

REDYMO – Research Programme on the Reduction of Resistant Microorganisms in the Food Chain

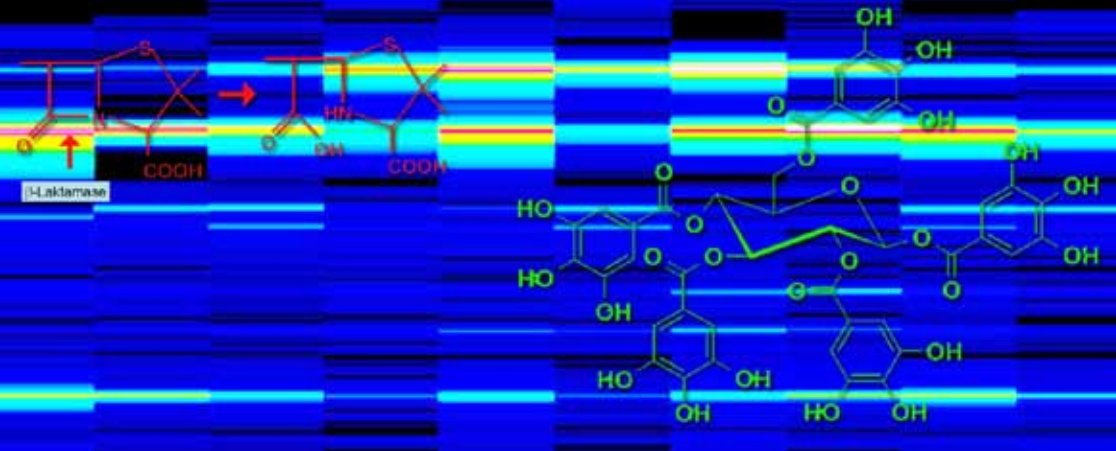


Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Swiss Confederation

Federal Department of Economic Affairs,
Education and Research EAER

Agroscope



REDYMO – Research Programme on the Reduction of Resistant Microorganisms in the Food Chain

Antibiotics used in human medicine are rapidly losing their effectiveness owing to an increase in resistant bacteria.

The food production chain is presumed to play a key role here, both as a reservoir for and in the formation of these resistances.

With the help of basic research and practical solutions, **REDYMO** – the Agroscope research programme on the '**R**eduction and **D**ynamics of antibiotic-resistant and persistent **M**icroorganisms along food chains' – will provide answers.

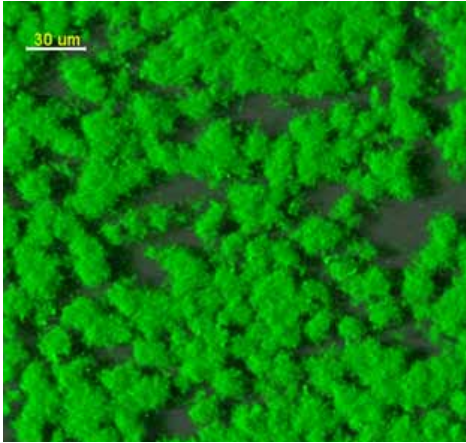
Aims

In selected areas of food production, antibiotic-resistant bacteria and resistant biofilms are being studied with three main aims:

- To identify possible risks for humans and animals
- To develop preventive measures
- To search for solutions to reduce contamination and the spread of infection.

Photos: Agroscope, David Drissner; Ann E. Hagerman (2010) Hydrolyzable Tannin Structural Chemistry

Research projects



The selected areas of food production dealt with in the research programme are (1) the production of plant-based foods, (2) the dairy industry, and (3) pig husbandry.

Microscopic photo (with a confocal laser microscope) of a biofilm.

Photo: Agroscope, Maria-Theresia Gekenidis

Networking

As an internal research programme of Agroscope, REDYMO consists of three project teams dealing with the research projects outlined below.

REDYMO cooperates on a national level with institutes of higher education, agencies, industries, and representatives of StAR (Strategy for Antibiotic Resistances, Swiss Federal Office of Public Health).

REDYMO is internationally networked with partners from COST Action FA 1202 ('A European Network for Mitigating Bacterial Colonisation and Persistence') and other institutes.

Antibiotic resistance (ABR) describes the ability of microorganisms to suppress the effect of antibiologically active substances.

Persistence is the 'stubborn' colonisation of an organism in a system. This can occur in food processing, e.g. when bacteria remain in pipes despite proper cleaning.

Biofilms consist of extra-cellular substances in which microorganisms are embedded. They develop when microorganisms colonise surfaces. There are biofilms everywhere (e.g. dental plaque).



Antibiotic resistance and persistence on plant surfaces

The aim of this project is to better understand the occurrence and transfer of antibiotic resistance (ABR) in the plant food chain. The focus is on the one hand on identifying and characterising bacterial isolates and communities, and on the other on determining the frequency with which ABRs occur in pathogenic (i.e. disease-causing) and non-pathogenic bacteria in fresh produce and its production environment. In addition, the transfer of ABR between bacteria on a molecular and cellular level as well as the mechanisms underlying persistence in biofilms are investigated. Research results are to serve as a basis for developing strategies for preventing the spread of ABRs in the food chain. This happens in close cooperation with practitioners and associations.

Project team: Dr. David Drissner, Dr. Mitja N.P. Remus-Emsermann, Maria-Theresia Gekenidis, Dr. Jürg Ernst Frey

Contact: Dr. David Drissner
david.drissner@agroscope.admin.ch

Photos: Agroscope, David Drissner und Mitja N.P. Remus-Emsermann



Biofilms in the dairy industry

The aim of these studies is to understand the role of biofilms in the dynamics of persistent and antibiotic-resistant bacteria in milk production and milk processing.

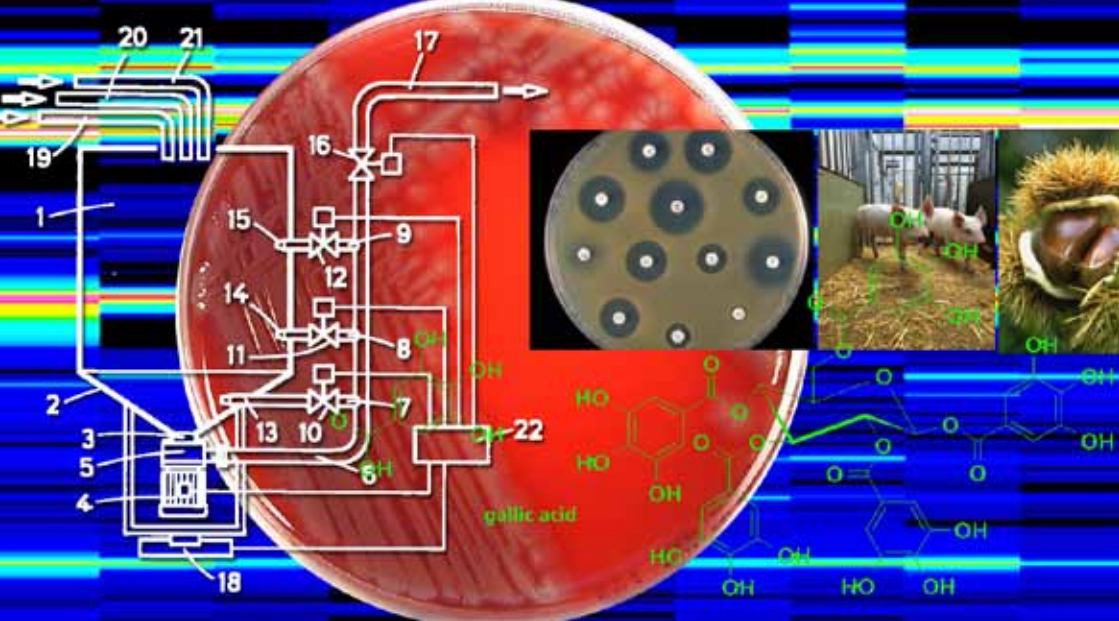
To this end, the biofilm formation potential of pathogens isolated from milk or raw-milk cheese is determined. In addition, biofilm-forming bacterial communities are characterised 'on the spot' in milking installations and in production areas of cheese dairies.

The aim is to investigate the importance of biofilms in the transfer and spread of antibiotic resistance genes, and the extent to which pathogenicity factors (e.g. bacterial toxins) play a role in bacterial populations from the dairy sector. Recommendations for food safety are derived from this research.

Project team: Dr. Jörg Hummerjohann, Dr. Hans Ulrich Graber,
Dr. Roger Marti, Elowine Thiran

Contact: Dr. Jörg Hummerjohann
joerg.hummerjohann@agroscope.admin.ch

Photos: Fluxionbio; Zeiss;
Agroscope, Jörg Hummerjohann



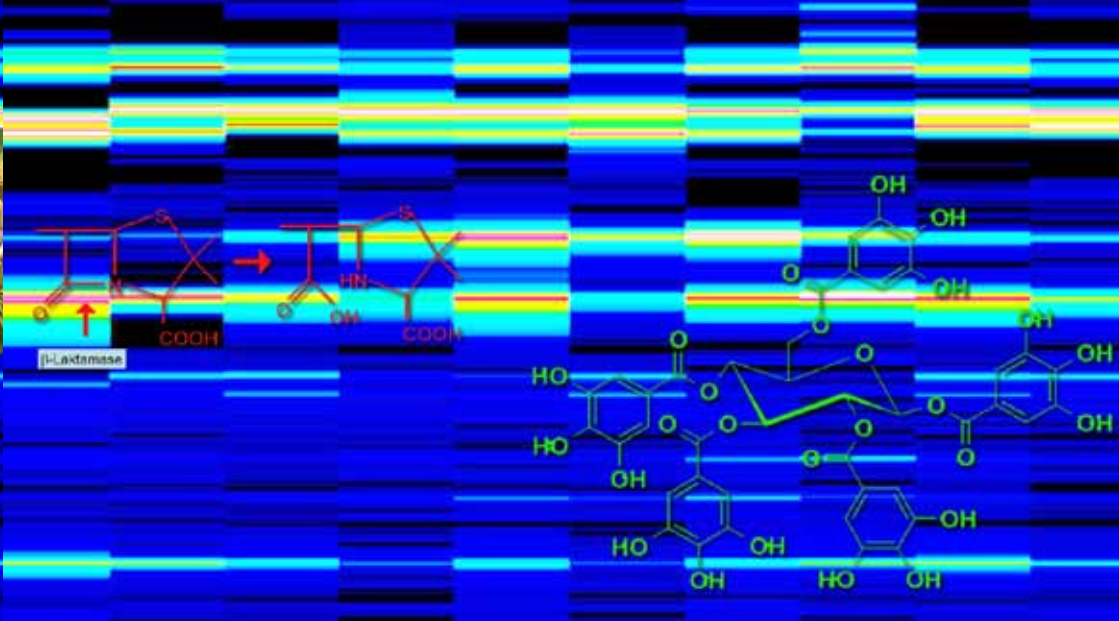
Reduction and spread of resistance in pig production

Each use of antibiotics can lead to the selection of resistant bacteria. When animals are treated with antibiotics, there is the risk of spreading resistant bacteria from animals to humans. One of the main areas of use of antibiotics in livestock husbandry is the control of diarrhoea in weaned piglets that have been separated from the mother sow and her milk. The use of plant-based active substances such as tannins or essential oils in diarrhoea prevention is meant to reduce the use of antibiotics in pig production. This in turn could mitigate the problem of resistance development. The possible spread of resistances via the pipes of liquid feeding systems on pig farms is also being investigated with the aim of formulating concrete recommendations for farmers.

Project team: Dr. Giuseppe Bee, Dr. Andreas Gutzwiller,
Dr. Sophie Thanner

Contact: Dr. Giuseppe Bee
giuseppe.bee@agroscope.admin.ch

Photos: Flüssigfütterungsanlage, SCHAUER MASCHINENFABRIK GESELLSCHAFT M.B.H. & CO. KG; globolab; bakteriologieatlas; Agroscope, Sophie Thanner; Agroscope



Programme management and information

Ulrich Zürcher, Dr.

Head of the Plant-Based Foods Research Division
 Head of Agroscope REDYMO Research Programme

Federal Department of Economic Affairs,
 Education and Research EAER

Agroscope

Institute for Food Sciences IFS

Schloss 1, Postfach, CH-8820 Wädenswil
 Tel. +41 (0)58 460 63 20
 Fax +41 (0)58 460 63 41
ulrich.zuercher@agroscope.admin.ch

Thomas Berger

Head of the Food Safety Research Group
 Deputy Head of Agroscope REDYMO Research Programme

Federal Department of Economic Affairs,
 Education and Research EAER

Agroscope

Institute for Food Sciences IFS

Schwarzenburgstrasse 161, CH-3003 Bern
 Tel. +41 (0)58 463 81 26
 Fax +41 (0)58 463 82 27
thomas.berger@agroscope.admin.ch

