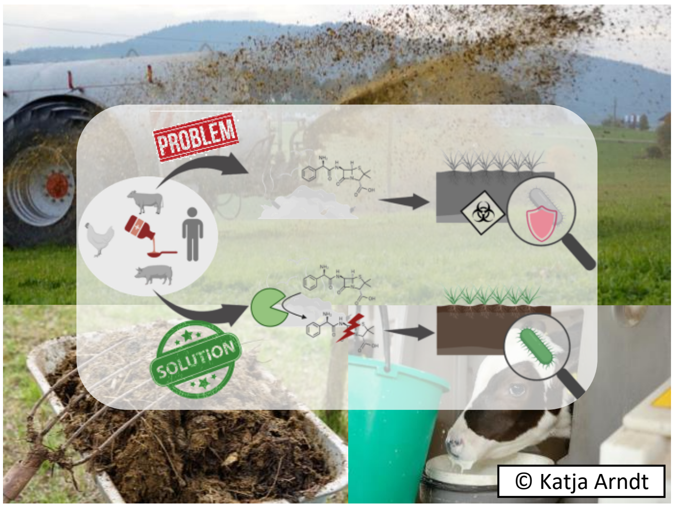
Universität Potsdam · Potsdam Transfer Transferservice

Transfer Offer 25-02

Enzymatic Inactivation of Antibiotics in Agricultural Waste

Description



The Molecular Biotechnology research group, led by Prof. Dr. Katja Arndt, develops innovative solutions to combat antimicrobial resistance (AMR) through the enzymatic inactivation of antibiotics in organic waste. Antibiotics are used in large quantities not only in human medicine but also extensively in animal husbandry and agriculture. As a result, antibiotics enter the environment via waste products, feces, or milk from treated cows, promoting the development of antibiotic resistance. This can lead to the emergence of multidrug-resistant pathogens that are ultimately difficult or impossible to treat, posing a serious threat to human health. Of particular concern is that antibiotic-resistant bacteria frequently activate mechanisms that enable them to develop resistance to multiple, even structurally unrelated, classes of antibiotics.

The research group is therefore working on novel methods for the enzymatic degradation of antibiotics in various media. A key application is the enzymatic treatment of raw milk to specifically eliminate antibiotic residues. This allows waste milk from treated cows to be safely fed to calves without the risk of resistance development. Additionally, the team is investigating the use of this technology for wastewater treatment, for example from hospitals or municipal sewage plants. The goal is to significantly reduce the antibiotic load in the environment and thereby effectively prevent the emergence and spread of resistant pathogens. For this purpose, enzymes are being engineered and optimized through targeted molecular evolution to efficiently deactivate antibiotics in agricultural waste such as liquid manure and waste milk. Recent results successfully demonstrate the practical applicability of an optimized enzyme for decontaminating antibiotic-containing waste in agricultural settings under real-world conditions. This biotechnological approach offers a cost- and energy-efficient method to prevent the release of antibiotics into the environment, thereby helping to mitigate the development and spread of antimicrobial resistance (AMR).

Details

- Targeted optimization of enzymes through molecular evolution
- Investigation of enzyme activity under real application conditions
- Verification of enzymatic inactivation of antibiotics in various samples
- Establishment of an enzymatic decontamination process for practical implementation

Applications

- Agriculture
- Waste water treatment
- Decontamination

Keywords

- Antibiotics
- Enzymes
- Resistance

Interest in cooperation

- Research-based collaboration
- Contract research
- Industry-sponsored research

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