

Antibiotics – enough but not too much

Elisabeth Okholm Nielsen & Karl Pedersen
SEGES Innovation, Husdyr

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Svineafgiftsfonden

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Antibiotics are important for humans and animals

- What are antibiotics and antibiotic resistance - Karl
- Legislation pertaining to antibiotics for pigs – Elisabeth
- Consumption of antibiotics in Denmark – Europe – The World - Karl
- Who treats the pig with antibiotics? – Elisabeth
- How to reduce the consumption of antibiotics – Elisabeth

What are antibiotics and antibiotic resistance

Karl Pedersen

What are antibiotics?

- Antibiotics are compounds, which **inhibit or kill bacteria**
- Several **kinds (classes)** of antibiotics with different action exist
- Antibiotics are the **most important and powerful drugs the vet has at his/her disposal**
- **Bacteria can develop resistance** to one or several antibiotics
- **Several different mechanisms exist**, with which a bacterium can develop resistance
- Resistance has been **detected to all** known antibiotics
- **No new antibiotics have been found** for the last 40 years

Significance of antibiotic resistance

- 33,000 deaths/yr in EU (ECDC) and 700,000 deaths/yr globally (WHO) due to infection with antibiotic resistant bacteria
- Anticipated 10 mill deaths/yr globally due to infection with antibiotic resistant bacteria in 2050 (O'Neill 2014)
- Antibiotic resistance is a top 10 global threat to public health (WHO)

Significance of antibiotic resistance

- All use of antibiotics contributes to development and spreading of resistant bacteria
- Therefore, it is important to use as little antibiotics as possible
- But as much as needed
- Use antibiotics only as prescribed by the vet
- Certain antibiotics are restricted to human use

Danish work against antibiotic resistance

- Danish Veterinary and Food Administration, 2021-2023. Action plan against antibiotic resistance

<https://www.foedevarestyrelsen.dk/SiteCollectionDocuments/Dyrevelfaerd%20og%20veterinaermedicin/Veterin%C3%A6rmedicin/Antibiotika/FVST%20AMR%20handlingsplan%202021-2023.pdf>

- Ministry of Environment and Food of Denmark, Ministry of Health, 2017. One health strategy against antibiotic resistance

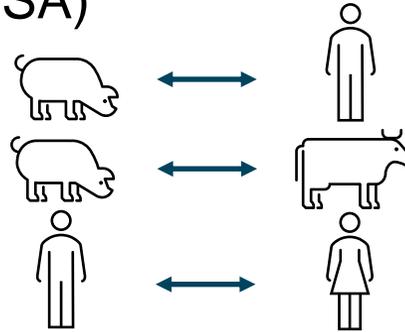
<https://sum.dk/Media/0/D/One%20health%20strategy%20mod%20antibiotikaresistens%20engelsk.pdf>



Spreading of antibiotic resistance

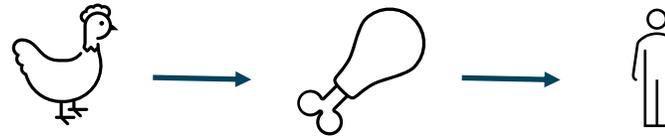
- **By physical contact** (e.g. MRSA)

- Animal ↔ human
- Animal ↔ animal
- Human ↔ human



- **Via food** (e.g. Salmonella or Campylobacter)

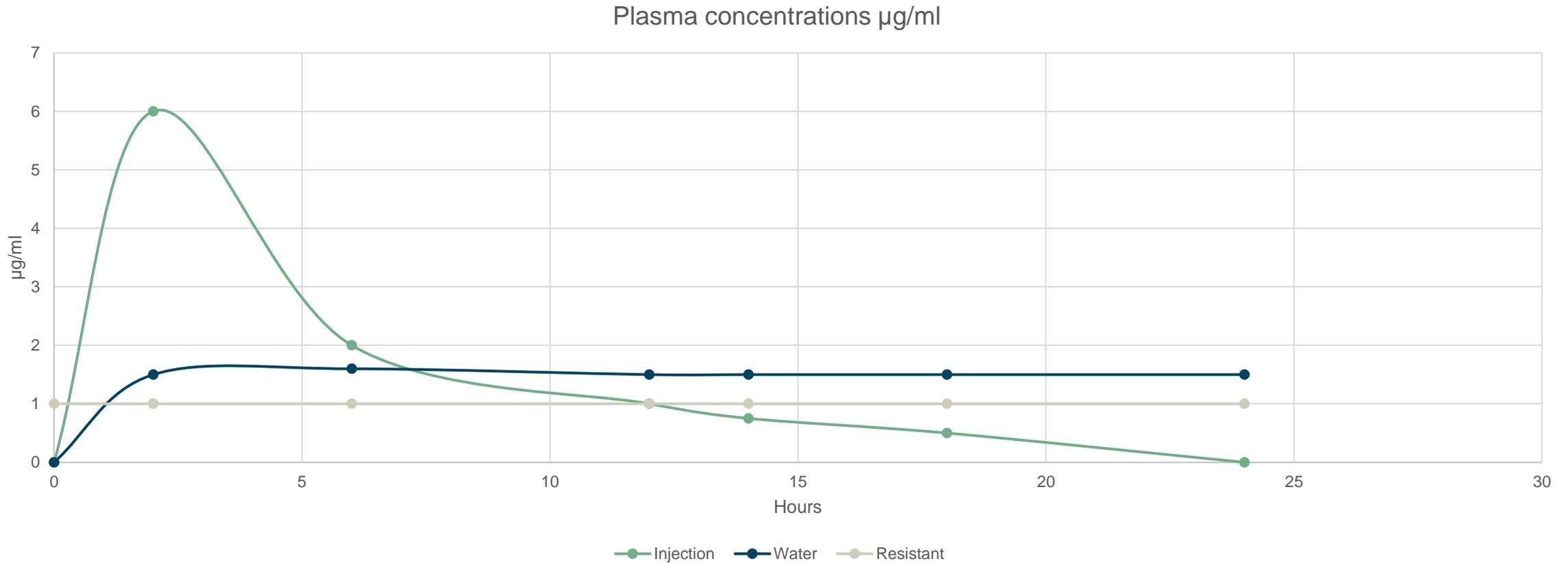
- Animal → food item → human



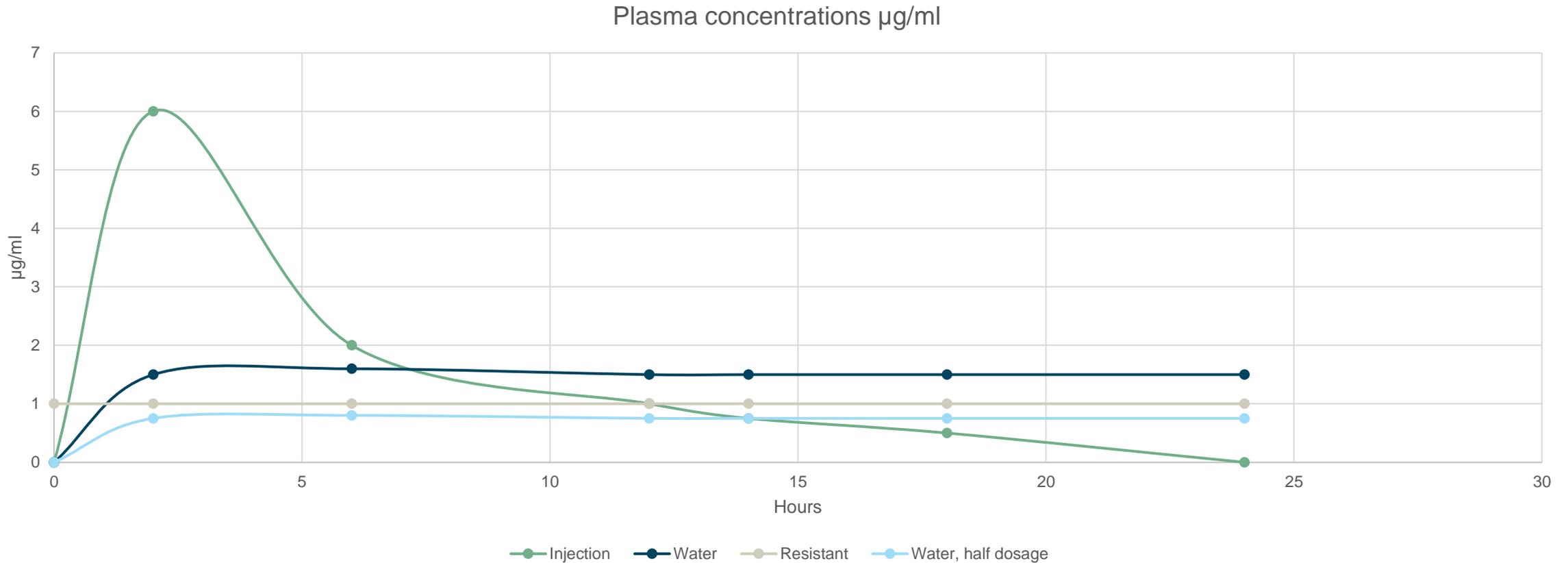
- **Indirect**

- Bacterium → resistance gene → other bacterium → human

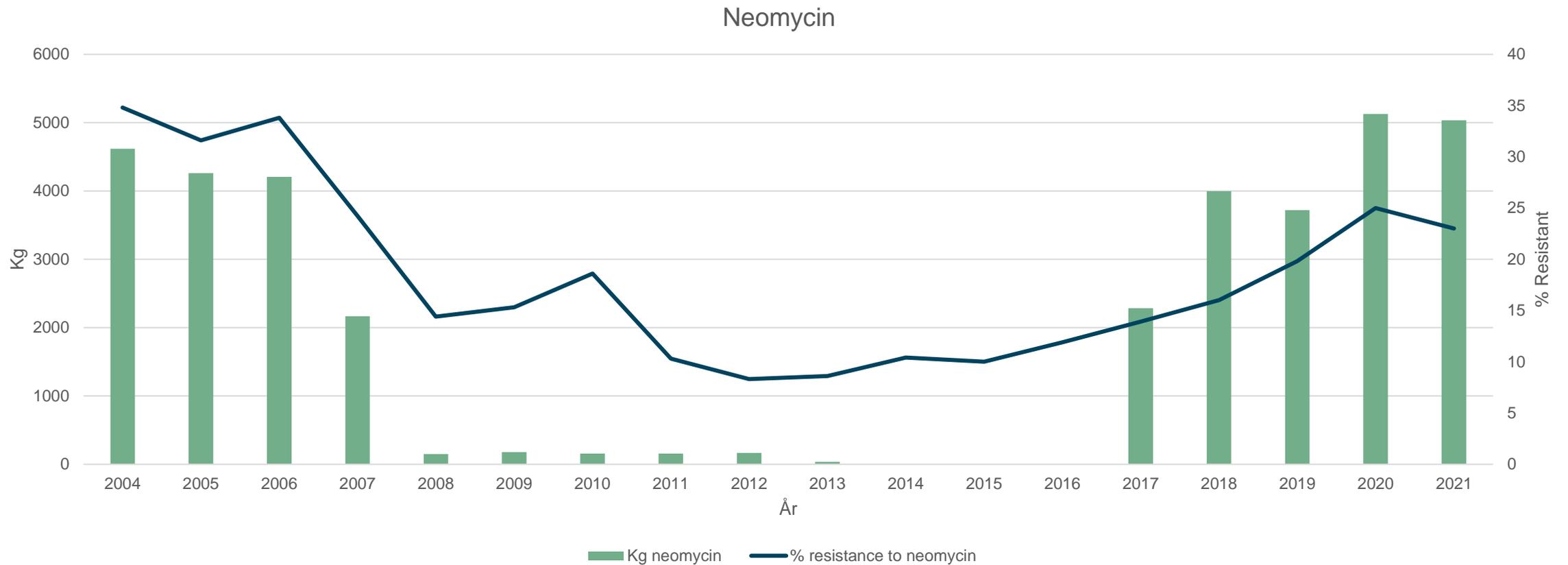
Concentrations of antibiotic in blood at different treatment (example)



Concentrations of antibiotic in blood at different treatment (example)



Association between usage and resistance – *E. coli* and neomycin (Neomay)



Resistance profile (example) – sensitive *E. coli*, oedema disease

Resistensbestemmelse

Hæmolytisk *E. coli*, Tarm, 1

Præparat	Aflæst værdi (µg/ml)	Fortolkning	Følsom hvis MIC ≤ (µg/ml)
Amoxicillin (1)	=4	F	8
Paromomycin	≤1	F	8
Apramycin	≤2	F	8
Amoxicillin/clavulansyre (2)	=4	F	8
Cefquinom	≤0.06	F	0.25
Colistin	≤0.5	F	2
Doxycyclin	≤1	F	4
Enrofloxacin	≤0.015	F	0.13
Florfenicol	=4	F	4
Gentamicin	≤0.5	F	2
Neomycin	≤2	F	8
Cefpodoxime	=0.5	F	0.5
Spectinomycin	≤16	F	64
Streptomycin	≤8	F	16
Trimethoprim/sulfamethoxazol	≤0.06	F	0.5
Tetracyclin	≤2	F	8

Source: Charlotte Mark Salomonsen, Kjellerup

Resistance profile (example) – multiresistant *E. coli*, oedema disease

Resistensbestemmelse

Hæmolytisk *E. coli*, F18, Tarm, 2

Præparat	Aflæst værdi (µg/ml)	Fortolkning	Følsom hvis MIC ≤ (µg/ml)
Amoxicillin	>64	R	2
Paromomycin	>64	R	8
Apramycin	≤2	F	8
Amoxicillin/clavulansyre	=8	R	2
Cefquinom	=0.12	F	0.25
Colistin	≤0.5	F	2
Doxycyclin	=32	R	4
Enrofloxacin	=0.03	F	0.13
Florfenicol	=16	R	4
Gentamicin	≤0.5	F	2
Neomycin	=64	R	8
Cefpodoxime	=1	R	0.5
Spectinomycin	>512	R	64
Streptomycin	>128	R	16
Trimethoprim/sulfamethoxazol	=4	R	0.5
Tetracyclin	>64	R	8

F = følsom, I = intermediær resistens, R = resistent

Resistance profile (example) – multiresistant *E. coli*, post-weaning diarrhoea

Resistensbestemmelse

Hæmolytisk *E. coli*, F18, Fæces, 1

Præparat	Aflæst værdi (µg/ml)	Fortolkning	Følsom hvis MIC ≤ (µg/ml)
Amoxicillin	>64	R	2
Paromomycin	>64	R	8
Apramycin	>64	R	8
Amoxicillin/clavulansyre	=8	R	2
→ Cefquinom	≤0.06	F	0.25
→ Colistin	≤0.5	F	2
Doxycyclin	=16	R	4
→ Enrofloxacin	=0.03	F	0.13
Florfenicol	=8	I	4
Gentamicin	>16	R	2
Neomycin	>64	R	8
→ Cefpodoxime	≤0.25	F	0.5
Spectinomycin	>512	R	64
Streptomycin	>128	R	16
Trimethoprim/sulfamethoxazol	>8	R	0.5
Tetracyclin	=64	R	8

F = følsom, I = intermediær resistens, R = resistent

Critically important antibiotics – are rarely used in Denmark

- Certain antibiotics are **critically important** for human treatment: **fluoroquinolones** (e.g., Baytril), **cefalosporins** (e.g., Ceftiofur) and **colistin**
- These antibiotics **are weighted 10 times** more than e.g., penicillin in Yellow Card
- These critically important antibiotics are only rarely prescribed by the vet
It **must be documented that no other antibiotics are efficient** for treatment
- There are **other antibiotics**, which **are never** allowed for treatment of animals

Legislation pertaining to antibiotics for pigs

Elisabeth Okholm Nielsen

Danish rules for antibiotics for pigs

- Only vets can prescribe antibiotics for animals – drugs are only sold from pharmacies
- Diagnostics of the disease is required for prescription of flock medication
- Before treatment of pigs, a course in medicine handling is required
- The veterinarian's prescriptions must be followed (ask the farm manager)
- All medical treatments must be registered

Requirements for registration of usage of antibiotics

- **Date** of initiation of treatment
- **Number of days** – as prescribed by the vet
 - **Which sow** (ear mark)
 - **Which pigs** (number, weight, pen number)
- **Name** of antibiotic product
- **Dosage** – as prescribed by the vet
- **Withdrawal period** – even if it is 0 days

Yellow Card since 2010

- Limits to usage of antibiotics in the herd
 - Sows (incl. suckling piglets) 3.2 doses/100 animals per day
 - Weaners 17.2 doses/100 animals per day
 - Growers/finishers 4.4 doses/100 animals per day
- Tetracyclines count extra – 1.5 times
- If the limit is exceeded, the Veterinary and Food Administration will check the herd
- The usage must be reduced to below limit, otherwise more authority checks will follow – and a second opinion veterinarian appointed by DVFA



VetStat includes all prescribed antibiotics

Example: antibiotics for weaners in one herd

Ministeriet for Fødevarer, Landbrug og Fiskeri
Fødevarestyrelsen

VetStat

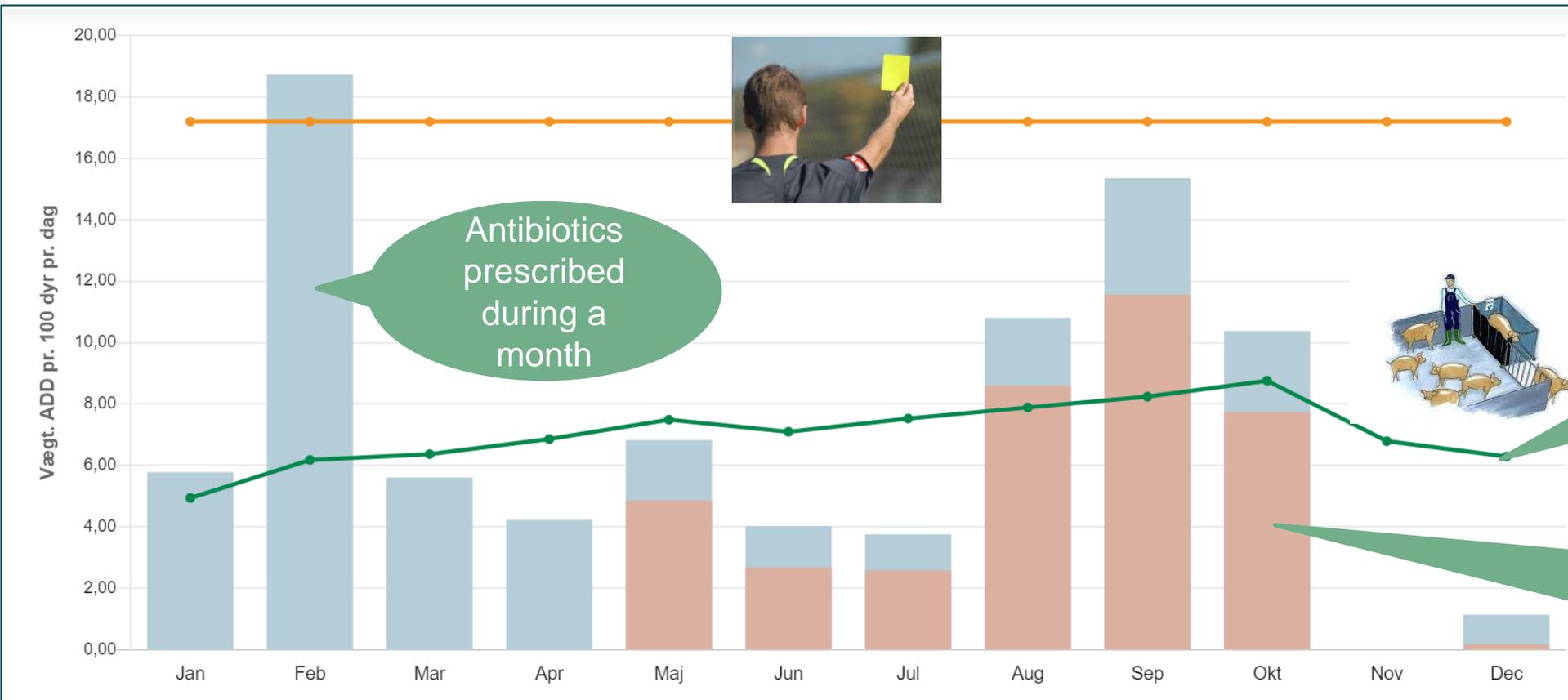
Log in

Welcome to VetStat

VetStat is the Danish database of all prescription drugs sold to animals in Denmark as well as the Danish veterinary register and the register of veterinary practices and veterinary advisory service contracts.

If you have questions or need help, you can contact the VetStat team either by email: vetstat@fvst.dk or phone +45 72 27 68 87 Monday to Thursday 9-15 and Friday 9-14.

Log in

Antibiotics prescribed during a month

Average antibiotic consumption latest 9 months

Flock medication

On January 28, 2022, EU regulation 2019/6 on veterinary medicinal products came into force

- All veterinary medicinal products – including antibiotics – must be used in accordance with the dosage and duration of treatment as stipulated in the summary of product characteristics (SPC)
- The veterinarian must not prescribe a dosage deviating from what is stipulated in the SPC
- The veterinarian must not truncate or prolong the treatment period stipulated in the SPC

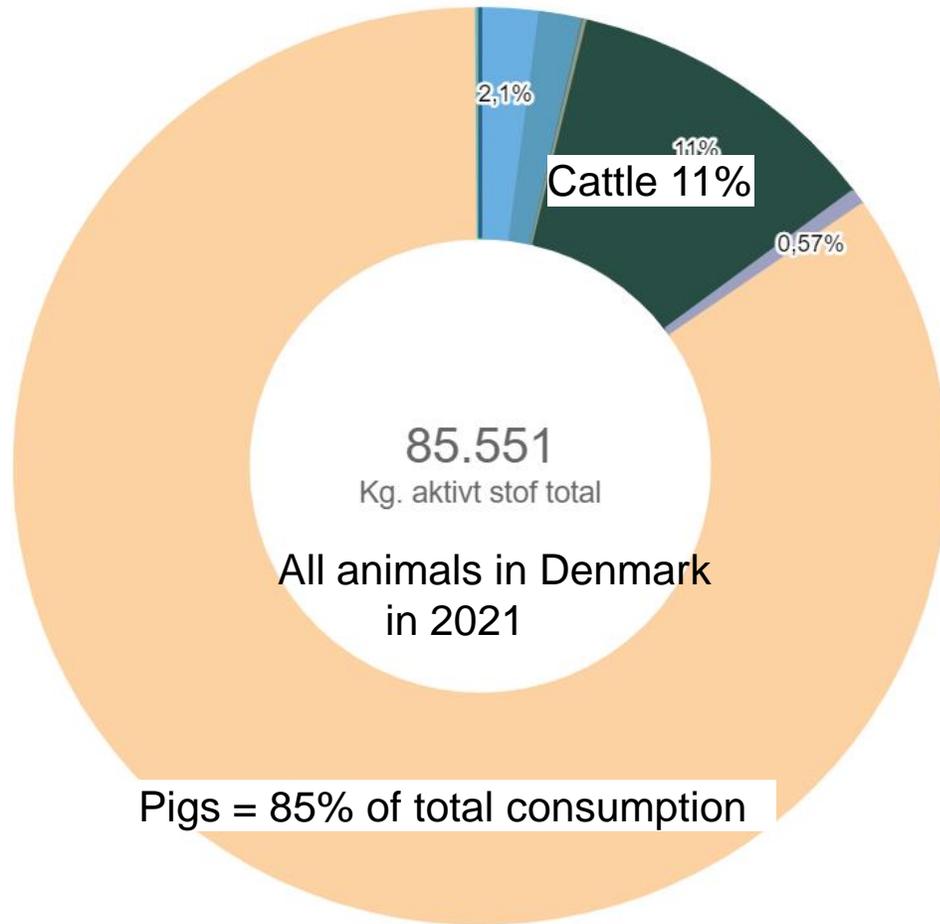
For veterinarians

Consumption of antibiotics in Denmark – Europe – The World

Karl Pedersen

Consumption of antibiotics for animals in Denmark

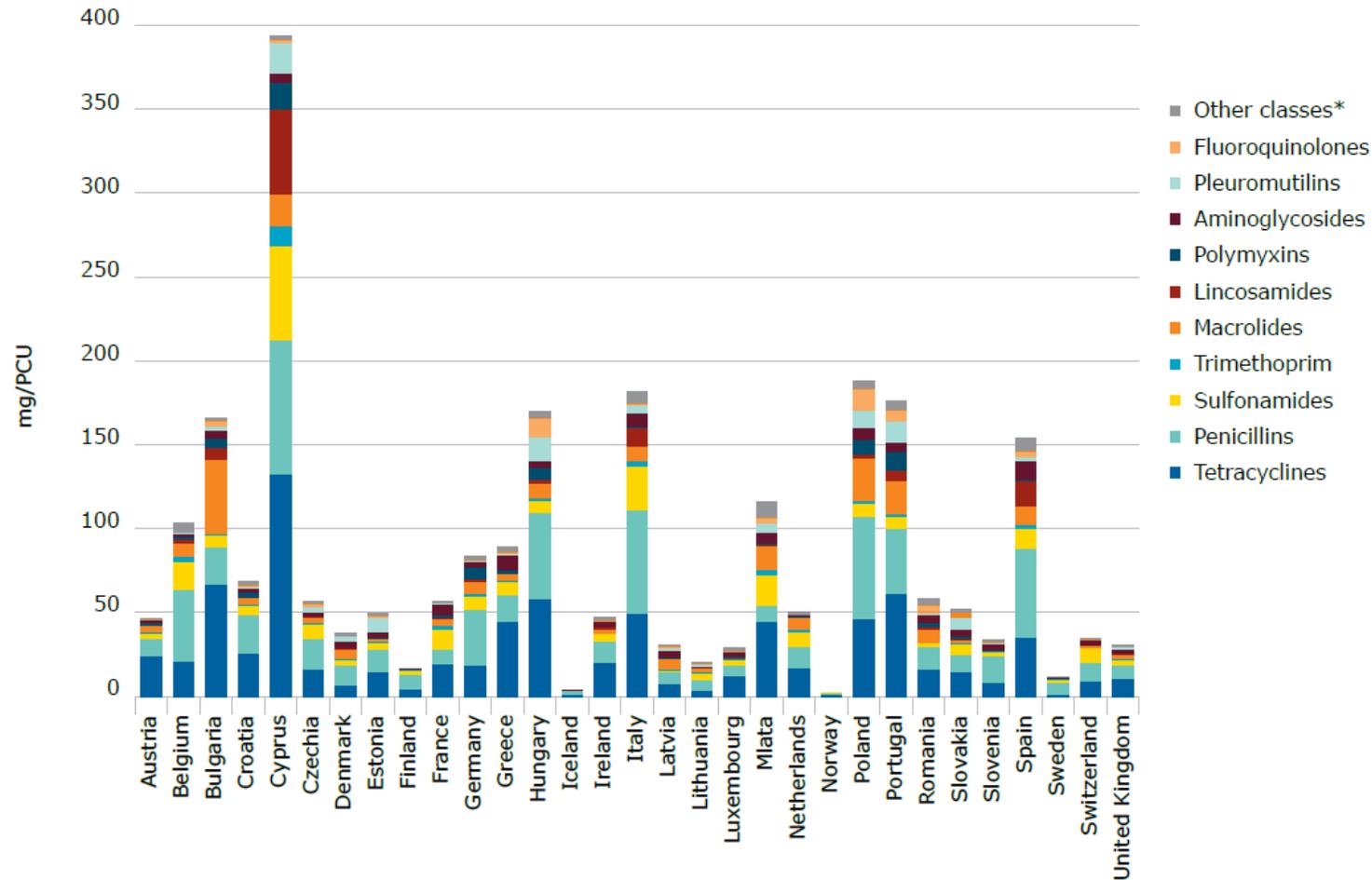
Vast majority of antibiotics is used for weaners



Antibiotics used for piglets in 2021 was **41%** of the total consumption of antibiotics for animals in Denmark

Usage (sales) of antibiotics for animals in Europe

Figure 2. Sales for food-producing animals, in mg/PCU, of the various antimicrobial classes, for 31 European countries, in 2020¹



Kilde: ESVAC report 2021

Global usage of antibiotics for animals

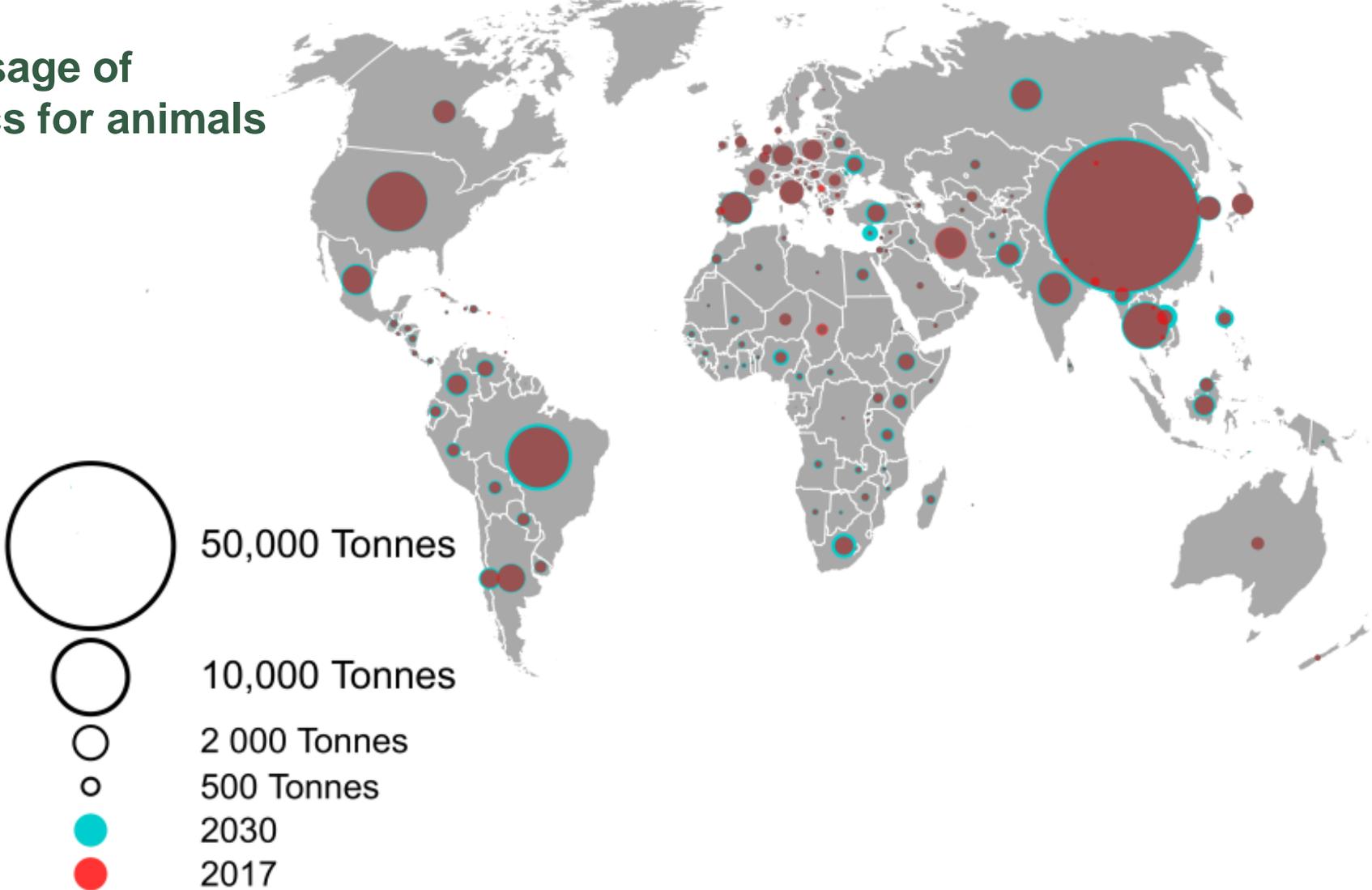


Figure 1. Antimicrobial consumption per country in 2017 and 2030. The size of the circles corresponds to the amounts of antimicrobials used. Dark red circles correspond to the amounts used in 2017, and the outer blue ring corresponds to the projected increase in consumption in 2030.

Tiseo et al.: Global Trends in Antimicrobial Use in Food Animals from 2017 to 2030. Antibiotics 2021

Global usage of antibiotics for animals

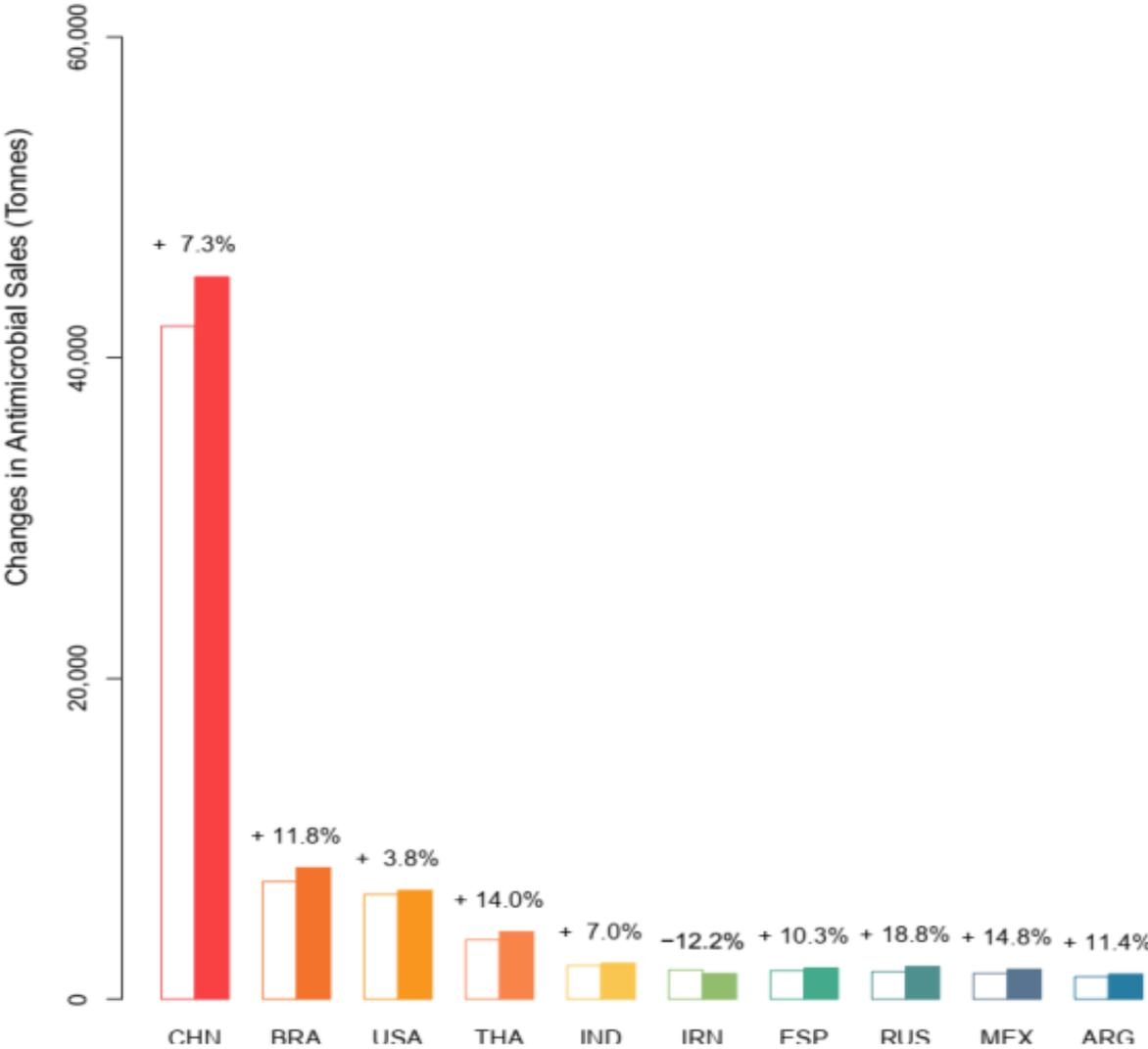


Figure 2. The top 10 consumers of veterinary antimicrobials by country in 2017 (open bars) and their projected consumption for 2030 (closed bars). CHN, China; BR, Brazil; USA, United States; THA, Thailand; IND, India; IRN, Iran; ESP, Spain; RUS, Russia; MEX, Mexico; ARG, Argentina.



Who treats the pig with antibiotics?

Elisabeth Okholm Nielsen

Check out svineproduktion.dk

Only in Danish



2019

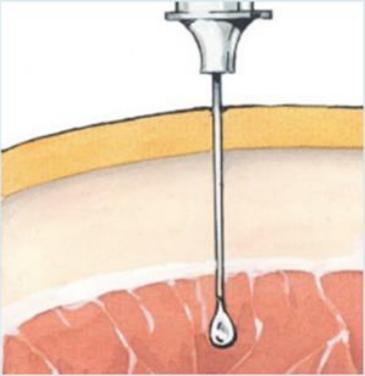
MANUAL TIL GOD ANTIBIOTIKAPRAKSIS

– så lidt antibiotika som muligt, men så meget som nødvendigt

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GIV ANTIBIOTIKA I NAKKEMUSKEL
IM = INJEKTION I MUSKEL



FORSKELLIGE STØRRELSER
KANYLER



INJEKTION I NAKKEMUSKEL



Injections

- Right size of needle
- Right angle to the skin
- Change needles between each litter/10 pigs /2 sows
- In case of a needle breaking in the animal – mark the animal and inform the slaughterhouse
- Avoid allergy to antibiotics
 - Use gloves
 - Wash hands
 - Wear P2-mask

Flock medication via drinking water

AFVEJNING AF ANTIBIOTIKA PÅ
BREVVÆGT



INDSTIL MEDICINBLANDER PÅ 2 PCT.



1 L. VAND PR. 10 KG GRIS PR. DAG



- Calculation of amount needed
- Use a scale!
- Check the equipment
- Rule of thumb – 1 liter water per 10 kilo pig per day

Calculation of the right amount – avoid waste

- Number of pigs
- Weight of the pigs
- Dose example 5 grams per 100 kilo bodyweight

200 pigs of averagely 10 kilo = 2,000 kilo pig total
100 grams antibiotics per 2,000 kilo pig

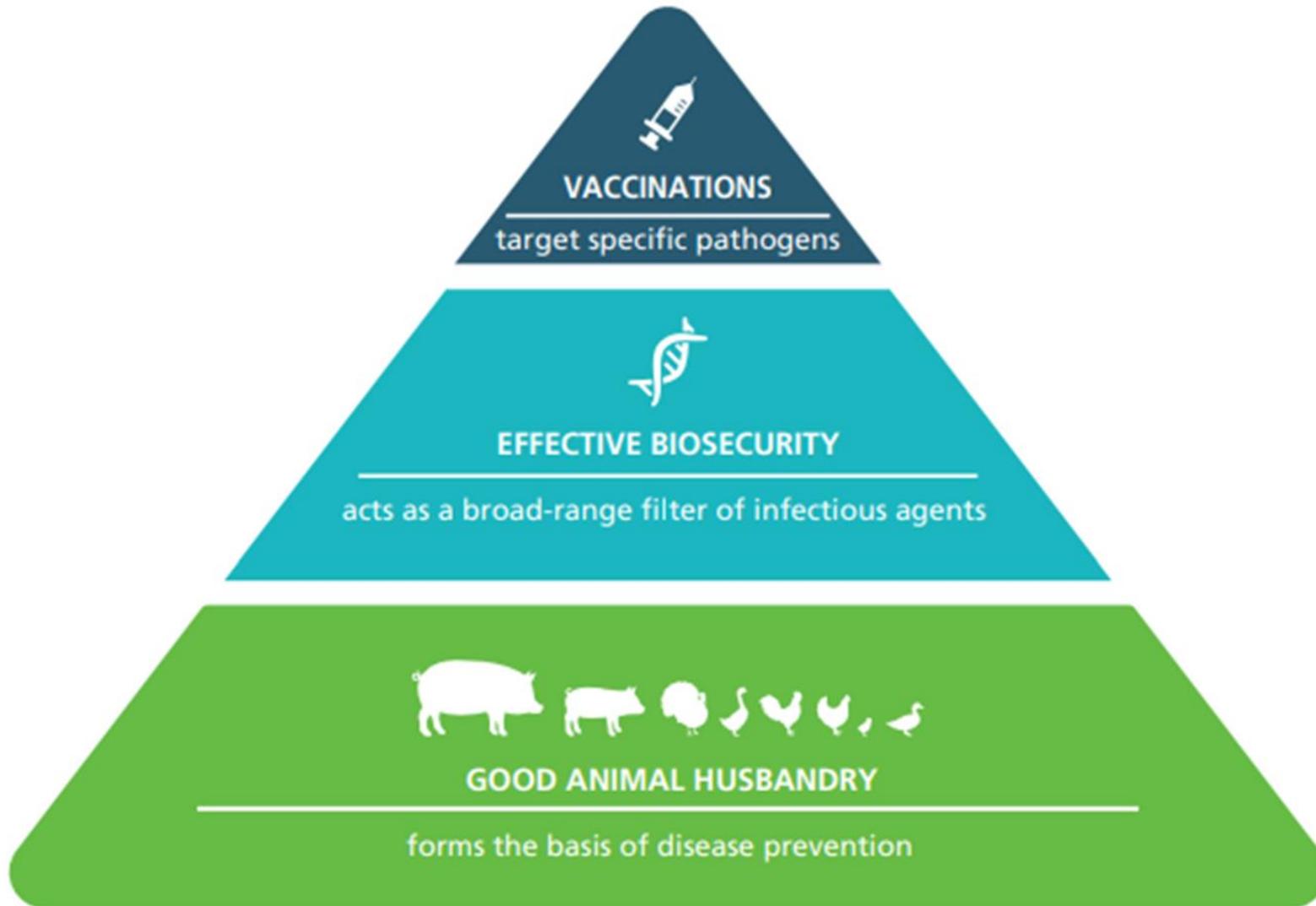
Treatment for one day in water – or in feed



How to reduce the consumption of antibiotics

Elisabeth Okholm Nielsen

Prevent disease – healthy pigs do not need medication



More precise antibiotic treatment



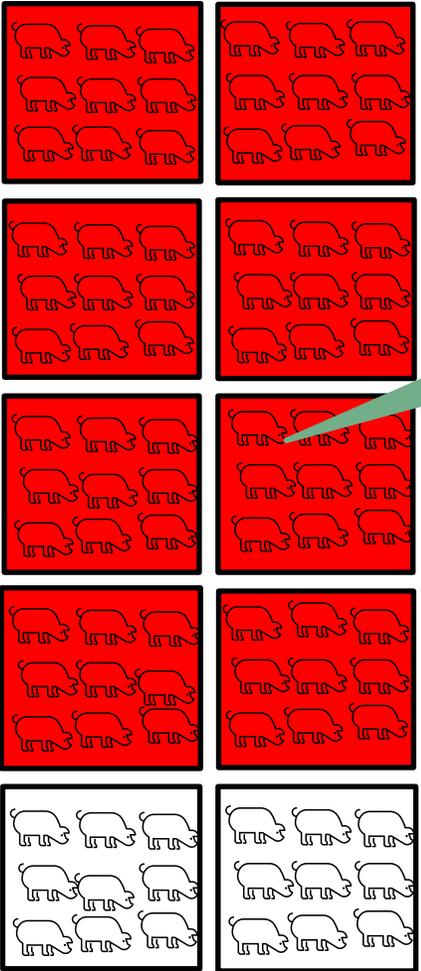
Wait and see – before treatment

Individual treatment

Pen-wise treatment

Pen-wise – treatment of diarrhoea

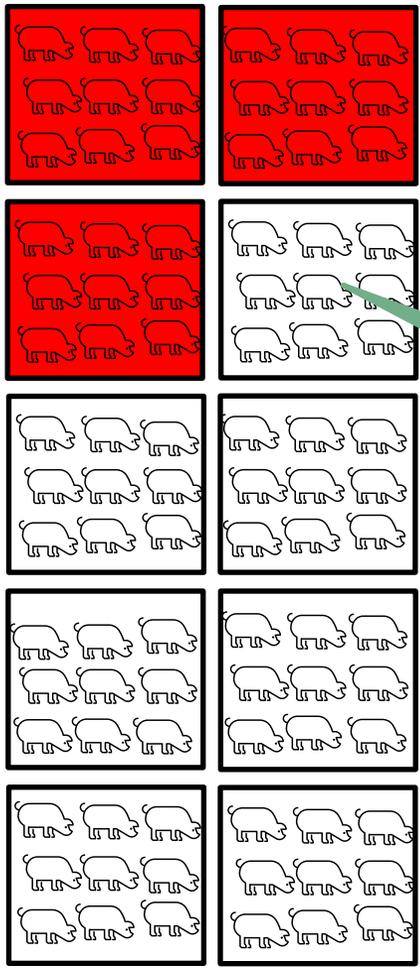
Control



77 % flock-medicated pens

3.1 treatment days

Experiment



29 % flock-medicated pens*

0.9 treatment days**

*p=0.0001
**p<0.0001

Waste of antibiotics = risk of development of resistance

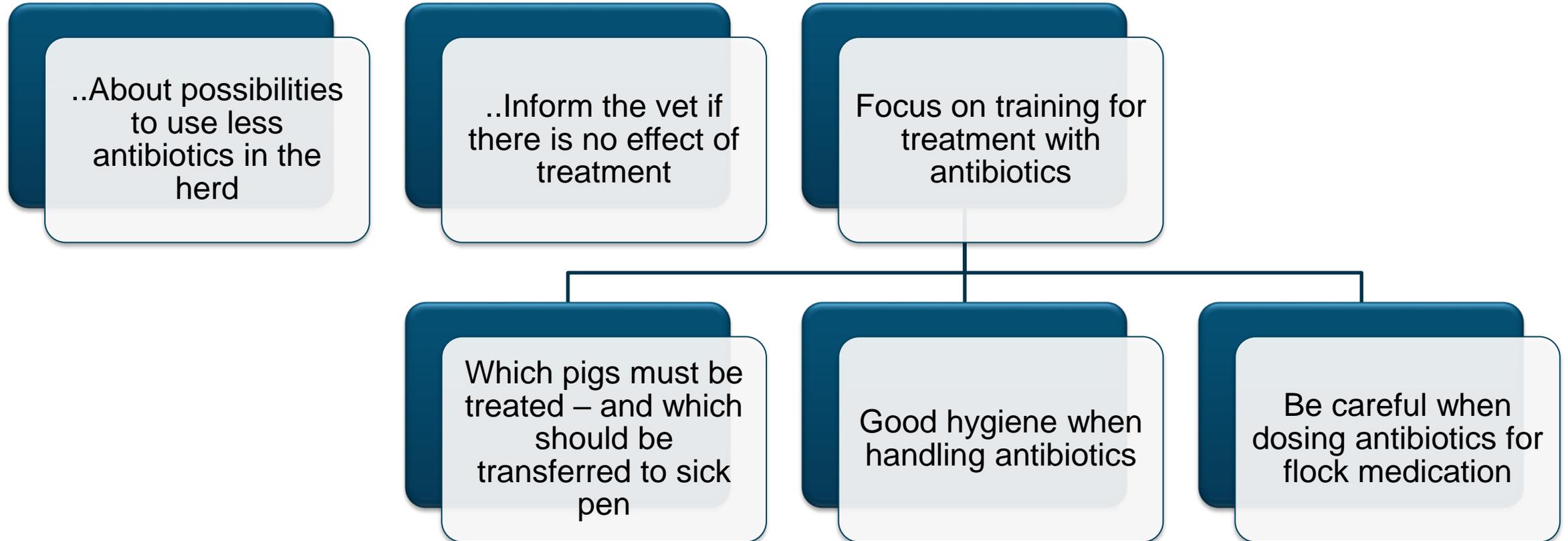
Lower dosage = inefficient treatment = waste of antibiotics

Shorter duration of treatment = inefficient treatment = waste of antibiotics

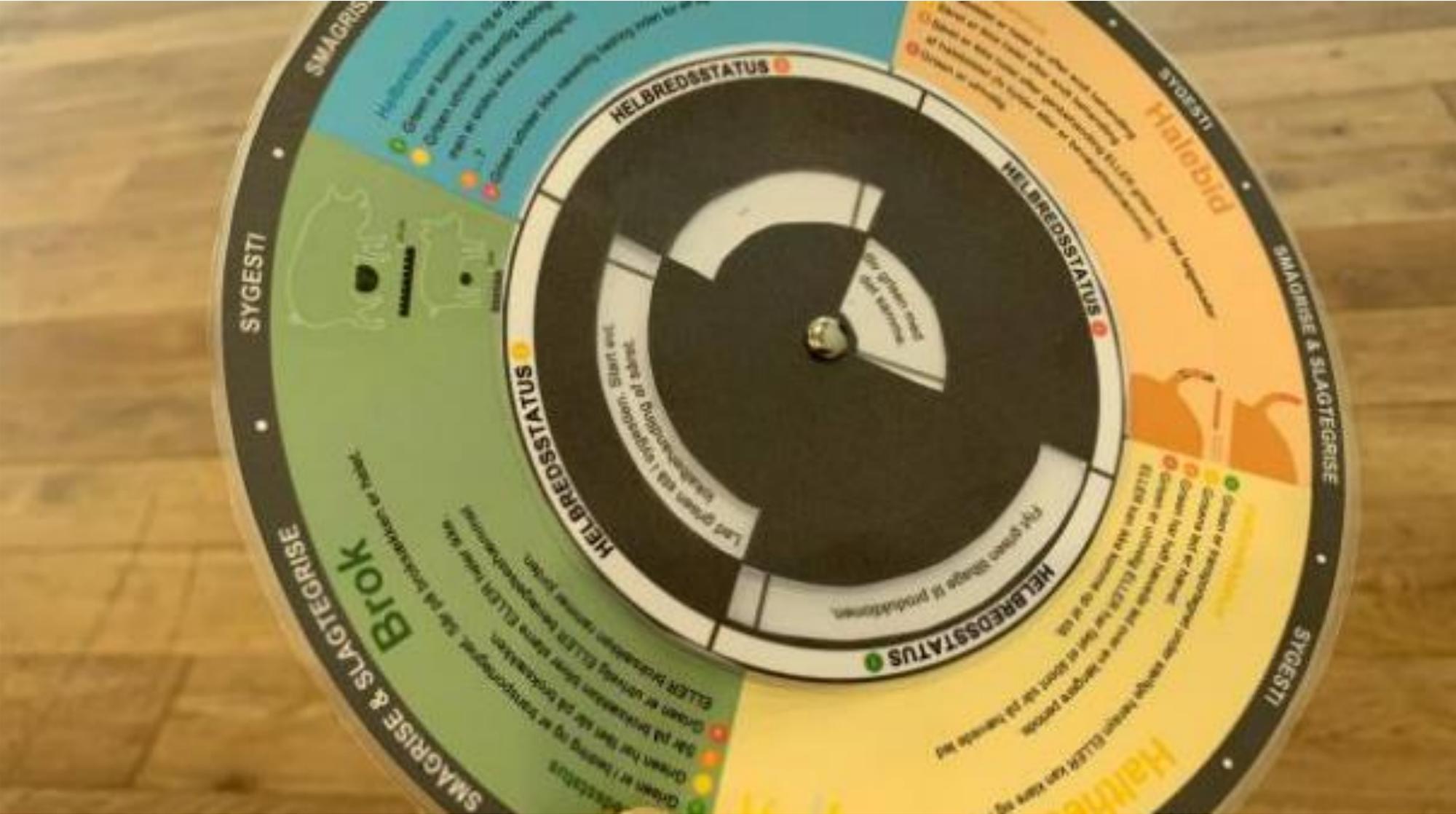
Use of antibiotics even when there is no effect of treatment = waste

Use antibiotics only as prescribed by the vet

Talk with your veterinarian



Use SEGES' health wheel – for sick and injured pigs



Take home messages

All antibiotics contribute to antibiotic resistance

Prevent disease, use as little antibiotics as possible

Take care of sick pigs

Use only antibiotics as prescribed by the vet

Be careful, avoid waste of antibiotics



Questions?

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