



Book of Abstracts

5TH INTERNATIONAL CONFERENCE

ANTIMICROBIAL RESISTANCE - CURRENT STATE AND PERSPECTIVES

FROM SCIENCE TO PRACTICE



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From Science to Practice

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Antimicrobial resistance – current state and perspectives

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Dear colleagues,

It is our great pleasure to welcome you to the 5th International Conference “Antimicrobial Resistance – Current State and Perspectives”, held in Novi Sad, Serbia. Over the past five years, this conference has evolved into an important regional platform for interdisciplinary dialogue, scientific exchange, and collaborative action in addressing one of the most pressing global public health challenges – antimicrobial resistance (AMR).

This year's conference is organized under the slogan “From Science to Practice”, reflecting our commitment to translating scientific knowledge into practical solutions and everyday professional practice. Within the One Health framework, the conference brings together experts from veterinary and human medicine, microbiology, pharmacology, food safety, agriculture, environmental sciences, and related disciplines, emphasizing the interconnectedness of human, animal, and environmental health.

The scientific and professional program includes more than 70 scientific contributions presented through lectures, short communications, poster presentations, and 6 practical workshops, covering a broad spectrum of current AMR-related topics. Special attention has been devoted to practical workshops intended for veterinarians and medical doctors, focusing on real-life clinical and field challenges, rational antimicrobial use, diagnostics, preventive strategies, and stewardship approaches.

This year's conference addresses numerous contemporary challenges related to antimicrobial resistance, including AMR surveillance and monitoring, resistant zoonotic pathogens, food safety, residues of veterinary medicinal products in food, environmental dissemination of resistance genes, wastewater surveillance, and the growing role of microplastics and ecological niches in AMR spread.

Particular emphasis is placed on antimicrobial stewardship and responsible antibiotic use in both veterinary and human medicine, with dedicated sessions focusing on poultry, swine, companion animals, and public health. The program also highlights national and international initiatives developed with FAO support, promoting evidence-based approaches and harmonized strategies for combating AMR.

In line with this year's slogan “From Science to Practice”, the conference additionally explores innovative preventive and therapeutic approaches aimed at reducing antimicrobial dependence, including biosecurity measures, microbiota-oriented therapies, probiotics, phytotherapeutics, and feed and food safety management. The practical character of the conference is further emphasized through workshops focused on companion animal dermatology, mastitis control, avian pathogenic *E. coli*, hospital hygiene, and responsible antimicrobial therapy.

This year's conference further emphasizes the importance of interdisciplinary collaboration and coordinated action within the One Health framework. By bringing together experts from veterinary and human medicine, microbiology, pharmacology, food safety, agriculture, and environmental sciences, the conference aims to strengthen dialogue, exchange practical experiences, and support the development of evidence-based strategies for combating antimicrobial resistance.

We sincerely thank all participants, speakers, researchers, institutions, and partners for their contribution and dedication to this important mission. We hope that this conference will inspire meaningful discussions, new collaborations, and practical solutions in the global fight against antimicrobial resistance.

*Dr Zorana Kovačević, associate professor
President of the Scientific and Program Committee*

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ACARICIDE RESIDUES IN COMMERCIAL BEESWAX AND THEIR IMPLICATIONS FOR ANTIPARASITIC RESISTANCE IN *VARROA DESTRUCTOR*

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ABSTRACT

Beeswax, as a lipophilic matrix that is continuously recycled in beekeeping, represents a significant reservoir of various lipophilic contaminants, including pesticides and acaricides within the honeybee colony. Control of the parasite *Varroa destructor* is largely based on the application of acaricides such as coumaphos, amitraz, and tau-fluvalinate. Their improper or prolonged use may lead to the accumulation of residues in beeswax and the creation of selective pressure, which may potentially contribute to the development of resistance. The aim of this study was to determine the presence and levels of residues of coumaphos, amitraz, tau-fluvalinate, and imidacloprid in commercially available beeswax foundation sheets. The study included 336 samples collected over a two-year period from the market in Vojvodina, including products from the six most prevalent manufacturers in commercial distribution. The results revealed a pronounced presence of coumaphos in the analyzed samples, with concentrations ranging from 0.182 to 1.252 mg/kg, with the highest values recorded in certain producers. In most samples, coumaphos levels significantly exceeded the maximum residue limit (MRL = 0.01 mg/kg), while only one sample was at or below the acceptable threshold. Amitraz was detected in all samples at low concentrations (0.0016–0.0031 mg/kg), well below the MRL (0.20 mg/kg), while tau-fluvalinate and imidacloprid were not quantified above the detection limit (0.01 mg/kg). These findings indicate dominant contamination of beeswax with coumaphos as the most persistent acaricide, while other substances were present at significantly lower levels or below detection limits, reflecting differences in their stability and behavior in beeswax as a

lipophilic matrix. The results clearly confirm that beeswax represents a long-term reservoir of contaminants, in which once-accumulated pesticides cannot be fully eliminated through recycling processes. On the contrary, melting and reprocessing of wax leads to their continuous redistribution within the honeybee colony, thereby maintaining and potentially increasing residue levels. In this way, a closed cycle of contamination is established, resulting in the long-term presence of pesticides in the hive and continuous exposure of both honeybee individuals and the parasite *Varroa destructor*. The continuous presence of pesticides in beeswax results in chronic exposure of honeybee colonies to sublethal concentrations, which may have multiple adverse effects, including impaired brood development, reduced vitality and longevity, behavioral changes, weakened immune response, and increased susceptibility to pathogens. Such chronic exposure may contribute to the impairment of physiological functions in honey bees, behavioral changes, and increased susceptibility to pathogens, while also creating conditions for selective pressure on the parasite *Varroa destructor*. Although this study does not directly investigate resistance, the obtained results indicate that the presence of residues in beeswax may represent one of the factors potentially contributing to the development of resistance in *Varroa*. In the context of global efforts to combat antimicrobial resistance, these findings highlight the need for more rational and controlled use of veterinary medicinal products in beekeeping, improvement of beeswax quality control systems, and enhanced beekeeper education in good veterinary and apicultural practices. The integration of these measures represents an important step toward reducing chemical burden in honeybee colonies and preserving their health and resilience.

Key words: *Beeswax; coumaphos; Amitraz; Varroa destructor; Pesticide residues.*

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