FINNISH FOOD AUTHORITY
Ruokavirasto • Livsmedelsverket

ANTIBIOTIC RESISTANCE IN THE MEAT PRODUCTION

Responsible antibiotic use – a guide for producers

Preventing antibiotic resistance is a shared concern and every farm can make a difference

Dear Producer,

We're extending an invitation for you to join us in our shared efforts to prevent antibiotic resistance because, when it comes to producing clean food, every farm has an important contribution to make.

Effective disease prevention and ensuring high level of animal health and welfare are key to maintaining the efficacy of antimicrobials. This can be achieved by ensuring that animals are kept in conditions promoting their wellbeing, maintaining high level of hygiene across all farm activities and by observing regular veterinary care, including vaccinations.

When antibiotics cannot be avoided and are needed to treat a sick animal, they should always be administered in accordance with the veterinarian's instructions. Thank you for joining us to promote better health for everyone and helping ensure that antibiotics remain effective now and in the future.

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You can make an important contribution to preventing antibiotic resistance

Antibiotics are used in the treatment of bacterial infections, including mastitis and septic arthritis, in production animals. Antibiotics are also important for humans and other animals. Especially over the past two decades, there has been a rise in antibiotic resistance and the number of multidrug-resistant bacteria around the world.

The health threat that antibiotic resistance poses is widely recognised internationally by organisations such as the United Nations' Food and Agriculture Organization (FAO), the European Commission, the World Health Organization (WHO) and the World Organisation for Animal Health (OIE).

Drug-resistant bacteria have always existed, but due to antibiotic use their amount has increased. The widespread use of antibiotics means that there may not be effective remedies/medicine to treat bacterial infections in the future.

Antibiotics *are medicines used in the treatment of bacterial infections. There are many different types of antibiotics, and the way they work and the bacteria they can be used to treat varies widely.*

Antibiotic resistance *describes the ability of bacteria to resist the effects of an antibiotic. All antibiotic use, especially overuse and misuse, drives resistance.*

Sensitive bacteria *means that bacteria will be killed or their growth will slow down when an antibiotic is administered.*

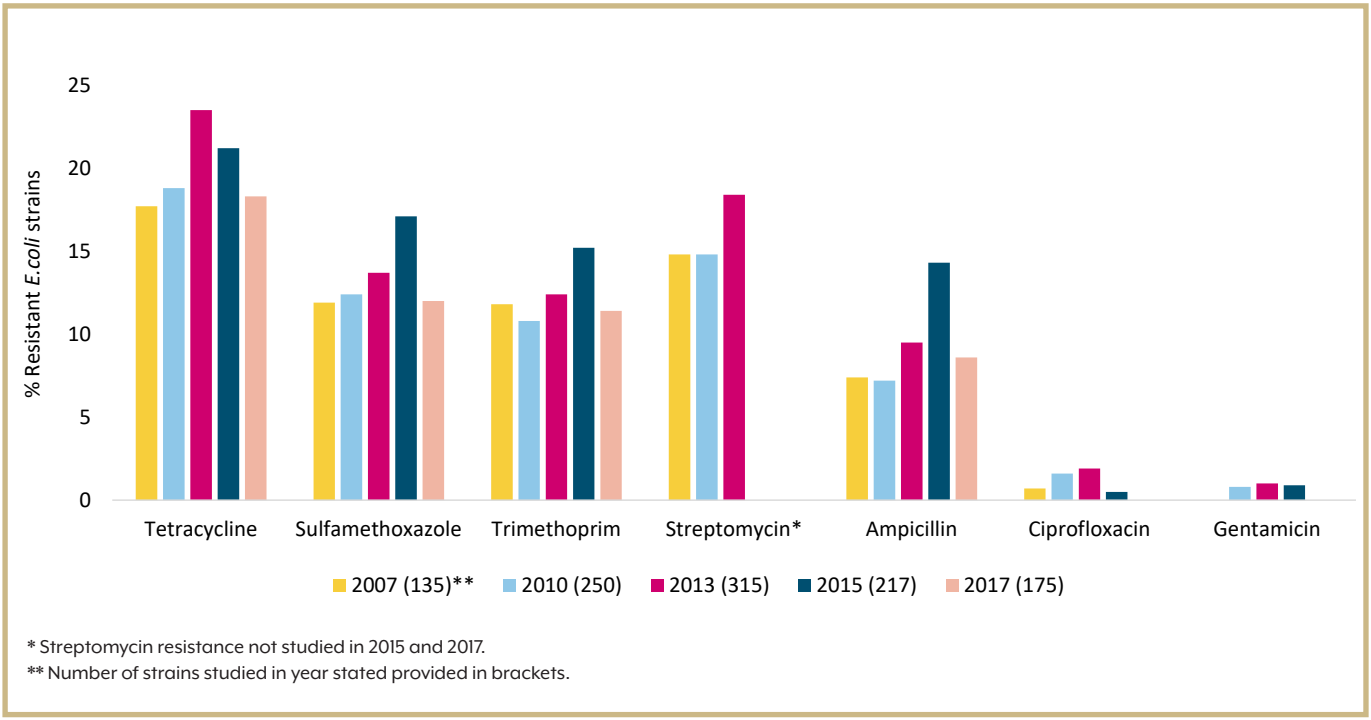
Acquired resistance *means that a bacterium that was previously sensitive to an antibiotic becomes resistant to it, either through a genetic mutation or by acquiring resistance from another organism. We can take action to prevent the spread of acquired resistance.*

Multidrug resistance *means that bacteria are resistant to more than one class of antibiotics. In the absence of effective antibiotic and other treatments, tackling multidrug-resistance infections can be challenging.*

What are antibiotics and antibiotic resistance?

Bacteria that themselves produce antibiotics and are resistant to these antibiotics are found in our natural environment. For these bacteria, the antibiotics they produce are almost like chemical weapons, which they can deploy against other bacteria to secure a competitive advantage. In sufficiently high concentrations, antibiotics slow down bacterial growth or kill them entirely. Humans have exploited this in the fight against pathogenic bacteria.

Antibiotic resistance is a natural bacterial defense mechanism against antibiotics found in their environment, such as a human or animal body. Depending on their species and the resistance they have acquired, bacteria can be resistant to one or more antibiotics. Bacteria that have developed a resistance to several antibiotics are known as multidrug-resistant bacteria or MDR.



* Streptomycin resistance not studied in 2015 and 2017.
** Number of strains studied in year stated provided in brackets.

The figure shows the percentage of antibiotic-resistant strains of E. coli naturally occurring in the pig digestive system found in Finnish pigs between 2007 and 2017. The data is based on the FINRES-Vet monitoring reports (see final page for hyperlink).

Spread of antibiotic resistance

In all bacterial communities, including those found in the digestive tract of an animal treated with antibiotics, there are bacteria that can be sensitive or resistant to antibiotics. Exposure to antibiotics during the treatment results in selection pressure, where bacteria sensitive to antibiotics are eliminated and resistant bacteria survive. This allows resistant bacteria to proliferate without competition for resources like nutrients and physical space, thus increasing their proportion in the bacterial community.

The ability to resist antibiotics lays in the genes of bacteria, and some bacteria have these genes naturally. Bacteria can also acquire resistance genes from other bacteria and incorporate them into their own DNA, making them resistant to antibiotics as well. Bacteria can pick up resistant genes released by dead bacteria in their environment or they can be transferred through direct contact between two bacteria. Alternatively, the genes can be transferred by bacterial viruses.

Not all bacteria cause disease in humans and animals. However, they can be resistant to antibiotics whether they are pathogens or not. Nonpathogenic bacteria that are resistant can prove problematic if their resistance is transferred to pathogenic bacteria.

Human activities have shaped microbial communities and, as a result, antibiotic-resistant bacteria have become more common in many different environments around the world. Antibiotic resistant bacteria can spread human-to-human but also animal-to-human and vice versa. Resistant bacteria spread via many different routes, including through direct contact between two animals or an animal and a human. Like other bacteria, they also spread through the air and in water, and are carried and spread by humans, pets, wild animals and insects. Resistant bacteria can cover long distances, as humans, animals and goods travel around the world.

Using antibiotics to treat disease

Antibiotic treatment of production animals is laborious and results in increased production costs. Antibiotics used correctly are nevertheless necessary and sometimes essential in treatment of bacterial infections.

Effective disease prevention should always be the priority in all animal production. But if an animal becomes unwell, prompt and appropriate treatment is crucial for their welfare.

Veterinarians determine whether antibiotic treatment is required following diagnosis. It is important to follow all instructions set out by the veterinarian in the herd health plan. Some bacteria are more sensitive to antibiotics than others, hence the type and the dosage of antibiotic used will always be determined on a case-by-case basis. Antibiotic treatment can be complemented with painkillers and animals that are unwell should be transferred to a sick pen.

Principles of antibiotic use:

- Antibiotics are not always necessary to treat a sick animal.
- Antibiotics should not be used preventatively or to compensate poor living conditions.
- Antibiotics cannot be used to treat viral illnesses.
- Correctly obtained bacterial samples help veterinarians to make the correct diagnosis and prescribe the correct treatment.
- Antibiotics should only be administered to an individual sick animal or, if necessary, to a small group of animals following a confirmed diagnosis and treatment plan by a veterinarian.
- Antibiotics have an impact also on normal microbial flora.
- The dosage must not be changed and the antibiotic must not be stopped unless instructed to do so by a veterinarian.
- If an animal receiving antibiotic treatment is not showing signs of improvement, contact your veterinarian for a review.
- Never use antibiotics that are out of date, stored incorrectly or have been prescribed for another animal.
- Always observe the withdrawal period mandated by your veterinarian to ensure that antibiotic residues are not passed on to foodstuffs.

What can you do to reduce antibiotic use on your farm?

Attempts to reduce the use of antibiotics must not lead to sick animals being left untreated. Prevention of disease entry and spread of diseases on the farm are key to ensuring good animal health and welfare and will help to reduce the use of antibiotics. The aim is to create living conditions that prevent diseases and improve the quality of life for production animals. Healthy animals require less antibiotics which slows down the spread of antibiotic resistance.

Disease prevention:

- Proper internal and external biosecurity measures prevent diseases from spreading on to the farm and limit the number of animals affected in the event of an outbreak.
- A lower stocking density promotes better animal health.
- Units should be managed on an all-in/all-out (AIAO) basis wherever practicable and one-way animal flow will reduce the spread of infection.
- The pens should be cleaned daily and as groups of animals are moved on, they should be thoroughly cleaned.
- Sick animals should be separated from healthy animals both physically and during daily routines. The use of separate sick pens is recommended.
- Good quality of feed, drinking water and bedding material should be ensured by regular testing.
- Each farm should provide personal protective equipment, including footwear, for persons working with animals. These should be available for each unit as appropriate to prevent transmission of pathogens between animals and humans.
- Disease prevention through vaccination.

One Health

The One Health approach highlights the connections between human, animal and environmental health and wellbeing. Production animals are part of the food production system and the impact of antibiotic use is not limited to the farms. Besides the production animals and the humans living and working with them, antibiotic use also has wider public health and environmental implications. During and after antibiotic treatment animals excrete antibiotic-resistant bacteria and antibiotic residues in their faeces and urine. Ultimately, resistant bacteria and antibiotic residues can be passed into the environment, such as fields through slurry spreading/via manure.

Antibiotic-resistant bacteria can be passed from animals to the humans handling them through direct contact. Antibiotic-resistant bacteria can also be passed from humans on to animals. On farms, transmission between human and animals can be minimised through the use of personal protective equipment and effective hand hygiene.

The environment plays a key role in the transmission of bacteria between humans and animals. Bacteria can also be transmitted to humans and animals indirectly, including through food, feed and water.

Thank you for joining us in the battle against antibiotic resistance!

Further reading:

- Finnish Food Authority: https://www.ruokavirasto.fi/en/farmers/animal-husbandry/animal-medication/controlled-use-of-medicines/principles-of-antimicrobial-therapy/
- FINRES-Vet reports: https://www.ruokavirasto.fi/en/farmers/animal-husbandry/animal-medication/monitoring-of-antibiotic-resistance/finres-vet-reports/
- Euro Surveillance of Veterinary Antimicrobial Consumption (ESVAC) reports: https://www.ema.europa.eu/veterinary-regulatory/overview/antimicrobial-resistance/european-surveillance-veterinary-antimicrobial-consumption-esvac
- European Medicines Agency (EMA), Analysis of antimicrobial consumption and resistance (JIACRA) reports: https://www.ema.europa.eu/en/veterinary-regulatory/overview/antimicrobial-resistance/analysis-antimicrobial-consumption-resistance-jiacra-reports
- Finnish Ministry of Social Affairs and Health National Action Plan on Antimicrobial Resistance 2017–2021: https://stm.fi/julkaisu?pubid=URN:ISBN:978-952-00-3965-3
- Animal Health ETT, information mainly in Finnish: https://ett.fi/

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