment of the food chain. The research findings confirm the circulation of *E. coli* in animal feed, as well as of resistant isolates in raw milk. It is essential to establish an integrated monitoring system in accordance with the One Health principles.

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BACTERIOLOGICAL SAFETY OF FISH AND FISH PRODUCTS IN THE CONTEXT OF THE “ONE HEALTH” CONCEPT

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The current food safety system in the European Union is based on preventive risk management at all stages of the food chain. Its operation involves product traceability, the application of procedures based on HACCP principles, the carrying out of official controls, and the use of laboratory testing as one of the tools for verifying an adequate level of safety. For fish and products of aquatic origin, depending on their type and production technology, controls are supplemented by the assessment of other parameters, in particular histamine content and organoleptic characteristics. It is important to note that, in the European model, the compliance of an individual laboratory sample with established microbiological criteria is not regarded as a standalone guarantee of the safety of the entire batch of products. Laboratory control is an element of a much broader system for the prevention and identification of hazards and the management of identified risks [1–4].

The control of fish and fish products forms part of the overall food safety surveillance system. Among microbiological hazards, particular attention is paid to *Salmonella spp.* and *Listeria monocytogenes*, whilst additional criteria and corresponding laboratory methods are applied to certain types of fish products. The relevance of this approach is confirmed by cases of foodborne infections linked to fish products, in particular the European outbreak caused by *L. monocytogenes* ST173. A separate area of modern control is the assessment of the prevalence of antimicrobial resistance in the food chain. The detection of multi-resistant *E. coli* isolates in fish does not constitute direct evidence of the transmission of a specific bacterial clone from a food product to a human.

The detection of pathogenic or antibiotic-resistant bacteria in a finished product should be regarded as a basis for identifying the possible source and routes of their spread, rather than merely as the final result of laboratory testing.