

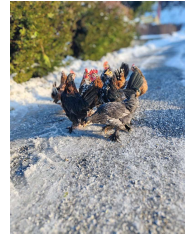
# The Role of Comprehensive Research on the Plant Extracts in a Circular Bioeconomy

Marijana Sokolovic (1), Camelia Tulcan (2), Roberta Tripon (2), Camen Dorin (2), Viktoria F. Samanidou (3), Natasa Kalogiouri (3), Marija Berendika (1)

1Croatian Veterinary Institute, Poultry Centre, Feed Analysis Laboratory, Zagreb, CROATIA

2Faculty of Engineering and Applied Technologies, University of Life Sciences "King Mihai I" from Timisoara, Timisoara, ROMANIA

3Laboratory of Analytical Chemistry, School of Chemistry, Aristotle University of Thessaloniki, Thessaloniki, GREECE



## Abstract

Improvement of animal welfare is strongly related to multi-factor goals of circular Bio-economy. All assets of poultry industry, just like in other livestock production systems, have important role in bio-economy. Namely, the use of different nutrients in animal feedstuffs, exploitation of poultry manure, feathers and other products have the goals not only to improve animal health and welfare, but also to assure human health, and to transform waste in resources. This approach has a strong potential to maximize efficiency of resources, assure sustainability and reduce environmental impacts.

In assuring animal welfare, health of animals is a critical factor. Improvements are necessary in the whole production chain, and starting with feed, and animal health is a noteworthy approach. In the scope of the project "Comprehensive Research on the Impact of Plant Extracts against resistant *Staphylococcus* (CRISP)", funded by the European Union NextGenerationEU and supported by the Ministry of Science and Education of the Republic of Croatia through the project NPOO 15 of Croatian Veterinary Institute, we aim to define the antimicrobial resistance burden in poultry and to search for novel plant-derived compounds. The results of this project will provide essential information on potential sources of antimicrobial resistance, risks of humans that are in close contact with animals, and will provide comprehensive knowledge on plant-derived compounds with beneficial effects on human and animal health.

The aim of this poster presentation is to provide overview of resources, scientific approach and goals that are used: to define and evaluate important issues in improvement of animal health; to acquire new knowledge on plant-derived compounds, and to elucidate how poultry industry influences the feed and food security, human health, re-use of poultry waste, agro-industry and other crucial elements of circular bio-economy.

## Introduction

Nowadays, poultry industry if focusing on novel feed ingredients and transforming waste in valuable resources with the final aims in reduction of environmental impacts, stronger sustainability and maximising resource efficiency.

In one of the current global health issues, i.e. antimicrobial resistance (AMR), the poultry industry is often viewed as a major contributor. In relation to this, numerous strategies are applied with the aim to prevent widespread use of antibiotics, application of novel feed ingredients, natural compounds with antimicrobial potential and enhancement of biosecurity measures. However, the role of animals in spreading of AMR in poultry industry is not fully investigated. Numerous researches are indicating that close-contact with animals (e.g. farm workers) as well as releasing of pathogens into environment via poultry manure (especially if it is used as fertilizer) are important routes of transmission of AMR. Defining the burden of AMR in healthy animals will in the end minimise the risks of transmission of pathogens among animals, as well as to humans and in the environment.

Plants and their extracts. Content of bioactive compounds (i.e. polyphenols) makes certain plants an important source for various applications in (veterinary) medicine, cosmetic, food and beverage industries. For that purposes, quality and safety are strongly related to knowledge of plant ingredients and content of specific compounds, presence of various contaminants, etc. Compounds of interest in poultry feed can be found in grains and other plant materials used for flavouring and palatability enhancement purposes, and as feed additives. Beneficial effects are direct antioxidant effects, improvement of nutritional value of feed (and consequently of poultry products), etc. However, certain compounds might have unwanted effect (e.g. anti-nutritive and toxic) or can be poorly absorbed in digestive system of poultry. Therefore, this study is focused on the importance of quality control testing of herbs and their extracts in evaluation of risks related to potential toxic effects of their use and defining the plants (and their extracts) that have promising potential in mitigating risks of antimicrobial resistance and improvement of human and animal health.

**Participants** - Research Team on this project will include scientists from;

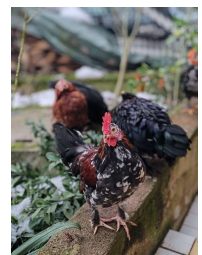
**Croatian Veterinary Institute, Poultry Centre – CROATIA**



**Faculty of Engineering and Applied Technologies,  
University of Life Sciences "King Mihai I" from Timisoara (ULST) – ROMANIA**



**Aristotle University of Thessaloniki, Department of Chemistry,  
Laboratory of Analytical Chemistry – GREECE**



- **WP1** Management and organisation of the project
- **WP2** Chemistry and Microbiology of Plants
- **WP3** Chemistry of Plant extracts
- **WP4** Prevalence of resistant *Staphylococcus* and related isolates
- **WP5** Dissemination and outreach activities

In the scope of the project "Comprehensive Research on the Impact of Plant Extracts against resistant *Staphylococcus* (CRISP)", funded by the European Union NextGenerationEU and supported by the Ministry of Science and Education of the Republic of Croatia through the project NPOO 15 of Croatian Veterinary Institute, we aim to define the antimicrobial resistance burden in poultry and to search for novel plant-derived compounds.

Main goals of the research project:

- Determination of the **chemical composition** of the dried leaves (source: bio producer and local plants) and the **content of bioactive compounds**
- **Preparation of plant extracts** (freeze dried plants and essential oils and combo extracts cocktails)
- **Chemical characterisation of plant extracts** (bioactive compounds, polyphenols, etc):
- Determination of **antioxidant and antimicrobial activity of extracts**
- Survey of **incidence of resistant strains of *Staphylococcus*** (and related ESKAPE pathogens) in dogs and cats and in primary poultry production
- Determination of **antimicrobial activity of prepared plant extracts against resistant *Staphylococcus* strains**.

## ACKNOWLEDGMENTS

This study was funded by the European Union NextGenerationEU and supported by the Ministry of Science and Education of the Republic of Croatia through the project NPOO 15 of Croatian Veterinary Institute entitled "Comprehensive Research on the Impact of Plant Extracts against resistant *Staphylococcus* (CRISP)"

**The results** of this project will elucidate how poultry industry influences the feed and food security, human health, re-use of poultry waste, agro-industry and other crucial elements of circular bio-economy.