ANTIBIOTICS IN PIG PRODUCTION – THE DANISH APPROACH FOR PRUDENT AND REDUCED USE

Poul Bækbo, senior adviser
DVM, PhD, Dipl. ECPHM

Agromek 2018

SEGES
Danish Pig Research Centre

WHAT IS SEGES?

- **The farmers' own Advisory & Research Organisation**
  - About 650 employees in SEGES
  - Annual turnover is one billion DKK=133 million EURO
  - Part of the **Danish Agriculture & Food Council**

- **The Pig Research Centre** is one of the units of SEGES

SEGES
Danish Pig Research Centre

THE OVERALL CHALLENGE

To ensure a *cost-efficient* pig production

with a **minimal use of antibiotic**

The main driver

- The risk of development of ***antimicrobial resistance*** (AMR) jeopardising human health and animal health
- In Denmark, **MRSA** is the driver

STATUS OF ZINC OXIDE BY JUNE 2017

The EU Commission:

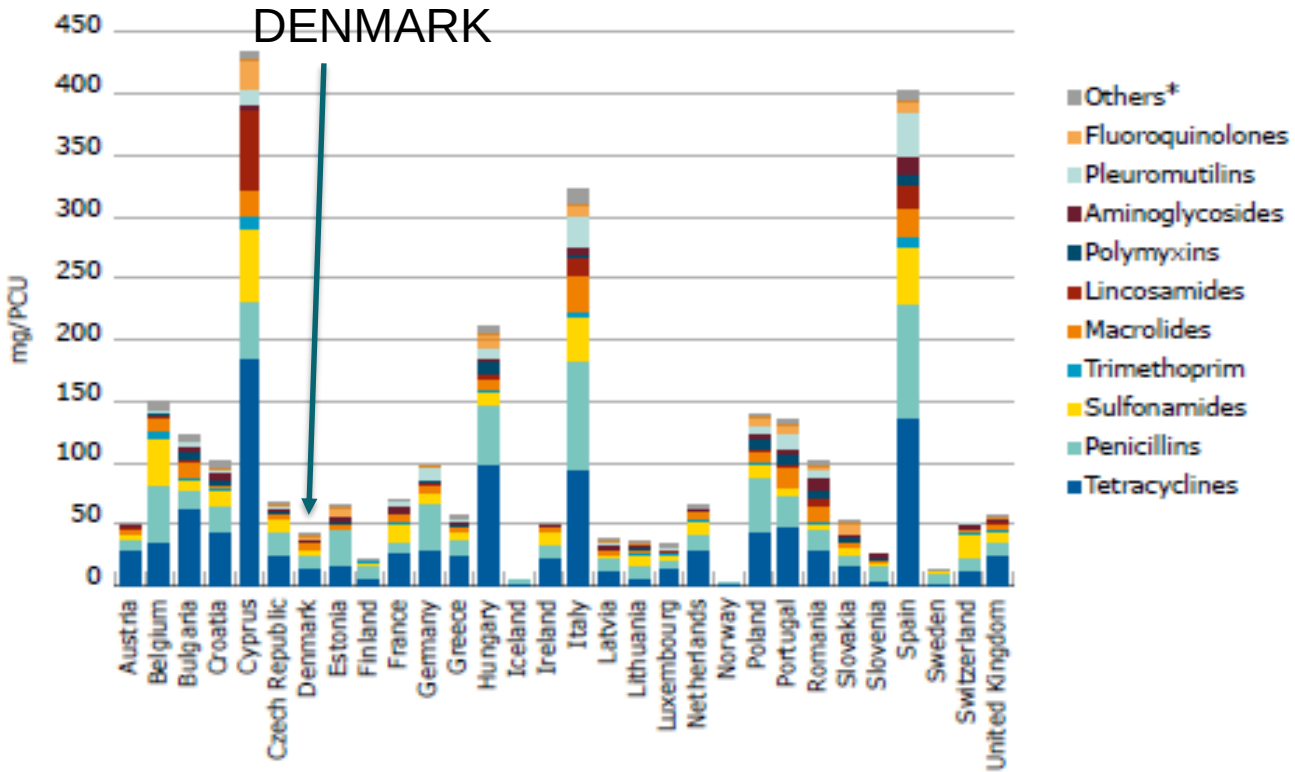
Medical Zinc Oxide (2,500-3,000 ppm)
must be banned in 5 years or less

BIG challenge for weaning of healthy pigs!

TOTAL SALES OF ANTIBIOTICS IN 2015
(ESVAC, OCT. 17)

SEGES
Danish Pig Research Centre

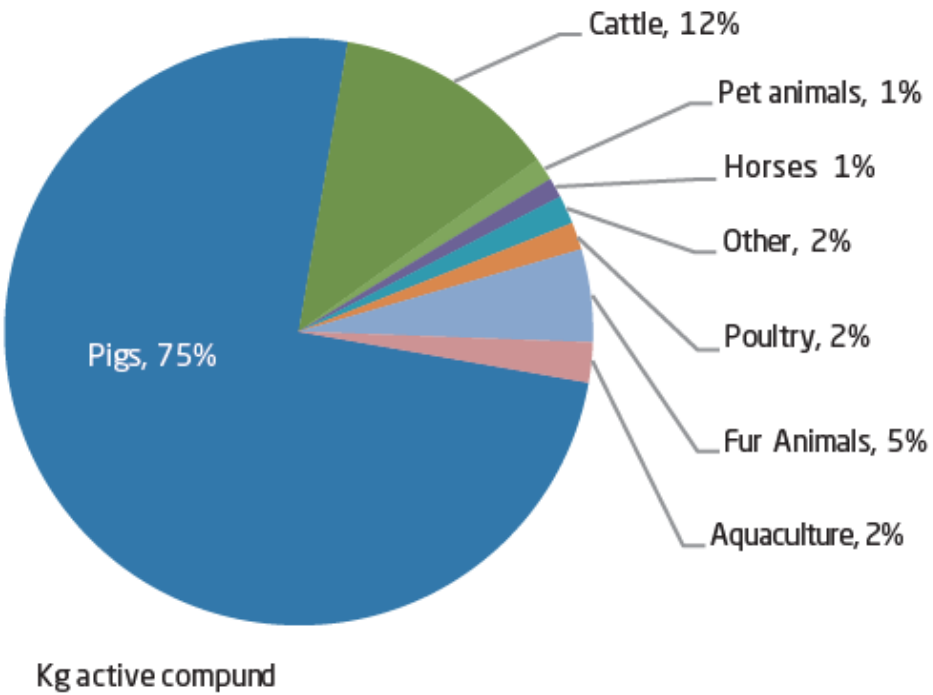
TOTAL SALES OF ANTIBIOTICS IN EU (2015)



SEGES
Danish Pig Research Centre

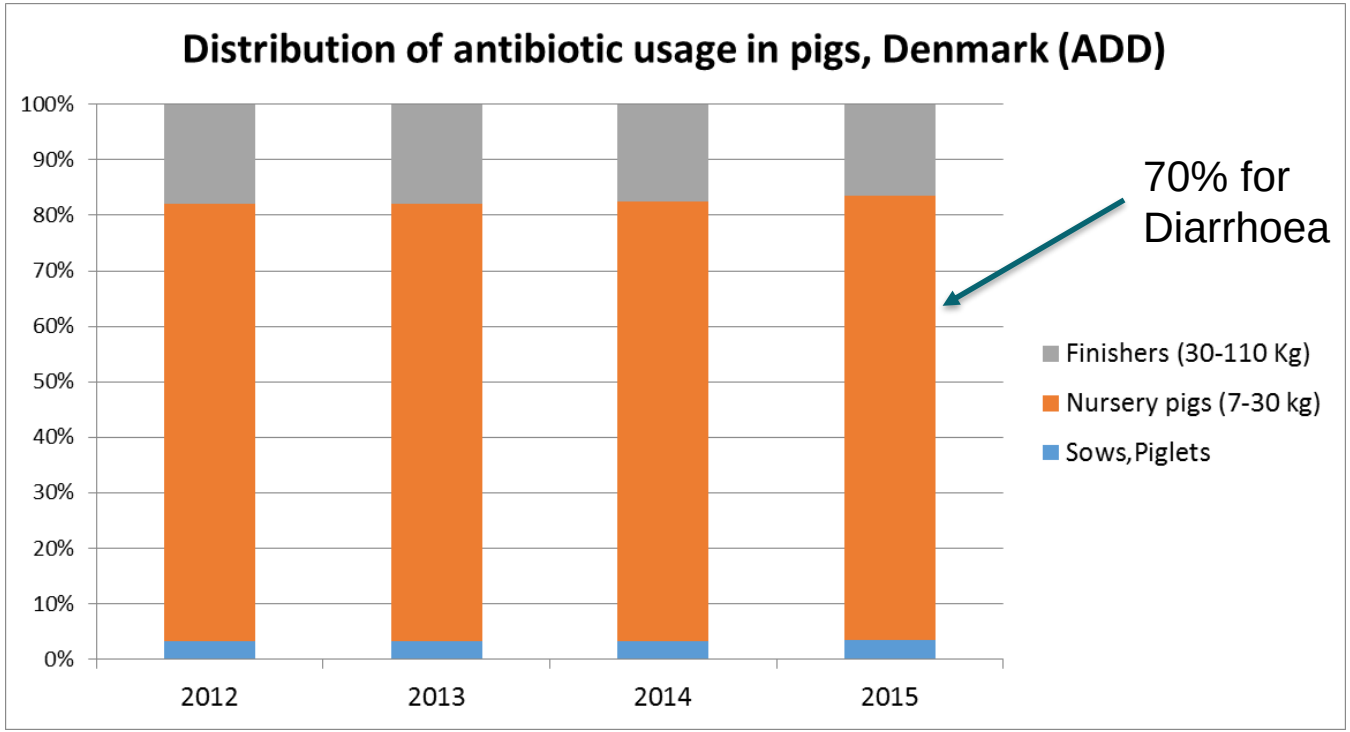
ANTIMICROBIAL CONSUMPTION (KG) IN MAIN ANIMAL SPECIES (DENMARK)

DANMAP 2016



SEGES
Danish Pig Research Centre

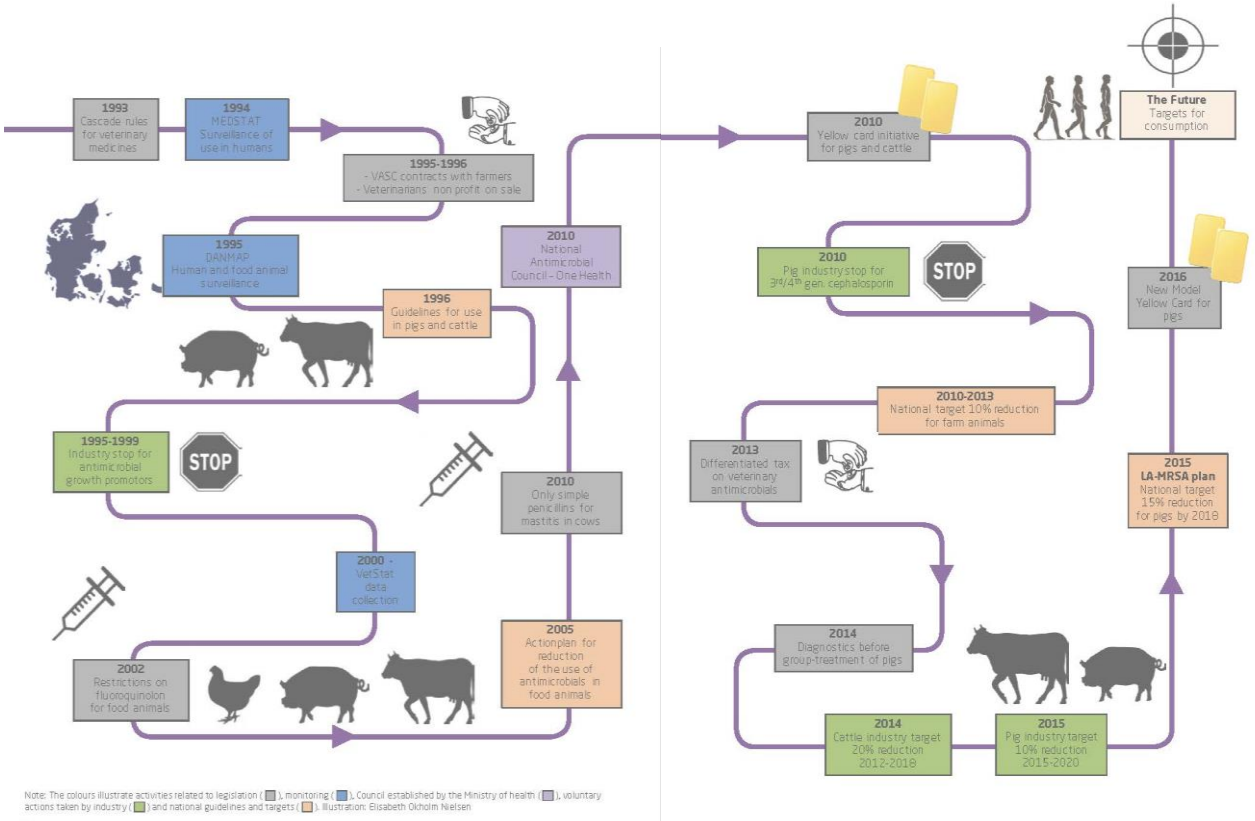
ANTIMICROBIAL USAGE, PIGS



Source: Vetstat

SEGES Danish Pig Research Centre

FLOW OF ACTIONS FOR REDUCTION IN THE USE OF ANTIBIOTICS IN DENMARK



SEGES
Danish Pig Research Centre

AWARENESS OF ANTIBIOTIC USE
THE LAST 24 YEARS IN DENMARK

1994: New regulations for veterinarians (**No sales** of drugs)
1996: Guidelines for selection of antibiotics for treatment
DANMAP
1998: Stop for Growth promotors to finishers
2000: Total AGP stop (voluntary ban, the Pig Industry)
2000: **VETSTAT**
2002: Stop for the use of flouroquinolones
2010: Industry voluntary stop for the use of cephalosporin
2010: **Yellow card** limits, in effect 2011
2014: 50% reduction in the use of Tetracyclins
2016: Support reduction in the use of Colistin

SEGES Danish Pig Research Centre

HERD HEALTH CONTRACT BETWEEN FARMERS AND VETERINARY ADVISORS INCLUDES

No direct sales of antibiotics from vets (since 1994)

6-12 veterinary consultations (herd visits) per year

- One to one relationship (VET and farmer)

Farmers are allowed to use prescribed drugs for 35 days for treatment of diseased animals

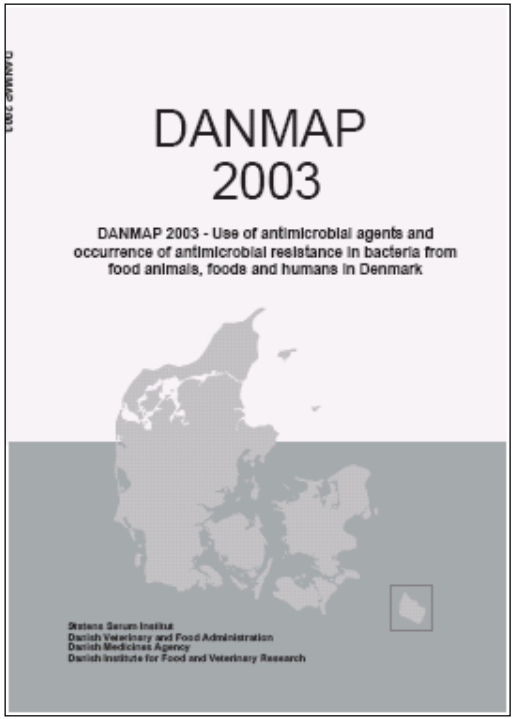
DANMAP (MONITORING OF RESISTANCE)

Resistance in indicator bacteria as well as certain zoonotic bacteria is monitored annually from pigs, cattle poultry and HUMANS (**since 1996**!)

A **ONE HEALTH** approach

Trends and figures are presented in the annual DANMAP report (www.danmap.org)

Data are reported to the EFSA



SEGES Danish Pig Research Centre

AWARENESS OF ANTIBIOTIC USE

THE LAST 22 YEARS IN DENMARK

1994: New regulations for veterinarians (**No sales** of drugs)

1996: Guidelines for selection of antibiotics for treatment

DANMAP

1998: Stop for Growth promotors to finishers

2000: Total AGP stop (voluntary ban, the Pig Industry)

2000: **VETSTAT**

2002: Stop for the use of flouroquinolones

2010: Industry voluntary stop for the use of cephalosporin

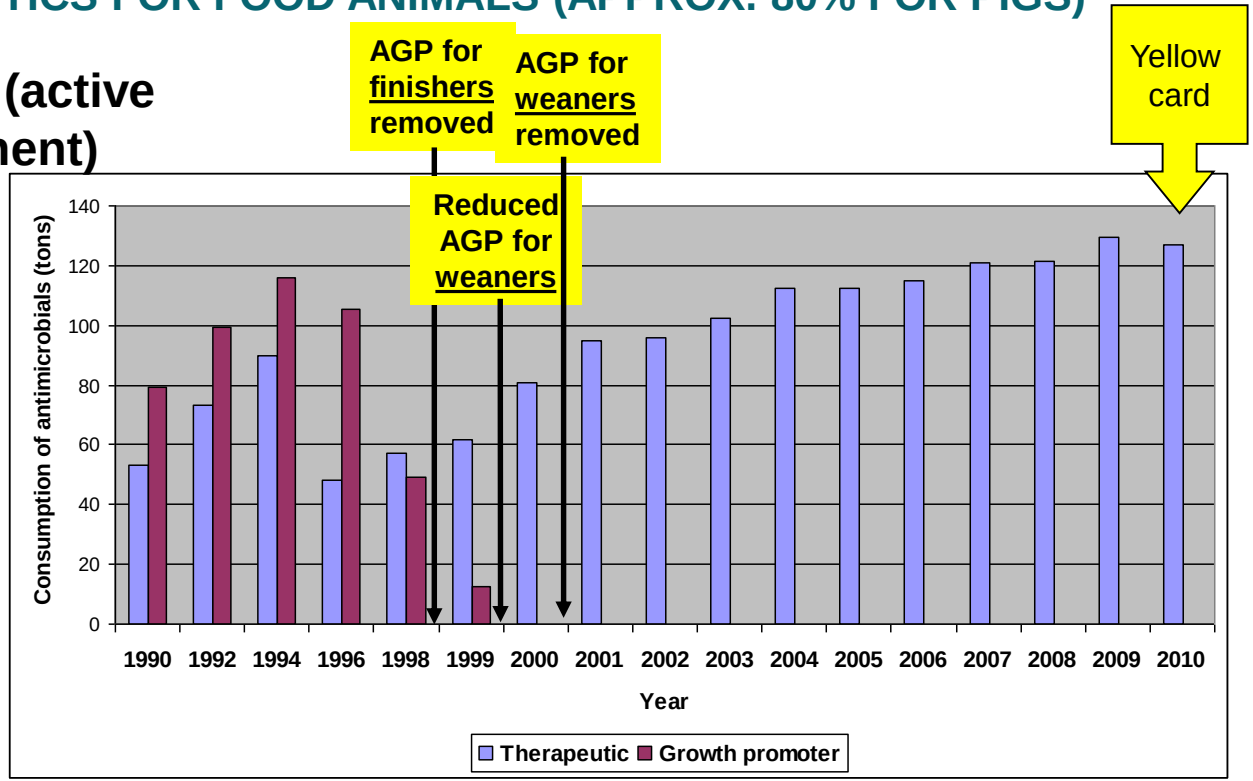
2010: **Yellow card** limits, in effect 2011

2014: 50% reduction in the use of Tetracyclins

2016: Support reduction in the use of Colistin

DEVELOPMENT IN THE TOTAL CONSUMPTION OF ANTIBIOTICS FOR FOOD ANIMALS (APPROX. 80% FOR PIGS)

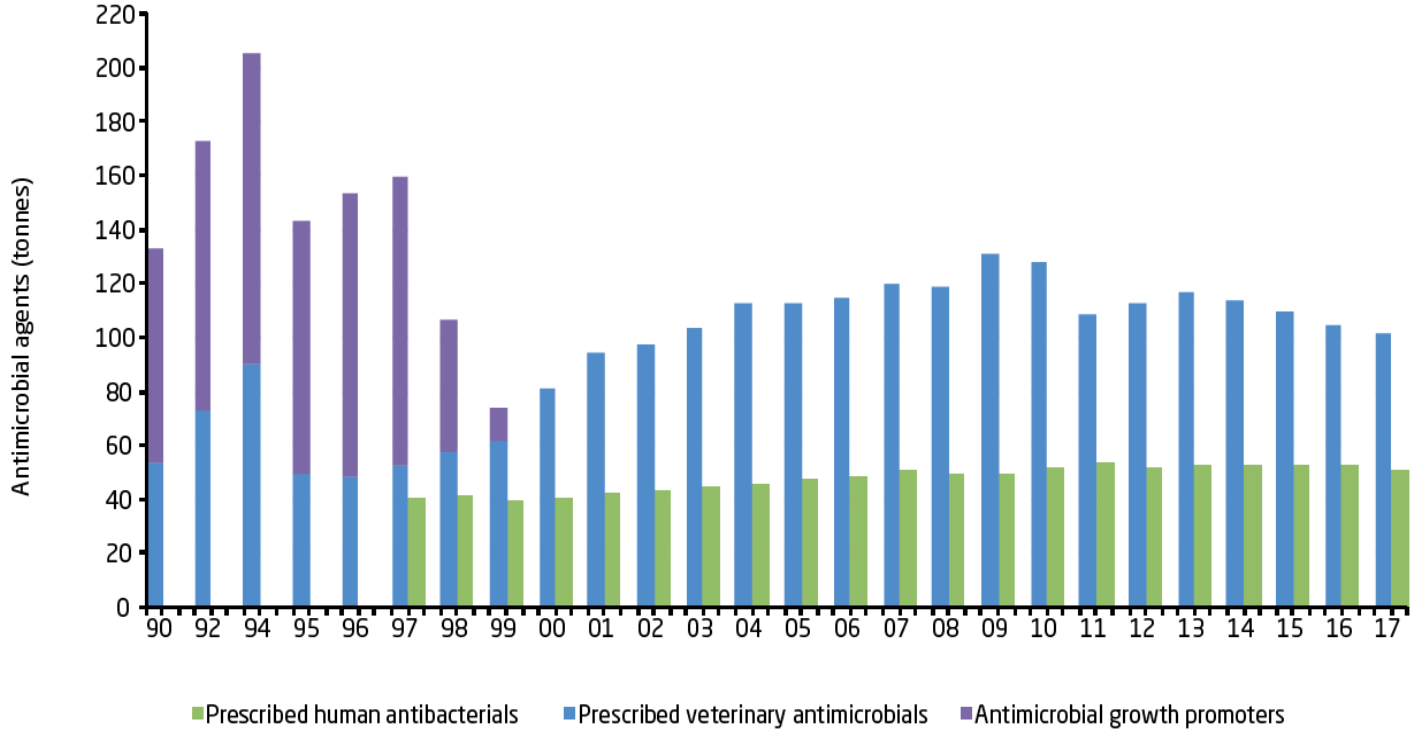
Tonnes (active component)



SEGES
Danish Pig Research Centre

Figure 4.1 Prescribed antimicrobial agents for humans, and for all animal species, Denmark

DANMAP 2017



Sources: Human therapeutics: The Danish Medicines Agency. Antimicrobials for animals: Until 2001, data are based on reports from the pharmaceutical industry of total annual sales from the Federation of Danish pig producers and slaughterhouses (1994-1995) and Danish Medicines Agency and Danish Plant Directorate (1996-2000). Data from 2004-2017 are based on data extracted from VetStat. Data for DANMAP 2017 was extracted from VetStat 6th August 2018. This figure includes all antimicrobial agents registered for use in animals.

SEGES
Danish Pig Research Centre

AWARENESS OF ANTIBIOTIC USE

THE LAST 24 YEARS IN DENMARK

1994: New regulations for veterinarians (**No sales of drugs**)

1996: Guidelines for selection of antibiotics for treatment

DANMAP

1998: Stop for Growth promotors to finishers

2000: Total AGP stop (voluntary ban, the Pig Industry)

2000: **VETSTAT**

2002: Stop for the use of flouroquinolones

2010: Industry voluntary stop for the use of cephalosporin

2010: **Yellow card** limits, in effect 2011

2014: 50% reduction in the use of Tetracyclins

2016: Support reduction in the use of Colistin

VETSTAT

Nationwide database (2000)

- **Monitoring all veterinary medicine** used in all herds
- Run by the veterinary authorities
- The objective is to minimise the consumption of antibiotics in farm animals

VETSTAT - DATA RECORDED

Monthly data flow

- Date
- Name of drug + quantity
- Target species
- Age group
- Reason for prescription (disease)
- Identity of farm
- Identity of prescriber (veterinarian)

VETSTAT - ACCESS TO DATA

Full transparency – access for every one!

SEGES
Danish Pig Research Centre

AWARENESS OF ANTIBIOTIC USE

THE LAST 24 YEARS IN DENMARK

1994: New regulations for veterinarians (**No sales** of drugs)

1996: Guidelines for selection of antibiotics for treatment

DANMAP

1998: Stop for Growth promotors to finishers

2000: Total AGP stop (voluntary ban, the Pig Industry)

2000: **VETSTAT**

2002: Stop for the use of flouroquinolones

2010: Industry voluntary stop for the use of cephalosporin

2010: **Yellow card** limits, in effect 2011

2014: 50% reduction in the use of Tetracyclins

2016: Support reduction in the use of Colistin

FLOUROQUINOLONES (2015)

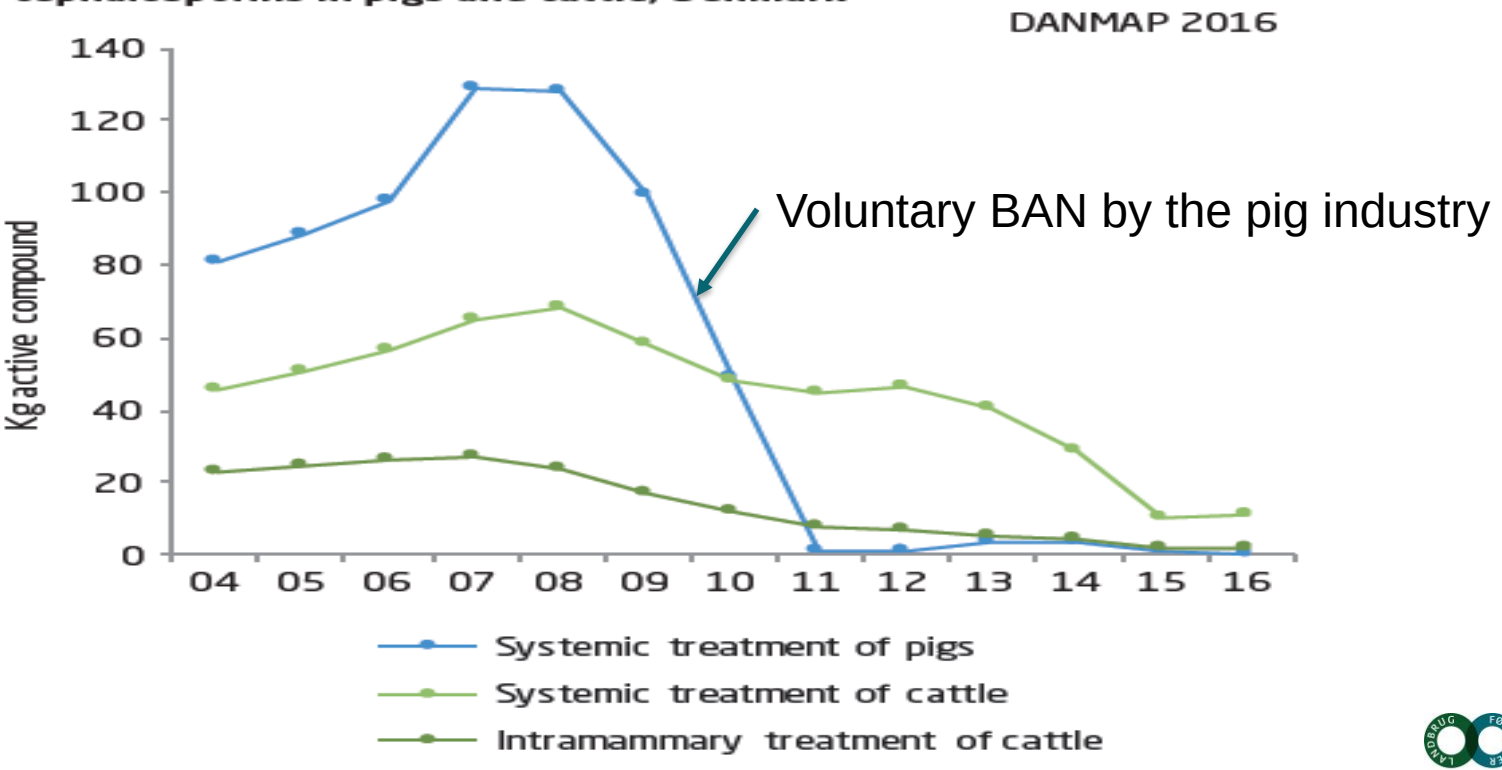
SEGES
Danish Pig Research Centre

3RD- & 4TH-GENERATION CEPHALOSPORINS

SEGES
Danish Pig Research Centre

CRITICALLY IMPORTANT ANTIBIOTIC

Figure 4.7. Consumption of 3rd and 4th generation cephalosporins in pigs and cattle, Denmark



SEGES Danish Pig Research Centre

AWARENESS OF ANTIBIOTIC USE

THE LAST 24 YEARS IN DENMARK

1994: New regulations for veterinarians (**No sales** of drugs)

1996: Guidelines for selection of antibiotics for treatment

DANMAP

1998: Stop for Growth promotors to finishers

2000: Total AGP stop (voluntary ban, the Pig Industry)

2000: **VETSTAT**

2002: Stop for the use of flouroquinolones

2010: Industry voluntary stop for the use of cephalosporin

2010: **Yellow card** limits, in effect 2011

2014: 50% reduction in the use of Tetracyclins

2016: Support reduction in the use of Colistin

SEGES Danish Pig Research Centre

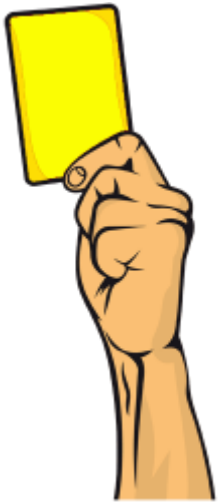
2010: YELLOW CARD ON ANTIMICROBIALS ALL PIG HERDS ARE MONITORED

SEGES
Danish Pig Research Centre

YELLOW CARD ON ANTIMICROBIALS

Permit limits by 2018 (ADD - average daily dose)

	Sows	Weaners	Finishers
ADD/100 animals/day	3.8	20.2	5.2



Limits have been reduced 5 times since 2010

Actions to be taken:

- **Action plan by the veterinarian**
- **Consumption must be reduced below threshold limit**
- Increased inspection by the authorities (!)

SEGES Danish Pig Research Centre

DIFFERENTIATED YELLOW CARD

Aim: To promote exclusion of certain antibiotics

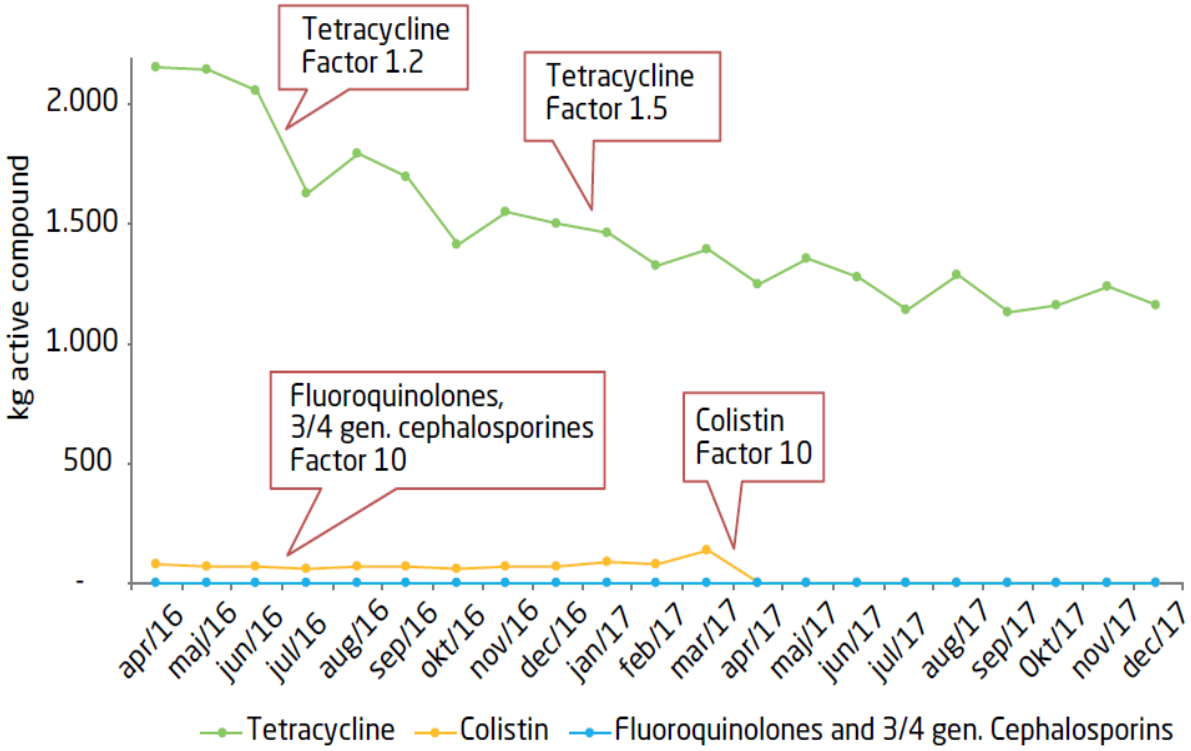
In force by 2018

Weighted ADD by a factor

- 10: Flouroquinolons, Cephalosporins and Colistin
- 1,5: Tetracyclin
- 1: Other antibiotic-groups

Figure 1 Use of selected antimicrobial agents in pigs per month (from april 2016), Denmark

DANMAP 2017



Note: Data was extracted from VetStat in May 2018. The data from the database is dynamic and the numbers above can change over time due to retrospective corrections. The usage of fluoroquinolones, 3rd and 4th generation cephalosporines does not show in the figure as the use is close to zero. The same applies to the use of colistin since April 2017.

SEGES
Danish Pig Research Centre

AWARENESS OF ANTIBIOTIC USE

THE LAST 22 YEARS IN DENMARK

1994: New regulations for veterinarians (**No sales** of drugs)

1996: Guidelines for selection of antibiotics for treatment

DANMAP

1998: Stop for Growth promotors to finishers

2000: Total AGP stop (voluntary ban, the Pig Industry)

2000: **VETSTAT**

2002: Stop for the use of flouroquinolones

2010: Industry voluntary stop for the use of cephalosporin

2010: **Yellow card** limits, in effect 2011

2014: 50% reduction in the use of Tetracyclins

2016: Support reduction in the use of Colistin

NATIONAL ACTION PLAN FOR REDUCTION

4-year National Action Plan for MRSA (2014)

Reduction of antibiotics: 15 pct. from 2015-18

FOCUS ON FEEDING BY THE PIG INDUSTRY

New feeding strategies that promote

- Weaning of ***healthy*** pigs
- Without using
  - Medical Zinc (2,500 ppm)
  - Antibiotics

SEGES
Danish Pig Research Centre

ALTERNATIVES TO ZINC FOR PIGLETS - TRIAL

1. 2,500 ppm zinc
2. 1,500 ppm zinc
3. 0 zinc
4. **Seaweed** from Ocean Harvest in Ireland
5. '**MiyaGold'** (probiotic) from Huvepharma
6. **'GærPlus'** (yeast) from Danish Agro

Trial design: 60 replicates (pens) including 4,500 piglets

SEGES
Danish Pig Research Centre

PRODUCTION RESULTS, 7-30 KG

THE ENTIRE PERIOD

Group (day 0-52)	2500 Zn	1500 Zn	0 Zn	Ocean Feed	Miya Gold	GærPlus
Feed intake, FUgp/pig/day	0.88	0.87	0.85	0.86	0.86	0.86
Daily gain, g	523	520	502	502	503	501
FCR, FU/kg gain	1.68	1.69	1.70	1.71	1.71	1.71
Production value, index	100	100	96	95	96	96

Red figures = significantly different from 2,500 Zn

No difference between 2,500 Zn and 1,500 Zn
Productivity in zinc groups higher compared with the other four groups

EFFECT ON TREATMENTS FOR DIARRHOEA

TREATMENT DAYS PER PIG

Group	2500 Zn	1500 Zn	0 Zn	Ocean Feed	Miya Gold	GærPlus
7-9 kg (day 0-11)	0.03	0.08	1.11			
9-15 kg (day 12- 27)	1.01	1.72	2.71			
15-30 kg (28-52)	3.79	2.91	3.58			
7-30 kg (day 0-52)	4.47	4.62	7.42			
% increase	-	3%	66%			

Red figures = significantly different from 2,500 Zn

No differences in treatments for diarrhoea at 2,500 Zn and 1,500 Zn
Significantly lower treatments compared with 0 Zn

EFFECT ON TREATMENTS FOR DIARRHOEA

TREATMENT DAYS PER PIG

Group	2500 Zn	1500 Zn	0 Zn	Ocean Feed	Miya Gold	GærPlus
7-9 kg (day 0-11)			1.11	1.02	0.80	0.80
9-15 kg (day 12- 27)			2.71	3.14	3.11	2.50
15-30 kg (28-52)			3.58	3.45	3.28	3.82
7-30 kg (day 0-52)			7.42	7.73	7.29	7.08
% increase			66%	73%	63%	58%

No improvement in the effect of alternative products compared with 0 Zn

NEW ACTIVITES ON FEEDING

- **Concept** test (finalised medio 2018)
- 23 applications of which 4 were selected:
  - 1- 2,500 ppm zinc
  - 2- 0 ppm zinc
  - **3- FraMelco**
  - **4- TrouwNutrition**
  - **5- Evonik**
  - **6- Vitfoss**

  - Test period 7-30 kg, 60 replications, 4,500 piglets

NEW ACTIVITES ON FEEDING

- **Concept** test (finalised medio 2018)
- 23 applications of which 4 were selected:
  - 1- 2,500 ppm zinc
  - 2- 0 ppm zinc
  - **3- FraMelco**
  - **4- TrouwNutrition**
  - **5- Evonik**
  - **6- Vitfoss**

Superior or equal to 2500 ppm Zn

- Test period 7-30 kg, 60 replications, 4,500 piglets

CONCLUSIONS

Different instruments can promote a reduction in the use of antibiotics:

- A combination of industry and national initiatives
- A persistent focus is needed
- Time and new knowledge are needed to ajust
- Feeding and nutrition are central players

Questions?