

Hazards related to cross-contamination of feed with antibiotics

The use of antibiotics in food-producing animals is one of the most significant concerns of consumers. No wonder, the antimicrobial resistance is a growing problem endangering public health across the world. Although the use of antimicrobials in veterinary medicine is decreasing in Europe, such trend is not necessarily seen in Poland. What is even more troubling, the use of some antibiotics found to be critical for human medicine (like polymyxins and fluoroquinolones) is among the largest ones in Europe.

Antimicrobials are given to animals via many routes. In pigs and poultry, administration with drinking water and medicated feed is preferred because of the practicality of the approach. High-quality medicated feed production is challenging; moreover, the next batches of feedstuff produced in the same feed mill may become cross-contaminated. The European Commission has acknowledged this problem and intends to introduce the legal limits for cross-contamination of feeds with antibiotics. However, to do so, it needs reliable data on the possible impacts of low doses of antibiotics given to animals for more extended periods.

This project is the response to that need. We intend to verify the possible impacts of low doses of antibiotics on animal and human health and the environment. The approach is broad and covers the emergence of antimicrobial resistance and subtle impacts on animal physiology, including microbiome metabolism of bioactive compounds and immunology.

An animal experiment will be conducted on broiler chickens. Six different antibiotics (colistin, doxycycline, flumequine, thiamphenicol, tiamulin, tilmicosin) will be tested and compared to the control group. The antibiotics will be given in feed during the whole rearing period at doses equal to 2% of the maximum approved concentration. The following parameters will be analyzed:

- Monitoring of clinical condition and production results;
- Histopathological analyses of intestines and spleen;
- Changes in the gut microbiome (percentage of specific genera/species of bacteria and occurrence of genes for antimicrobial resistance);
- Metabolic activity of gut microbiome that could impact the animal physiology;
- Transcriptomic profile cecum, spleen, liver, and pancreas representing, among others, the immunological status of the animal;
- Interactions with CYP450 enzymes in the liver and intestine that could impact the action of other drugs given to the animals;
- Residues of antibiotics in muscle, liver, and kidney;
- The quality of meat.

Analysis of risks related to the cross-contamination of feeds with antibiotics is to be performed by European Food Safety Authority. The project will provide data for such analysis. In addition, the project's results could be used by the producers willing to grow animals without the use of antibiotics.