



**Ministry of Food, Agriculture  
and Fisheries of Denmark**  
Danish Veterinary and  
Food Administration

# **The Danish Veterinary and Food Administration's national action plan for antibiotic resistance in production animals and food**

**2021-2023**

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# Introduction

Antibiotic resistance is a growing global problem that threatens both human and animal health. Antibiotic resistance needs to be managed from a One Health perspective across the veterinary, human and environmental sectors, as there is a need to tackle the problem in a more holistic perspective.

With this action plan, the Danish Veterinary and Food Administration aims to continue efforts to combat antibiotic resistance in production animals and food during the 2021-2023 period. The Danish Veterinary and Food Administration is responsible for the formation of rules and regulations for the production of food throughout the chain, from farm to fork. This includes regulations regarding the use of antibiotics for production animals, regulations on biosecurity measures at farms and monitoring of antibiotic resistance in production animals and in food.

This action plan is the Danish Veterinary and Food Administration's second national action plan for antibiotic resistance in production animals and food. The Danish Veterinary and Food Administration's first action plan for antibiotic resistance was adopted in 2017 along with Denmark's national One Health Strategy against antibiotic resistance.

All objectives in the Danish Veterinary and Food Administration's 2017 action plan have either been met or transferred to the present action plan. The achievements of the goals in the previous action plan are described in an annex to this new action plan (in Danish only).

# Background

Healthy animals are the foundation of low consumption of antibiotics and the prevention of resistance in the animal sector. They contribute significantly to animal welfare, and are prerequisite for resource-efficient, sustainable and economic production.

Since the 1970s, the Danish Veterinary and Food Administration and the agricultural industry have focused on producing healthy animals and have introduced disease control programmes leading to eradication of a number of livestock diseases. Since the 1990s, awareness has also focused on the risk of development of antibiotic-resistant bacteria. The existing action plans for controlling salmonella and campylobacter encompass monitoring of resistance and measures to reduce the spread of resistant bacteria.

As a result of the increase in the use of antibiotics in production animals up to 2009, the minister and the political parties behind Veterinary Agreement I stated, in 2010, that the use of antibiotics for production animals should be reduced, and introduced the Yellow Card initiative to reduce antibiotic use in production animals. In 2015, a broad political agreement was reached “Action plan for controlling livestock-associated MRSA” for the period 2015-2018. The plan was followed by the introduction of Veterinary Agreement III for the period 2018-2021 with support from all Danish parliamentary parties. Veterinary Agreement III includes initiatives to ensure low consumption of antibiotics in animals and prevent resistance, including initiatives aimed at livestock-associated MRSA. In 2018, Food Agreement 4 was adopted for the period 2019 to 2022. It focussed on measures combatting resistance, including optimisation of the monitoring of prevalence and development of resistance in production animals and food.

In December 2018, two EU regulations were adopted, one on veterinary medicinal products (2019/6) and one on medicated feed (2019/4). These regulations take effect from January 2022. One of the purposes of the regulations is to restrict the use of antimicrobial medicinal products in order to reduce the development of resistant bacteria.

# National and international action plans

The “Global Action Plan on Antimicrobial Resistance” endorsed by the World Health Organization (WHO) in 2015 recommends development of national action plans. In July 2017, the EU published “A European One Health Action Plan against Antimicrobial Resistance (AMR)”, as a European implementation of the “Global Action Plan on Antimicrobial Resistance”.

Denmark's national One Health Strategy (2017) identifies five goals aimed at reducing the use of antibiotics and preventing resistance in relation to humans and animals:

- A prudent use of antibiotics to reduce the incidence of resistance
- Greater efforts to prevent infections and to facilitate antibiotic alternatives
- Enhanced knowledge to improve targeted measures
- Information and guidance on resistance and transmission
- A strong international cooperation to minimise the development of antibiotic resistance

The Danish Veterinary and Food Administration's second national action plan for antibiotic resistance in production animals and food for 2021 to 2023 follows the above five goals in the Danish One Health Strategy.

# Objective

Danish Veterinary and Food Administration presents national initiatives and goals for the use of antibiotics in production animals and antibiotic resistance in production animals and in food in the national action plan. The overall aim is to reduce the exposure of consumers in Denmark to resistance from production animals and food.

# Aims

## 5.1 – A prudent use of antibiotics to reduce the incidence of resistance

### Goals

- Achieve a reduction of 2 per cent per year (2019-2022) in the use of antibiotics for pigs, and maintain or reduce the use of antibiotics for other livestock species.
- Maintain low use for production animals of those antibiotics that are critically important for treating humans (2019 level).

### Initiatives

- Monitoring the extent of all veterinarian-prescribed antibiotics. Each month, the Danish Veterinary and Food Administration publishes figures on [www.fvst.dk](http://www.fvst.dk) regarding use in cattle, pigs and overall use.
- Continued focus to ensure that flock medication is only applied when this is the professionally correct form of treatment.
- Supervision of and guidance for pig veterinarians regarding prudent and reduced use of antibiotics.
- Restricted prescription of those antibiotics that are critically important for treating humans.
- Benchmarking of veterinarian's prescription of antibiotics.

### Monitoring the extent of all veterinarian-prescribed antibiotics

The Danish Veterinary and Food Administration monitors all prescription of antibiotics and therapeutic zinc by veterinarians via the VetStat database, which covers all prescription of medicinal products for production animals and pets in Denmark. The Danish Veterinary and Food Administration will update the VetStat system to provide a new user interface for veterinarians and farmers. Each month, the Danish Veterinary and Food Administration publishes figures on [www.fvst.dk](http://www.fvst.dk) regarding the use of antibiotics in cattle, pigs and overall use. Data reported to the VetStat database will meet the requirements for reporting to the EU on consumption of antimicrobial medicinal products as stipulated in the regulation on veterinary medicinal products (2019/6).

Denmark is working to reduce the use of antibiotics in production animals, with a particular emphasis on use in pigs. The goal is a two percent reduction annually from 2019 to 2022, i.e. 8 per cent in total compared with use in 2018 measured in kilograms of active antibiotics. This is a policy decision based on a professional recommendation from the Danish Advisory Committee

on Veterinary Medicines. The goal considers the fact that the farmer still needs access to antibiotics to treat sick animals appropriately.

From 1 July 2022, Market authorisations for zinc for therapeutic use will be withdrawn, to avoid accumulation in soil and leaching into the aquatic environment, and due to the risk of developing antibiotic resistance.

Since 2019, veterinarians have been able to distribute exact amounts of medication to production animals and pets. This is to prevent leaving excess of medication for disposal with animal owners after the prescribed treatment ends.

### **Flock treatment**

More than half of antibiotics used in pig production are administered as flock treatment via the water supply or feed. Since 2014, flock treatment for respiratory and intestinal diseases has required a veterinary diagnosis. Thus, flock treatment of pigs is reserved for situations in which other forms of treatment or preventive measures are insufficient. The implementation of the EU regulation on veterinary medicinal products (2019/6) further restricts flock treatment.

### **Supervision and guidance for veterinarians**

The Danish Veterinary and Food Administration will provide support and guidance for individual veterinarians to work toward prudent and reduced use of antibiotics in pig herds in order to prevent the development of antibiotic resistance. The emphasis in supervision is on strongly encouraging veterinarians to play an active role in efforts to reduce antibiotic consumption via their professional veterinary advice. This supports the objective of reducing the use of antimicrobial medicinal products as stated in the regulations on veterinary medicinal products (2019/6) and medicated feed (2019/4).

### **Restricted prescription of those antibiotics that are critically important for treating humans**

The Danish Veterinary and Food Administration's Yellow Card Initiative focuses on both overall use of antibiotics and those antibiotics that are critically important for treating humans. There is now almost zero use of the critically important antibiotics fluoroquinolones, colistin and third and fourth generation cephalosporins in pigs. Rules around Tetracycline use have also been adjusted (cf. the 2015 MRSA action plan), resulting in a reduction in the use. Restrictions on prescription of fluoroquinolones, colistin and third and fourth generation cephalosporins for all production animals are expected to be implemented in the national Danish regulations when the EU regulation on veterinary medicinal products (2019/6) comes into effect in January 2022.

### **Benchmarking of antibiotic prescription by veterinarians.**

In consultation with stakeholders and the Danish Advisory on Veterinary Medicines, the Danish Veterinary and Food Administration will look at options for allowing veterinarians to compare their own antibiotic prescription's through benchmarks. This will be based on the modernised VetStat.



## 5.2 – Greater efforts to prevent infections and to facilitate antibiotic alternatives

### Goals

- To maintain or, if possible, reduce the low incidence of resistance in food, with an emphasis on critically important resistance, by enhanced focus on biosecurity and hygiene in production animals and food production as well as on animal health.
- To limit the spread of livestock-associated MRSA from pig herds and in the community.

### Initiatives

- Improve biosecurity when leaving the stable, e.g. by requiring baths at the end of the working day for employees working with pig herds.
- Produce recommendations for good clinical practice regarding veterinary advice and prescription of antibiotics in the event of flock treatment of production animals.
- Initiate research that may reduce the need for antibiotics, including antibiotic alternatives.

### Prevention of direct animal-to-human transmission

Biosecurity in animal husbandry is important, and the more intensive the production, the more important this becomes. There is a significant focus on livestock-associated MRSA and the risk of transmitting it from pig herds into the community must be limited by strengthening existing infection barriers between pig herds and the community.

In Denmark, anyone who has been in a herd with pigs is required to wash their hands and change their clothes, when they leave the herd. This applies to all pig herds that have a health advisory contract. As of 2018, anyone who deals with live pigs is required to take a course in hygiene. As of 2020, the infection barrier outside the stable was further raised to minimise the amount of livestock-associated MRSA brought into the surrounding community. Baths are now required at the end of the working day for employees working with pig herds, and disposable overalls are required for individuals who frequently spend short periods of time in stables with pigs. With the 2021–2023 action plan, the Danish Veterinary and Food Administration will look at how more guidance can help to improve compliance with the rules on biosecurity.

### Development of recommendations for good clinical practice

The Danish Advisory Committee on Veterinary Medicines will provide recommendations for good clinical practice regarding veterinarians' advice and prescription of antibiotics in the event of flock treatment of production animals.

### **Antibiotic alternatives/prevention of animal disease**

Research projects have been initiated as described under "Research" in section 4.3.

### **Prevention of human infection via food**

Resistant bacteria may be transmitted from animals via food to humans. The bacteria come from the animal's intestinal tract, pharynx, nasal mucous membranes and skin, and may contaminate the meat during slaughter. Infections in humans can be prevented by impeding the transmission, growth and spread of resistant bacteria from animals before, during and after slaughter, and by avoiding growth and spread in subsequent processing.

Efforts to optimise hygiene during slaughter and in subsequent processing steps will reduce the risk of spread and growth of resistant bacteria in food, and thereby reduce the risk to humans.

Biosecurity is also an integrated part of action plans and measures in cattle, pig and poultry production (salmonella and campylobacter).

The action plans are prepared in cooperation with research institutions, industry and the authorities. All plans are produced according to the "farm to fork" principle and include measures at both herd and slaughter level to reduce the prevalence of the specific pathogens in food. A strong focus on, and monitoring of, hygiene is a key aspect of these measures, and will result in a reduction in the spread of both the specific pathogens and other transferable agents. Monitoring also covers resistance, and the plans contribute to reduce the risk of resistant bacteria being transferred to fresh meat. The Danish Veterinary and Food Administration has established legislation for follow-up if a slaughterhouse or herd owner discovers salmonella with critically important resistance during monitoring.

Resistant bacteria can also be transferred to food other than meat, e.g. fruit and vegetables originating from manure and fertiliser or contaminated irrigation water. The Danish Veterinary and Food Administration carries out regular screening projects in which non-animal foods are examined for the presence of resistant bacteria.

### 5.3 – Enhanced knowledge to improve targeted measures

#### Goals

- To ensure that monitoring of resistant bacteria in food production is broad and comprehensive, so that it is possible to:
  - follow and catch trends,
  - compare results with monitoring of resistant bacteria in humans, and
  - take relevant measures to follow up on monitoring results.
- To use the best, most up-to-date methods in monitoring of resistance in the food production.
- To increase knowledge of methods to reduce the use of antibiotics.

#### Initiatives

- In a four-year Food Agreement project, the Technical University of Denmark (DTU) is studying whether metagenomic sequencing is a useful method for monitoring resistance.
- The Danish Veterinary and Food Administration performs risk-based monitoring of resistance in the food production, adapted to and incorporating new knowledge. Each year, the Danish Veterinary and Food Administration decides whether supplementary studies on particular forms of resistance are required.
- Livestock-associated MRSA is monitored in production animals with an action limit of 10% positive herds.
- As part of Veterinary Agreement III, the Danish Veterinary and Food Administration is carrying out four years of research aimed at reducing the use of antibiotics, including facilitating measures that will help to reduce incidence of infections requiring treatment and thus the need for treatment with antibiotics.
- As part of Veterinary Agreement III, DTU is carrying out a research project to develop a mathematical model to support decision-making when managing antibiotic resistance in slaughter pigs.
- The Danish Veterinary and Food Administration is updating the VetStat system to provide a new user interface for veterinarians and farmers (see also section 5.1).

## **Monitoring of resistance**

The prevalence of resistant bacteria in production animals and food is monitored continuously. The EU regulation provides for a harmonised monitoring of resistance in production animals and food in the EU. Denmark supplements this monitoring to ensure that relevant production animals and foods are monitored yearly.

There are no EU regulations regarding the monitoring of livestock-associated MRSA. Danish monitoring of livestock-associated MRSA is described under Research.

Denmark has played an active role in the negotiations regarding the establishment of a new EU monitoring scheme covering the 2021-2027 period. Among other things, Denmark has campaigned for and supported a One Health surveillance focussed on resistance to critically important antibiotics used to treat humans. Denmark also continues to work on implementing and expanding gene-based methods (whole-genome sequencing (WGS)).

In addition, every year the Danish Veterinary and Food Administration undertakes projects that help to clarify the extent of certain types of resistance in selected foods. As part of Food Agreement 4, DTU is undertaking a project on behalf of the Danish Veterinary and Food Administration to optimise the methods used to monitor resistance in food production. This will study how metagenomic sequencing can be used to monitor resistance.

## **Livestock-associated MRSA monitoring in livestock in the 2018-2021 period**

Since 2008, the Danish Veterinary and Food Administration has screened regularly for livestock-associated MRSA. Veterinary Agreement III in 2018 initiated a systemic programme of monitoring livestock-associated MRSA in livestock. The programme has set screening intervals based on prevalence in the most recent screening for the relevant species. The screening intervals are based on the herd-level prevalence: below 5% (the species are examined every two years), between 5 and 10% (the species is examined annually) and among animal species with a herd prevalence above 10%, control measures are implemented if appropriate.

If the prevalence of livestock-associated MRSA exceeds the action level of 10% for the relevant species, the Danish Advisory Committee on Veterinary Medicines will assess the situation and recommend any appropriate measures.

## **Monitoring the use of antibiotics in animals**

The use of antibiotics in animals in Denmark is monitored continuously, and the VetStat database was launched on 1 August 2000. The aim is to provide near-real-time data on all sales of prescribed medicinal products for production animals at both company and species level (cattle, small ruminants, pigs, poultry, aquaculture, fur-bearing animals and others). Information on antibiotic sales reaches VetStat via pharmacy prescription information, when a product is sold to the animal's owner. VetStat also records medicinal products that are used or sold by veterinarians.

Modernisation of the VetStat system is vital in order for it to continue providing a basis for furthering initiatives to regulate and monitor antibiotic use in production animals. The data quality will be improved and the VetStat system will be more user-friendly and contribute to transparency in this area with a new user interface for veterinarians and farmers.

### **DANMAP**

DANMAP is the annual reporting on the monitoring of antibiotic resistance in production animals, food and people, as well as monitoring of antibiotic use in animals and humans in Denmark. The DANMAP report is produced by DTU and Statens Serum Institut and presents the results from all the surveillance systems. This integrated monitoring of antibiotic use and resistance in production animals, food and people is key in order to follow trends, and to compare resistance developments in animals and food with developments in humans. The report may identify areas in which adjustments or changes to the monitoring are required.

### **Research**

Based on Veterinary Agreement III and the MRSA expert group's recommendations, a four-year research initiative is underway with contributions from the University of Copenhagen, Aarhus University and Statens Serum Institut. This research initiative covers the following research areas: rearing of pigs with reduced use of antibiotics, potential alternatives to antibiotics and minimisation of flock medication, more precise diagnostics, optimal use of antibiotics in terms of better dose determination, treatment duration and treatment interval, and studying factors of importance to the prevalence of livestock-associated MRSA.

A research project at DTU is also developing a mathematical model to support decision-making when managing antibiotic resistance in slaughter pigs.

## 5.4 – Information and guidance on resistance and transmission

### Goal

- Create awareness and share new knowledge on resistance and transmission pathways.

### Initiatives

- The Danish Veterinary and Food Administration is working with relevant authorities and stakeholders from a One Health perspective.
- The Danish Veterinary and Food Administration works via newsletters, its website and social media to create a better understanding of the association between antibiotic use and antibiotic resistance.

Established in 2010, the Danish National Antibiotic Council includes a broad group of players with human, veterinary and environmental backgrounds. The Danish Veterinary and Food Administration has a seat in the Council. The National Antibiotic Council supports national and international initiatives on the prevention of antibiotic resistance and use. The Council also helps to perform specifically identified national tasks relating to antibiotics, and to promote and ensure local follow-up on initiatives and proposals discussed by the Council.

The Danish Advisory Committee on Veterinary Medicine, established in 2018, discusses and helps to perform specific tasks and offers guidance on initiatives concerning the use of antibiotics and resistance. Its objective is to provide the Minister for Food, Agriculture and Fisheries with professional, evidence-based recommendations regarding the use of veterinary medicine. The Committee includes experts from relevant authorities, research institutions, the Danish Medical Association and the Danish Veterinary Association.

The Livestock-Associated MRSA Advisory Service was created on 1 July 2014. The purpose of the Advisory Service is to provide information and advice on livestock-associated MRSA and how to limit transmission by taking certain hygiene precautions. The services of the Advisory Service have been much in demand, and with Veterinary Agreement III it was temporarily extended until the end of 2021.

The Danish Veterinary and Food Administration works to create awareness of resistance and its spread via written information and various fora. For example, the Danish Veterinary and Food Administration has launched an information campaign about the importance of bathing at the end of the working day in pig herds, and created an e-learning course on the importance of hygiene and explaining resistance. The course is mandatory for anyone working with live pigs, and is open to others with an interest in the topic.

## **5.5 – A strong international cooperation to minimise the development of antibiotic resistance**

### **Goals**

- To share the Danish experiences and ensure Danish influence and impact on EU legislation and Codex Alimentarius documents.
- To ensure that EU legislation is implemented in a timely manner.

### **Initiatives**

- Participate in international fora on antibiotic resistance in production animals and food.
- Participate in negotiations on future EU monitoring of antibiotic resistance in food production.
- Help to implement the new EU regulations on veterinary medicinal products and medicated feed.

### **European cooperation**

The Danish Veterinary and Food Administration is a member of a European Commission Antimicrobial Resistance (AMR) One Health working group involved.

In accordance with regulation (EU) 2019/6, which comes into effect as of January 2022, monitoring of antibiotic use in EU member states will cover the use of antibiotics for production animals at species and herd level. Denmark is already able to supply this information.

Denmark plays an active role in the European Surveillance of Veterinary Antimicrobial Consumption (ESVAC) project, which provides an annual report on the sale of antibiotics for production animals. The most recent report (2017) presented data from 31 European countries. The project has been running since 2009 and new countries are constantly being added.

### **Nordic cooperation**

A One Health AMR partnership has been set up under the Nordic Council, with Denmark participating at both expert and strategic levels. The Danish Veterinary and Food Administration contributes actively to the work of the expert group. This forum allows for the exchange of experience and collaboration based on the Nordic white paper, which is a guide produced by the Nordic Council. The Nordic countries take turns to host the annual meetings of the Nordic expert group.

### **Codex Alimentarius and OIE**

Denmark participates in ongoing work with Codex Alimentarius, which sets international standards for food production. This work will lead to the Code of Practice to Minimize and Contain Antimicrobial Resistance being revised, and new Guidelines for the Monitoring and Surveillance of Foodborne

Antimicrobial Resistance being produced. Denmark also contributes to the "Responsible and Prudent use of Antimicrobial Agents in Veterinary Medicine" chapter of the Terrestrial Animal Health Code, published by the World Organisation for Animal Health (OIE).

### **ICARS**

The International Centre for Antimicrobial Resistance Solutions (ICARS) was fostered through a Danish initiative and is tasked with working with low- and middle-income countries in their efforts to reduce antibiotic-resistant infections. ICARS develops tailored solutions together with governments and researchers, who then implement them on-site with the aid of ICARS financing and expertise.

### **Strategic Sector Cooperation (SSC)**

SSC is a partnership between Danish public authorities and their foreign partner ministries. Denmark offers expertise and experience relevant to local priority issues, taking into account local conditions and needs. The aim of SSC is to promote sustainable and responsible growth, jobs and prosperity while creating opportunities for Danish businesses.

The Danish Veterinary and Food Administration provides expertise on food safety and antibiotic resistance in several countries, such as Colombia and Vietnam.

In addition to this, each year the Danish Veterinary and Food Administration hosts several delegations of stakeholders and authorities from other countries wishing to learn more about Danish monitoring and regulation in this area. The members of the Danish Veterinary and Food Administration also attend international meetings, symposiums, workshops and conferences related to antibiotic resistance.



# Conclusion

In Denmark, combatting resistance is based on collaboration between research institutions, industry and the authorities.

In terms of food safety, Denmark has had action plans for salmonella and campylobacter for many years. The action plans are developed using the "farm to fork" principle in collaboration between research institutions, industry and the authorities. A strong focus on hygiene and monitoring to ensure that hygiene rules are complied with, are key aspects of these initiatives. The effect is a reduction in the spread of not only the specific pathogen covered by the action plan, but also transferable resistant bacteria.

In the past decade, Danish Veterinary authorities have focused more intensively on reducing the use of antibiotics in production animals. Especially, the Yellow Card Initiative had a large impact. Despite a substantial reduction in the use of antibiotics and strict limitations on the antibiotics that are critically important for treating humans, it is still possible to treat animal infections.

Since 2014, the Danish Veterinary and Food Administration has also focused in particular on livestock-associated MRSA. A number of initiatives have been introduced, for example to move the infection barrier outside the sheds, so that livestock-associated MRSA is not carried out of sheds and into the surrounding community. The initiatives to reduce the use of antibiotics, especially tetracycline, and research to improve knowledge also support combatting of livestock-associated MRSA.

From 2021 to 2023, the Danish Veterinary and Food Administration will continue all efforts to avoid antibiotic resistance in sustainable production of food of animal origin. With the aid of incentives, the public sector and the private sectors, the aim is to meet the following policy goal: Healthy animals are the foundation of low consumption of antibiotics and the prevention of resistance. This contributes significantly to good animal welfare, and is a prerequisite for resource-efficient, sustainable and economic production.

# Annex 1

## Status of the Danish Veterinary and Food Administration's action plan against antibiotic resistance 2017

### I. Reduced consumption of antibiotics for animals to reduce the presence of resistant bacteria in Danish meat

*Denmark aims to keep the consumption of antibiotics used for animals low and prudent*

| Goals to reduce the incidence of resistant bacteria |  |
|---|--|
| <b>Goal</b>   | Avoid increase in total consumption of antibiotics for production animals between 2016 and 2017.   |
| <b>Status</b>                                       | Consumption decreased from 102 tons in 2016 to 98 tonnes in 2017 and 2018  |
| <b>Goal</b>   | Obtain a 15 percent reduction in total consumption of antibiotics for pigs by 2018 compared to 2014.   |
| <b>Status</b>                                       | Consumption of antibiotics for pigs has been reduced by approximately 13 percent measured in kilos from 2015 to 2018. A policy decision extended the target period to 2019 and a 15.5 per cent reduction was achieved. |
| <b>Goal</b>   | Maintain absence of carbapenem resistance in Danish meat from pigs, cattle and chickens *  |
| <b>Status</b>                                       | No cabapenem resistance in Danish meat was detected.   |

*\* Carbapenems are an antibiotic group for the treatment of serious infections with multi-resistant ESBL bacteria*

## II. Focus on preventing infections in production animals

*Denmark aims to reduce the consumption of antibiotics by preventing infections in animals*

### Goals to prevent infections in animals

**Goal** Develop a Best Practice guidance for vaccination of pigs by 2018

**Status** The goal was not reached. The Advisory Committee on Veterinary Medicines will develop a Best Practice guidance by the end of 2021.

**Goal** Conduct a knowledge synthesis and cost-effect analysis for the prevention of weaning diarrhoea

**Status** Both studies were completed in 2017 by Aarhus University and IFRO at the University of Copenhagen.

## III. Science-based policies and initiatives

*Initiatives related to antibiotic consumption and resistance is based on a solid scientific knowledge base, which constantly expands through systematic monitoring and research*

### Goals for new knowledge

**Goal** Explore the “OUA production” (pigs raised without antibiotics) to share Best Practice throughout the industry.

**Status** The Danish Veterinary and Food Administration continuously collects information about measures that can reduce the need for antibiotic treatment, including Danish Crown's OUA production.

**Goal** Gain more knowledge about how therapeutic zinc can be phased out in the pig production

**Status** The Danish Veterinary and Food Administration, the pig industry and the universities have in collaboration initiated a number of initiatives. In 2018, the Danish Veterinary and Food Administration, in collaboration with the industry, made it possible to dispense from the Yellow Card scheme, if a pig herd participated in approved projects aimed at finding alternatives to therapeutic zinc.

### Goals for new knowledge

|               |  |
|---------------|--|
| <b>Goal</b>   | Introduce whole genome sequencing in 2017 to monitor resistance in salmonella                        |
| <b>Status</b> | Whole genome sequencing was introduced to monitor resistance in salmonella                           |
| <b>Goal</b>   | Understand and elucidate transmission routes for livestock-associated MRSA                           |
| <b>Status</b> | One Health research project on livestock associated MRSA in animals and humans (OHLAM) was completed |

#### IV. Information and advice on resistance and transmission

*The Danish Veterinary and Food Administration will further create awareness about prudent use of antibiotics and how it influences the development of resistance.*

### Objectives for information and advice

|               |  |
|---------------|--|
| <b>Goal</b>   | Veterinary advisory service continues to develop towards prevention rather than treatment  |
| <b>Status</b> | The rules for veterinary advisory services have been changed to ensure prevention rather than treatment. A special annual focus on biosecurity has been included in the veterinary advisory services |
| <b>Goal</b>   | An updated treatment guideline for prescribing antimicrobial for pigs  |
| <b>Status</b> | The treatment guideline for prescribing antimicrobial for pigs was updated in April 2018.  |

## V. Strong international collaboration on antibiotic resistance

*Antibiotic resistance does not respect national borders and Denmark will continue to be actively involved in promoting cooperation with other countries to combat antibiotic resistance globally.*

| <b>Goals for international collaboration</b> |  |
|--|--|
| <b>Goal</b>                                  | Denmark will work to introduce mandatory monitoring of antibiotic consumption in animals in EU's forthcoming action plan   |
| <b>Status</b>                                | Mandatory monitoring of antibiotic consumption for production animals is included in the new EU regulation on veterinary medicine (2019/6).  |
| <b>Goal</b>                                  | Denmark will work towards introducing harmonized methods for resistance determination in EU antibiotic resistance monitoring *   |
| <b>Status</b>                                | The proposal for a future EU monitoring of AMR in food production allows the use of WGS for ESBL analysis. This is supported by EFSA and Denmark continues to work towards expanding the use of these methods in the EU. |

\*2013/652/EU



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