Alternatives to Antibiotics

Erasmus+ 2021-2027 *Blended intensive programme (BIP) on Essential oils and humic substances in food production*
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When it comes to food safety, consumers worry most about antibiotic residues, as a current survey shows. Is it a legitimate concern? How great is the danger?

- ✓ *According to the current consumer survey, consumers believe that their food is generally safe.*
- ✓ *However, the majority of people are concerned about antibiotic residues and resistances – even more than they worry about microplastics, pesticide residues, mycotoxins or Salmonella.*
- ✓ *Indeed, antibiotics in the food chain have been a well-known issue for several years.*
- ✓ *In industrial animal husbandry, animals are often treated with antibiotics, which may result in residues in animal products if used incorrectly.*
- ✓ *Consumption of contaminated food is a health risk.*

So how many antibiotics are there in our food?

- ✓ *None, as long as the drug was used correctly in livestock and the statutory withdrawal period was observed before the animals were slaughtered.*
- ✓ *Antibiotics form residues only if used incorrectly or excessively.*
- ✓ *However, foodstuffs of animal origin are carefully monitored and overall the food authorities only rarely encounter antibiotic residues in food.*

Chemical contaminants in the food chain - YouTube

https://food.r-biopharm.com/news/antibiotic-residues-how-contaminated-is-our-food/

ONE HEALTH

BY PROTECTING ANIMALS, WE PRESERVE OUR FUTURE

Animal and human sectors work together to protect health and ensure food safety and security

- **60%** of human pathogens are of animal origin
- **5** new human diseases appear each year
- **20%** of animal production losses are caused by diseases globally

With regards to animal health, veterinarians are key players of the 'One Health' concept

Early detection of diseases and infections at animal source can prevent their transmission to humans or introduction of pathogens into the food chain

FROM FARM

Healthy animals raised in humane conditions

1 PRODUCTION

- Surveillance, prevention and control of animal diseases
- Animal welfare management to ensure robust and healthier animals
- Feed quality control
- Safe use of veterinary drugs

2 TRANSPORT

- Only healthy animals transported
- Animals health and welfare monitored during the journey from the farm to the slaughterhouse

3 SLAUGHTERHOUSE

Before slaughter
- Analysis of the health data from the farm
- Clinical examination

After slaughter
- Inspection of the carcass
- Laboratory analysis

4 PROCESSING, STORAGE AND DISTRIBUTION

- Verification of hygiene
- Cold chain integrity

5 SUPERMARKET RESTAURANT

- Verification of hygiene
- Cold chain integrity

TO FORK

Safe food for consumers

Open cooperation with all the actors involved along the food chain is essential

THROUGHOUT THE FOOD CHAIN
Veterinarians are responsible for regulations on animal health, animal welfare, traceability, food safety and safe trade of animal products

European Commission

WORLD ORGANISATION FOR ANIMAL HEALTH
Protecting animals, preserving our future

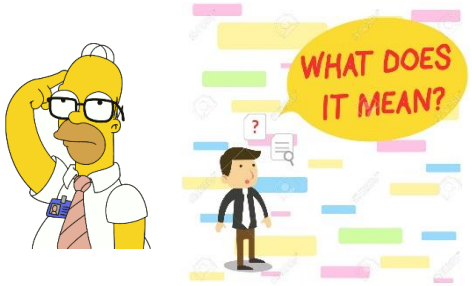
Antibiotics are drugs used to treat infections in both humans and animals

ANTIBIOTICS

Ensuring appropriate use of drugs in animals to preserve their effectiveness

- Prescription and administration of antibiotics to animals under the supervision of **well-trained veterinarians**

Their misuse in humans or in animals can lead to the emergence of bacteria resistant to their action, and hamper the control of animal and human diseases



What is an antibiotic?

- *'**antibiotic**' means any substance with a direct action on bacteria that is used for treatment or prevention of infections or infectious diseases*

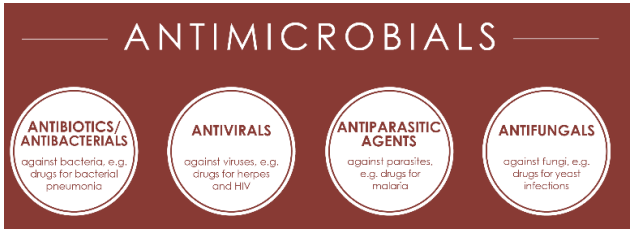
What group does antibiotics belong to?

- *Antibiotics belong to the group of antimicrobials.*

https://www.youtube.com/watch?v=ztsBGJ5FFoY

What is an antimicrobial?

- *'**antimicrobial**' means any substance with a direct action on micro-organisms used for treatment or prevention of infections or infectious diseases, including antibiotics, antivirals, antifungals and anti-protozoals*



*These substances **may leave residues in the food from treated animals.***

***Regulation (EU) 2019/6** of the European Parliament and of the Council of 11 December 2018 on veterinary medicinal products and repealing Directive 2001/82/EC*

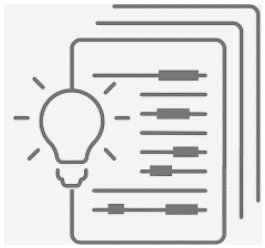
What is a residue?

•***'residues of pharmacologically active substances'*** *means all pharmacologically active substances, expressed in mg/kg or µg/kg on a fresh weight basis, whether active substances, excipients or degradation products, and their metabolites which remain in food obtained from animals*

Regulation (EC) No 470/2009 *of the European Parliament and of the Council of 6 May 2009 laying down Community procedures for the establishment of residue limits of pharmacologically active substances in foodstuffs of animal origin*

https://www.youtube.com/watch?v=_s5fCHDeIL4

Therapeutic classification of pharmacologically active substances



Commission Regulation (EU) No 37/2010 *of 22 December 2009 on pharmacologically active substances and their classification regarding maximum residue limits in foodstuffs of animal origin*

- ✓ *Anti-infectious agents / Antibiotics*
- ✓ *Anti-infectious agents / Chemotheurapeutics*
- ✓ *Antiparasitic agents / Agents acting against protozoa*
- ✓ *Antiparasitic agents / Agents acting against endo- and ectoparasites*
- ✓ *Agents acting on the reproductive system*
- ✓ *Agents acting on the nervous system / Agents acting on the central nervous system*
- ✓ *Agents acting on the nervous system / Agents acting on the autonomic nervous system*
- ✓ *Anti-inflammatory agents / Nonsteroidal anti-inflammatory agents*
- ✓ *Corticoides / Glucocorticoides*

Residues can occur in all types of foods of animal origin including milk, meat, internal organs (liver, kidney), skin, fat, eggs and honey.

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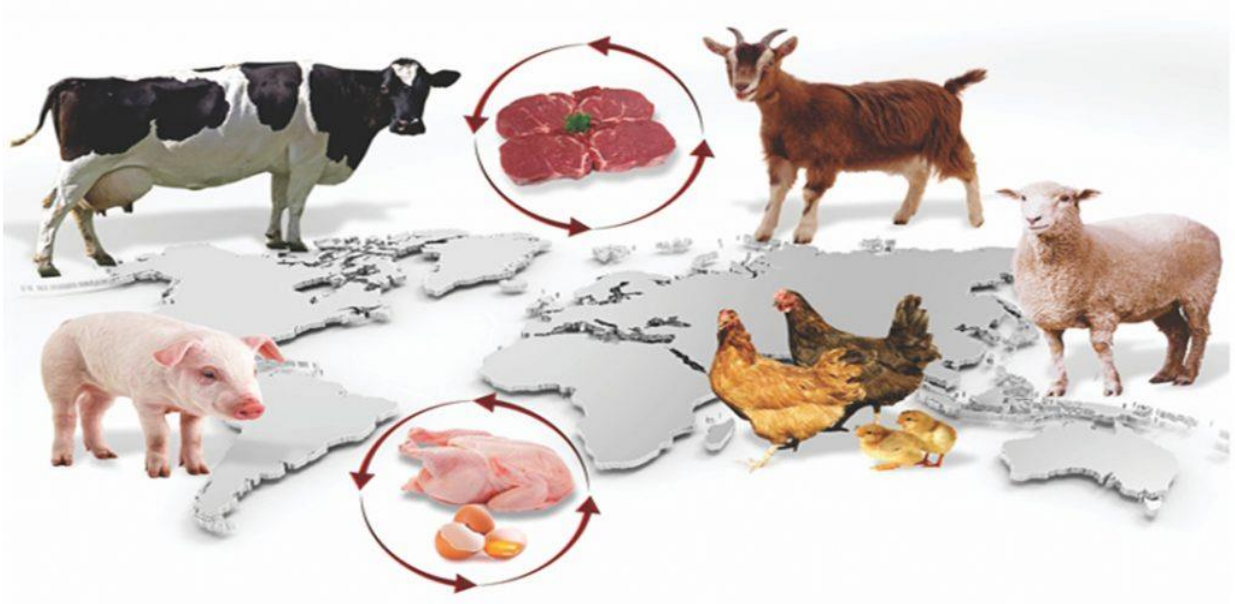
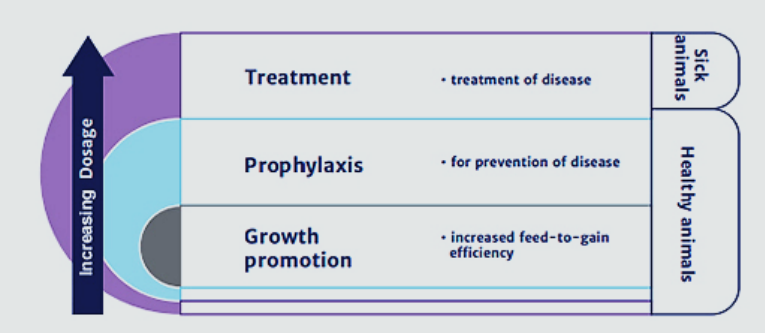
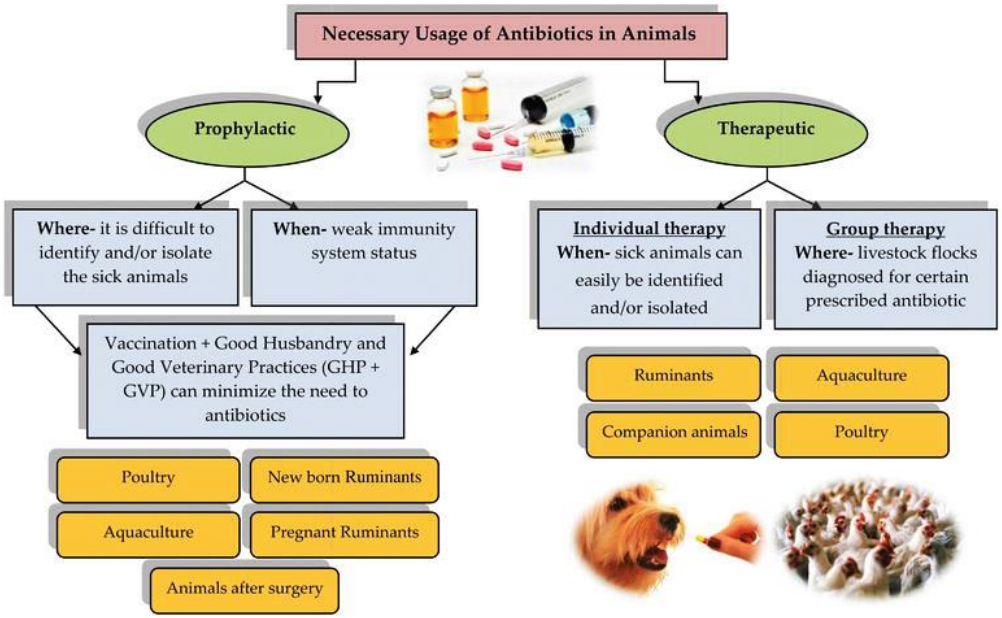


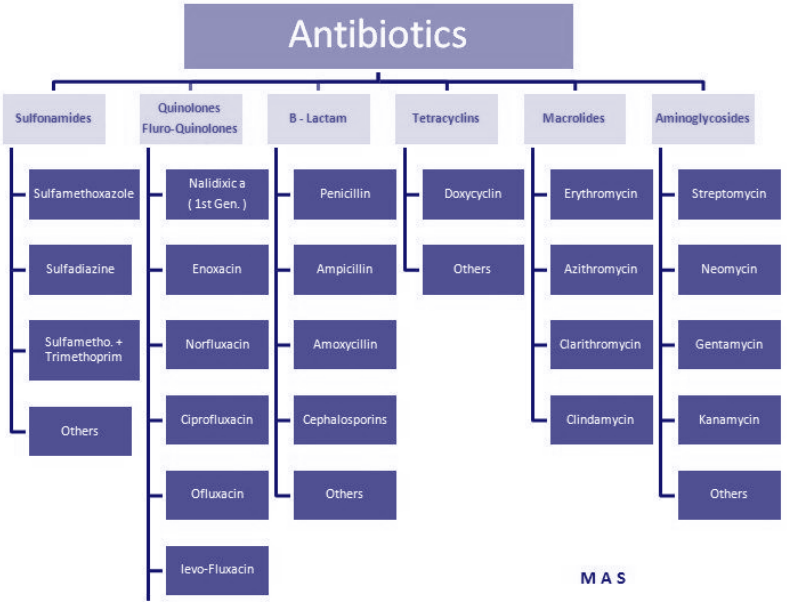
*'**Food-producing animals**' means animals bred, raised, kept, slaughtered or harvested for the purposes of producing food.*

Residues of pharmacologically active substances occur in foods of animal origin as an unwanted concomitant consequence of the use of drugs in animal production.

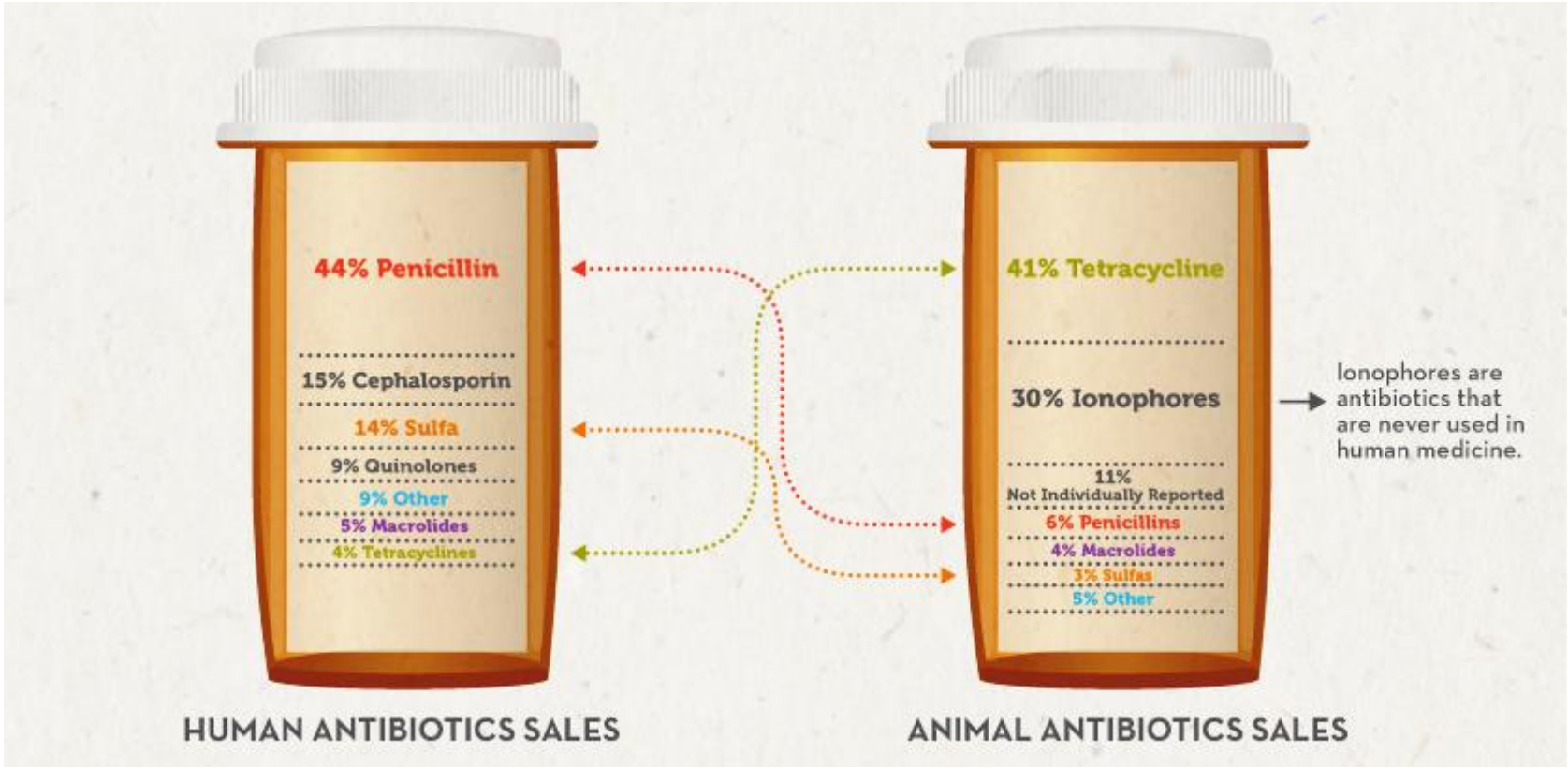


- ***at therapeutic concentrations***
- ***at subtherapeutic concentrations***
- ***subtherapeutically for production enhancement***



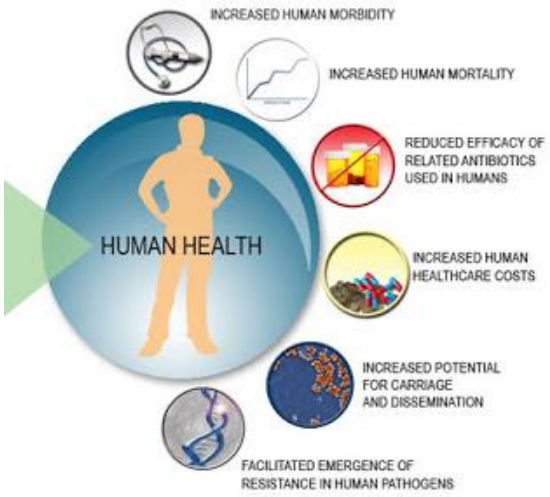


TOP ANTIBIOTICS USED IN HUMANS vs. ANIMALS



Health risks of antibiotic residues in food

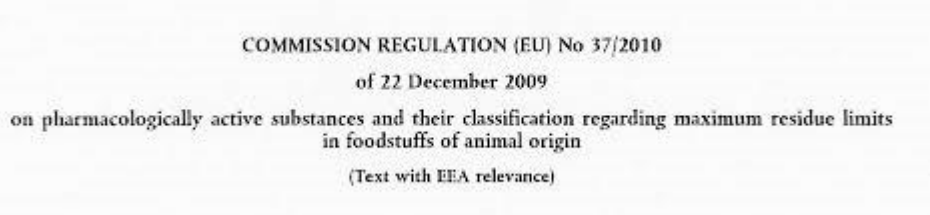
- ✓ *Due to the potentially **carcinogenic, mutagenic, teratogenic and toxic properties of antibiotic residues and their allergic or hypersensitivity potential, including disruptions of normal intestinal flora**, the consumption of contaminated food establishes a direct risk for public health.*
- ✓ *The inappropriate use of antibiotics in animal husbandry and food production promotes **the multi-drug resistance of pathogen bacteria for antibiotics used in human medicine**.*
- ✓ *Antibiotic residues bear a risk for the production process safety and consequently also an economic risk, as they **inhibit biotechnological production processes involving microorganisms such as starter cultures in the dairy and meat industry**.*



- https://www.youtube.com/watch?v=FdfdG-2r9Lw
- https://www.pbs.org/wgbh/frontline/article/documentary-superbugs-antibiotic-resistance-food-animals-nightmare-bacteria/
- https://www.youtube.com/watch?v=s0964QSFPf8

The EU requires by law that foodstuffs such as meat, milk or eggs must not contain residue levels of veterinary medicines that might represent a hazard to the health of the consumer.

- ***In order to protect public health, maximum residue limits should be established*** *in accordance with generally recognised principles of safety assessment, taking into account toxicological risks, environmental contamination, as well as the microbiological and pharmacological effects of residues.*
- *'**maximum residue limit**' means the maximum concentration of a residue of a pharmacologically active substance which may be permitted in food of animal origin*
- *Once maximum residue limits have been allocated,* ***it is necessary to determine the withdrawal period.***
- *'**withdrawal period**' means the minimum period between the last administration of a veterinary medicinal product to an animal and the production of foodstuffs from that animal which under normal conditions of use is necessary to ensure that such foodstuffs do not contain residues in quantities harmful to public health*


COMMISSION REGULATION (EU) No 37/2010

of 22 December 2009

on pharmacologically active substances and their classification regarding maximum residue limits in foodstuffs of animal origin

(Text with EEA relevance)

List of substances monitored in live animals and animal products

ANNEX I

GROUP A — Substances having anabolic effect and unauthorized substances

(1) Stilbenes, stilbene derivatives, and their salts and esters

(2) Antithyroid agents

(3) Steroids

(4) Resorcylic acid lactones including zeranol

(5) Beta-agonists

(6) Compounds included in Annex IV to Council Regulation (EEC) No 2377/90 o

GROUP B — Veterinary drugs(1) and contaminants

(1) Antibacterial substances, including sulphonomides, quinolones

(2) Other veterinary drugs

- (a) Anthelmintics
- (b) Anticoccidials, including nitroimidazoles
- (c) Carbamates and pyrethroids
- (d) Sedatives
- (e) Non-steroidal anti-inflammatory drugs (NSAIDs)
- (f) Other pharmacologically active substances

(3) Other substances and environmental contaminants

- (a) Organochlorine compounds including PcBs
- (b) Organophosphorus compounds
- (d) Chemical elements
- (d) Mycotoxins
- (e) Dyes
- (f) Others

Table 2

Prohibited substances

Pharmacologically active substance	MRL
Aristolochia spp. and preparations thereof	MRL cannot be established
Chloramphenicol	MRL cannot be established
_____	
Chlorpromazine	MRL cannot be established
Colchicine	MRL cannot be established
Dapsone	MRL cannot be established
Dimetridazole	MRL cannot be established
Metronidazole	MRL cannot be established
Nitrofurans (including furazolidone)	MRL cannot be established
Ronidazole	MRL cannot be established

- ✓ *Antibiotics were once considered wonder drugs. They worked fantastically to treat infections and bring down the mortality and morbidity due to bacterial infections.*
- ✓ *Unfortunately, humans misused these drugs resulting in antibiotic resistance. As a result, antibiotics started to fail.*
- ✓ *The emergence and spread of antibiotic resistance have created a growing global threat.*
- ✓ *Pharmaceutical companies are showing more interest in funding drugs like anticancer drugs and diabetic drugs instead of antibiotics.*
- ✓ *As a result, very few new antibiotics got discovered in the last decade.*
- ✓ ***Hence, it becomes imperative to utilize alternatives to antibiotics to preserve our wonder drugs.***

ALTERNATIVES

to Antibiotics in Animal Agriculture

Alternative products play a crucial role in allowing farmers and veterinarians to reduce the use of antibiotics.

- ✓ *Can help maintain healthy herds*
- ✓ *Reduce the need for antibiotics*

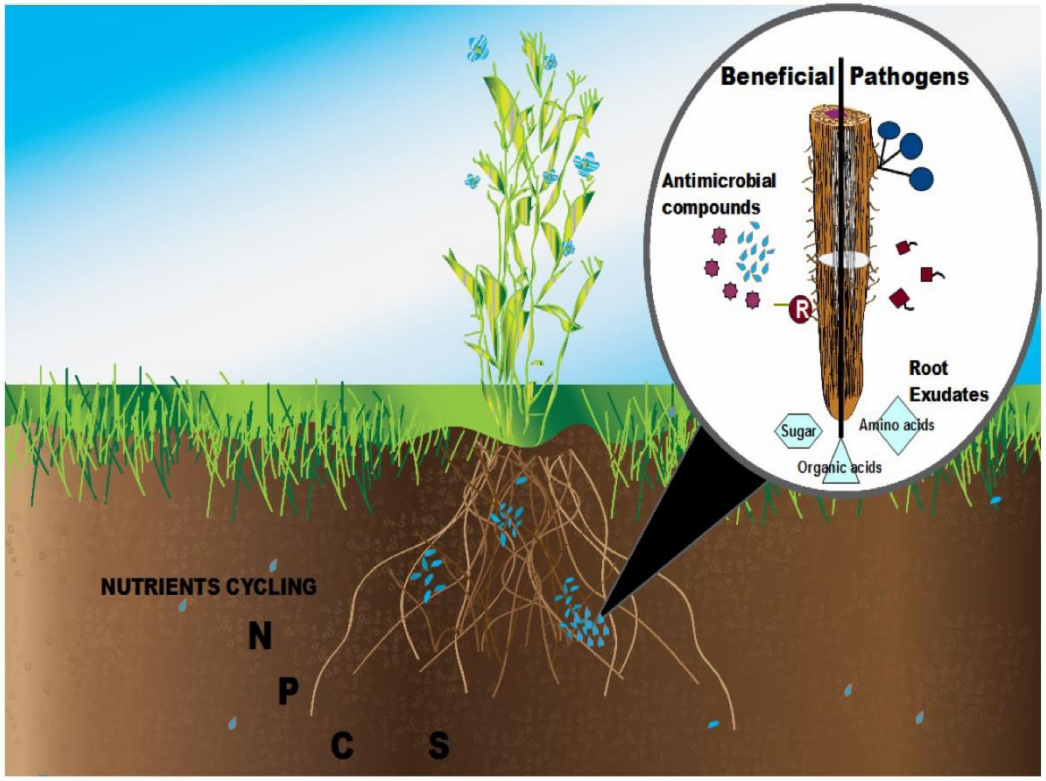
Mechanism of Action?

- ✓ *Target bacteria*
- ✓ *Improve gut health*
- ✓ *Stimulate or enhance host immune response*

https://preventit.in/abr-news/short-review-on-the-potential-alternatives-to-antibiotics-in-the-era-of-antibiotic-resistance/

➢https://www.youtube.com/watch?v=7EnsXc3kZ5c

What about the Humic Substances?



Viewpoints on the Humic Substances Research - Simona Hriciková, Mgr.

Thank you for your attention

HAVE A NICE DAY