Ministry of Environment and Food of Denmark
Danish Veterinary and Food Administration

The ‘balloon effect’ – intervention triggers shift between antimicrobial classes

How interventions on one substance effect the use of other substances – for gastrointestinal disorders in weaner pigs

AACTING, Bern

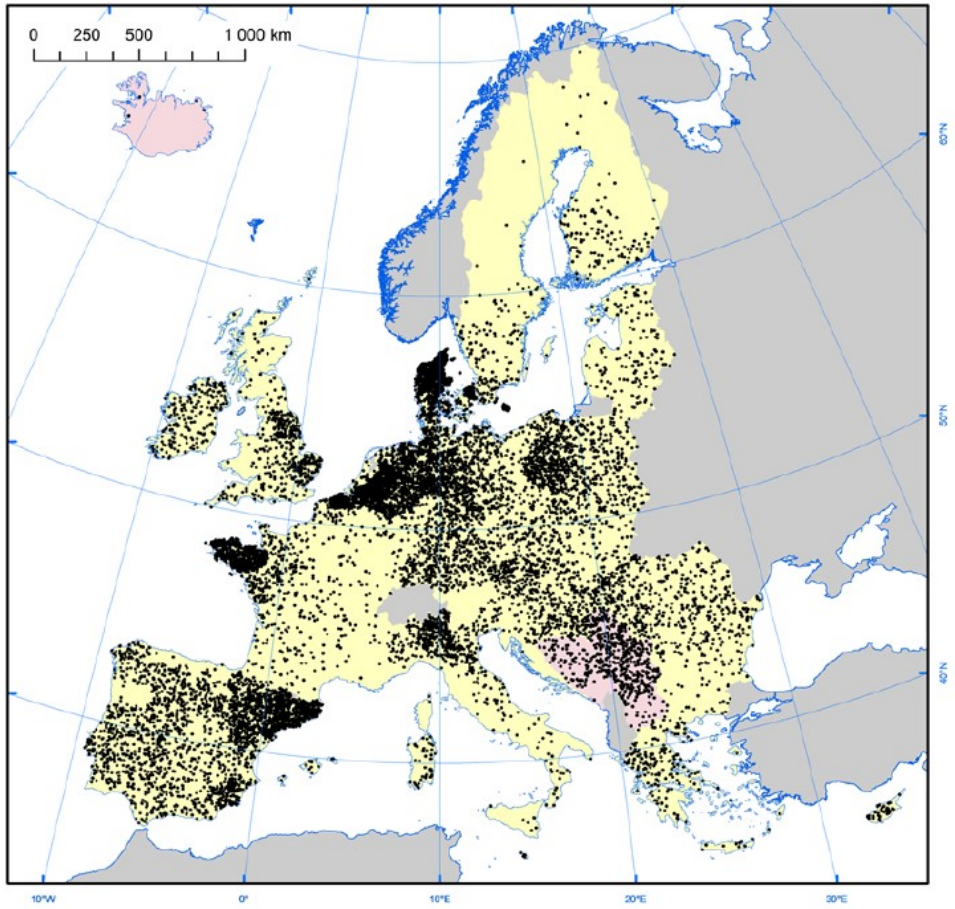
2-3. July 2019

Laura Mie Jensen

***Balloon** effect. ... The name draws an analogy between efforts to eradicate the production of illegal drugs in South American countries and the phenomenon of the same name when a latex **balloon** is squeezed: The air is moved, but does not disappear, instead moving into another area of less resistance. (Wikipedia).*

Banning the use of specific substances may lead to increase selection pressure on the remaining antimicrobials, and thereby speed development of AMR

Denmark



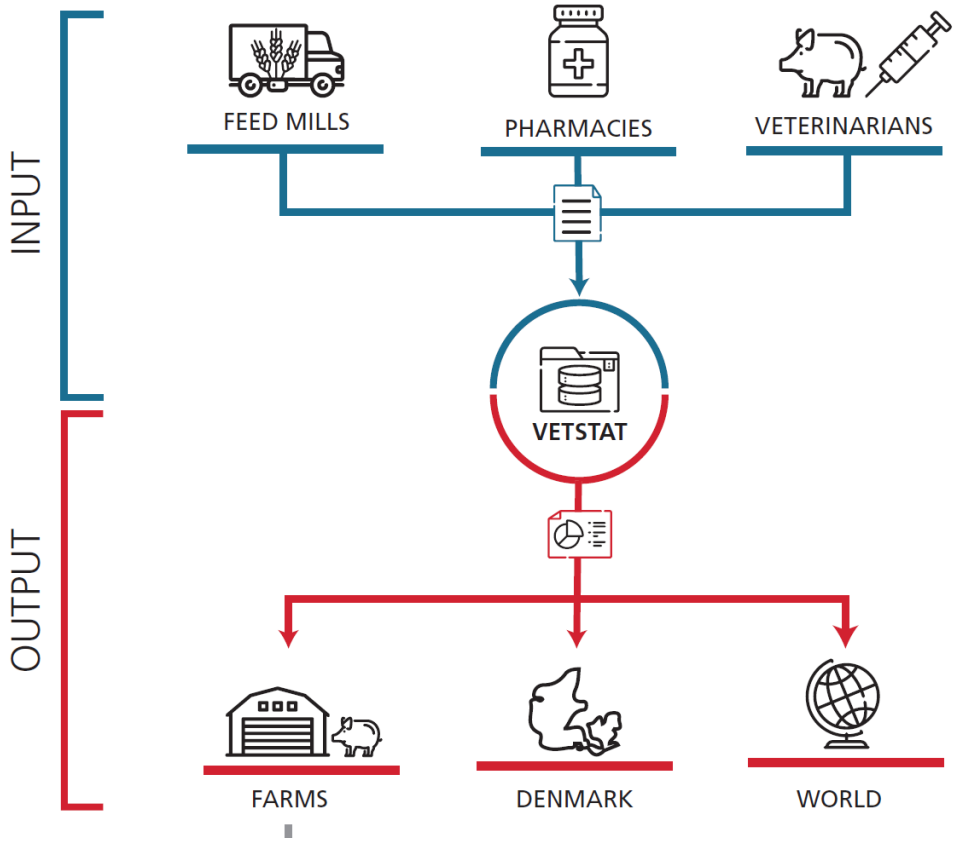
Map 1: Number of sows by region (2013) - Source: Eurostat (agr_r_animal)

Danish livestock 2017

0.5 million cattle
0.5 million dairy cows
32 million swine (14 million pigs exported)
117 million broilers

share 43,000 sq km land
with 6 million people

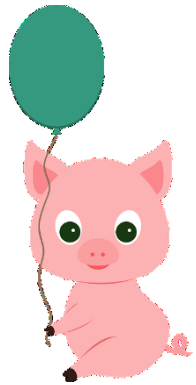
Surveillance of AMU in VetStat



The VetStat database (2000) records the age of the target group and the reason for prescribing antimicrobials

Data on antimicrobial sales for the pig sector are predominantly entered from the prescription information submitted by pharmacies at the point of sale to the pig producer

In addition, medicines used or sold by veterinarians are recorded in VetStat by the veterinarian



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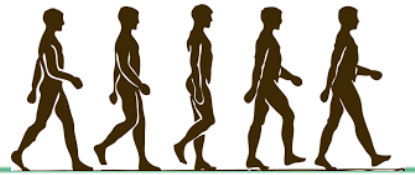
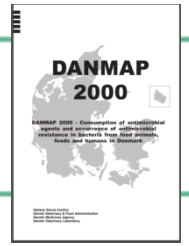
1994
Monitoring of all use for humans



1994
Herd Advisory Contracts
Vet's: No profit on VMP sale

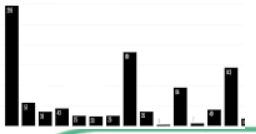
Det Nationale Antibiotikaråd



1995
DANMAP

1995-1999
Industry ban on antimicrobial growth promotors

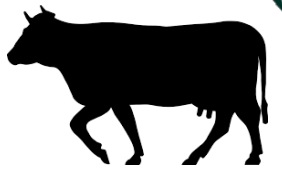
2000
National ban on AGP's



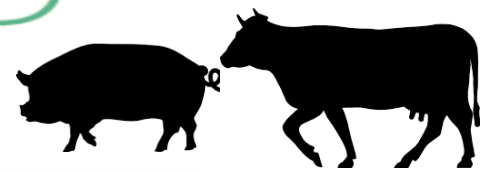
2000
VetStat data collection

2002
Restriction on CIA: fluoroquinolon

2010
Restriction: only simple penicillins for mastitis

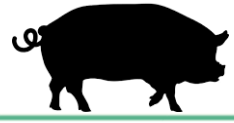


2010
Yellow card initiative
Benchmarks for pigs and cattle



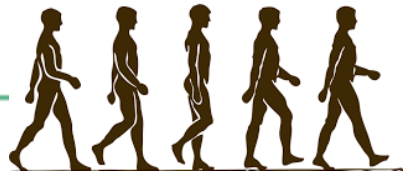
2010
Pig industry ban on CIA: 3rd/4th cephalosporin

2013
Tax on antimicrobials

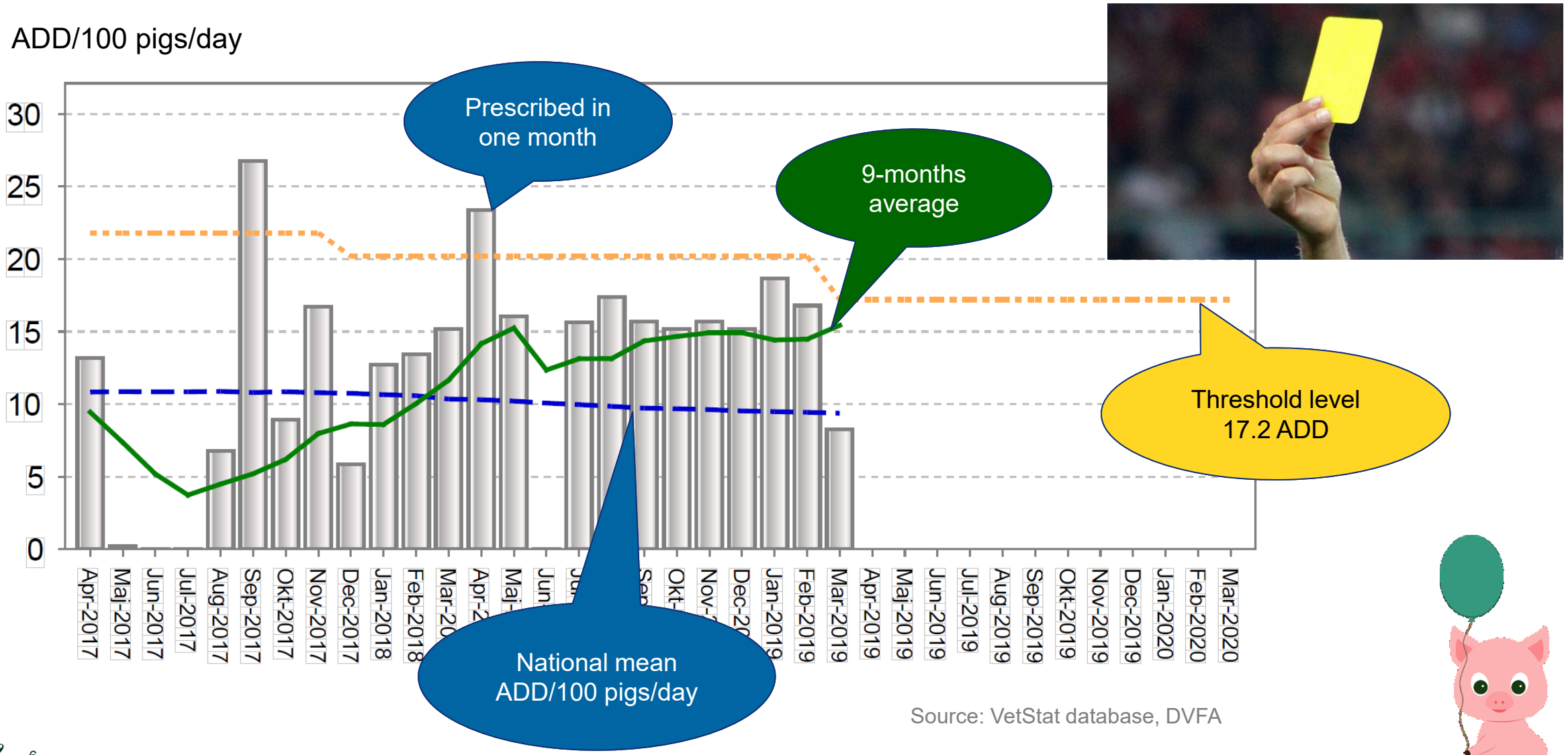


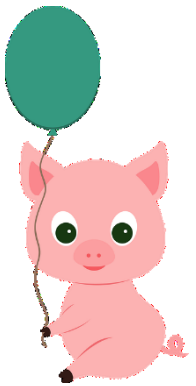
2016 -2017
New Yellow Card Initiative for pigs - risk of AMR

2017
National One Health Strategy



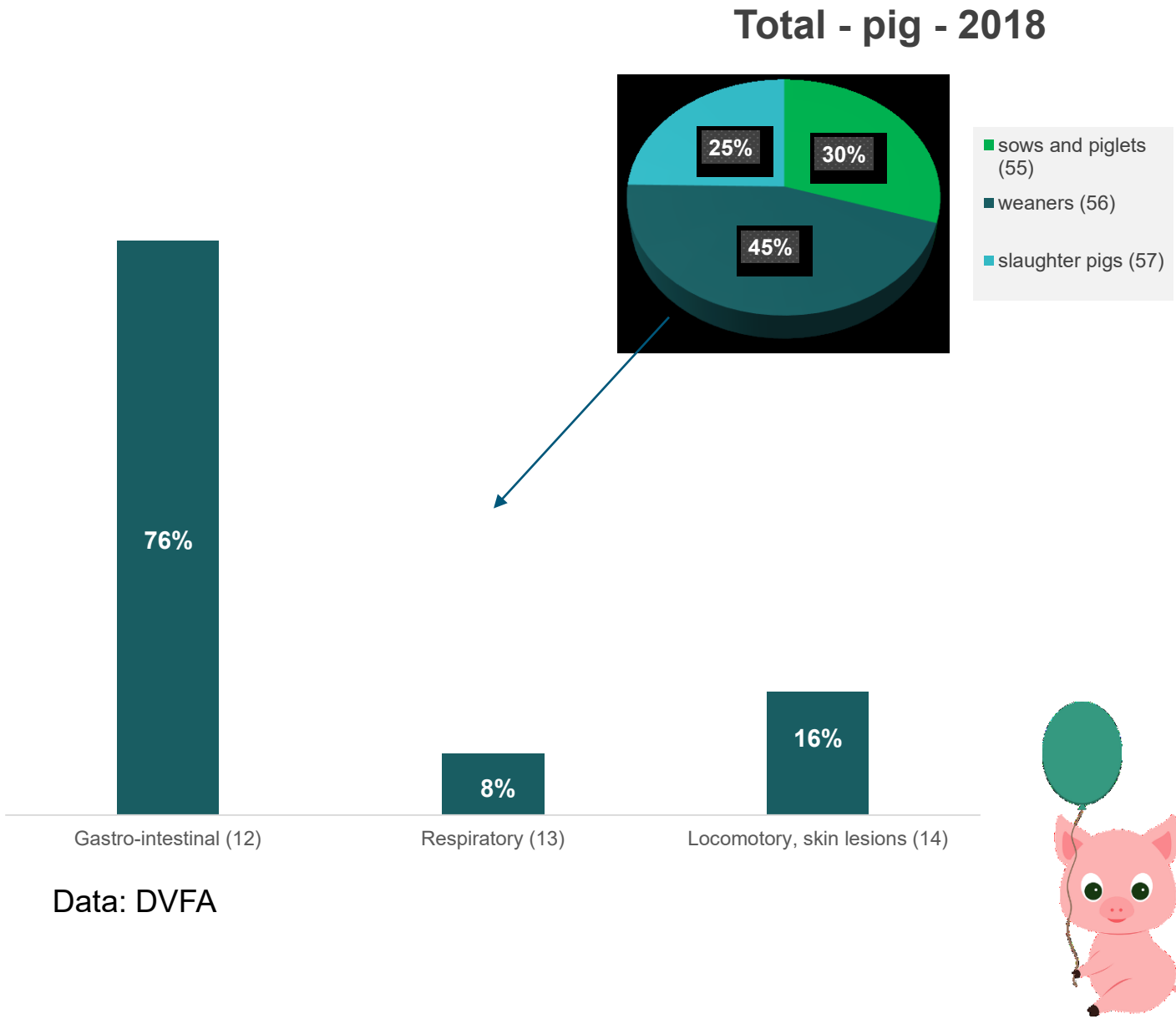
AMU benchmark for a weaner pigs herd (7-30 kg)





Source: VetStat database, DVFA

Antimicrobial treatment of weaner pigs



Data: DVFA

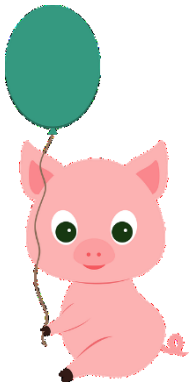
An incentive to more prudent use

The ‘Yellow card’ initiative with threshold values for pigs has been in place in Denmark since 2010. In 2015 it was decided politically to promote a more prudent use.

Differentiation between antimicrobial classes in the ‘Yellow card’ initiative was chosen as the regulatory framework, and the technical dose values were weighted into three categories in 2016 and modified in 2017.

	Factor
Flouroquinolones, 3.-4. gen. cephalosporins, ***colistin***	10.0
Tetracyclines	1.5
Other antimicrobials	1.0

Colistin is weighted with a factor 10, as a precautionary measure



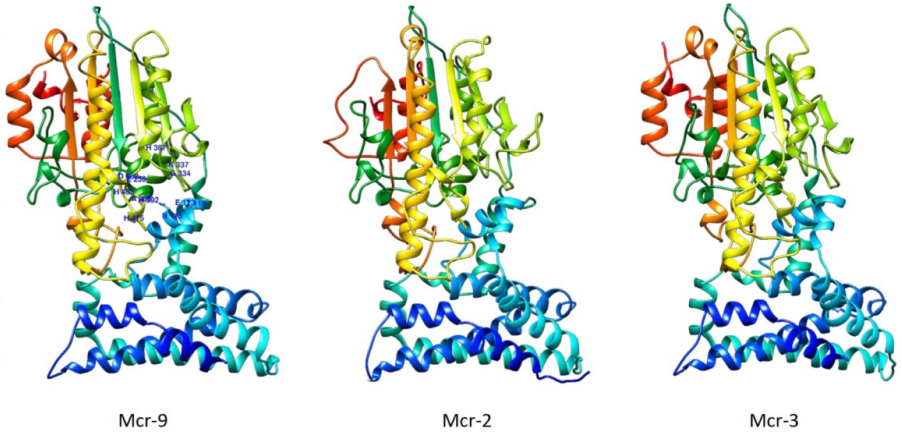
Colistin became important for treatment of humans

EUROPEAN MEDICINES AGENCY
SCIENCE MEDICINES HEALTH

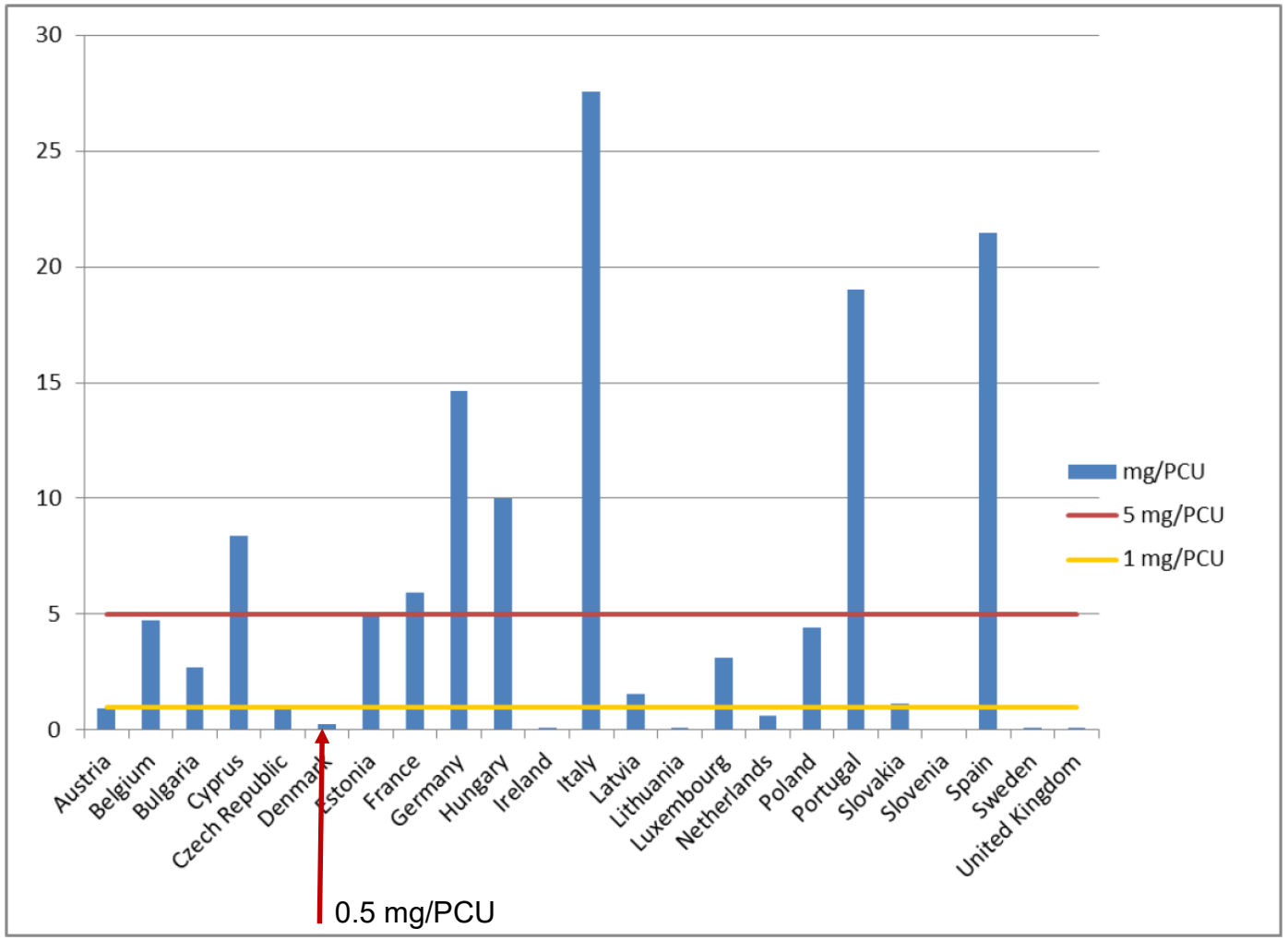
2016

27 July 2016
EMA/CVMP/CHMP/231573/2016
Committee for Medicinal Products for Veterinary use (CVMP)
Committee for Medicinal Products for Human Use (CHMP)

Updated advice on the use of colistin products in animals within the European Union: development of resistance and possible impact on human and animal health

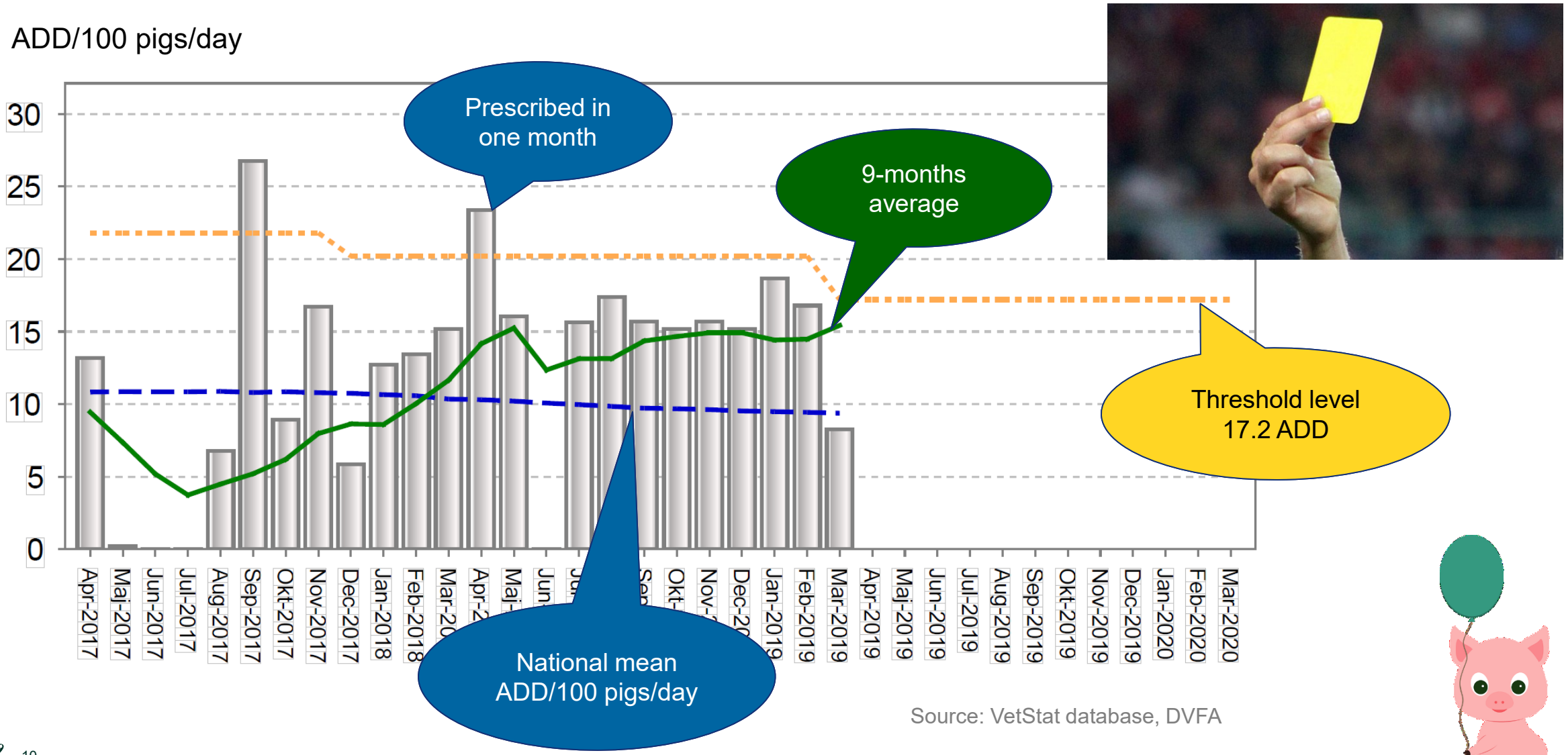


Colistin resistance genes from Carroll et al. 2019



Sales of colistin in for use in animals in mg/PCU in 2013 (ESVAC data), including the 5 and 1 mg/PCU levels.
No sales reported in Finland, Iceland and Norway.

AMU benchmark for a weaner pigs herd (7-30 kg)

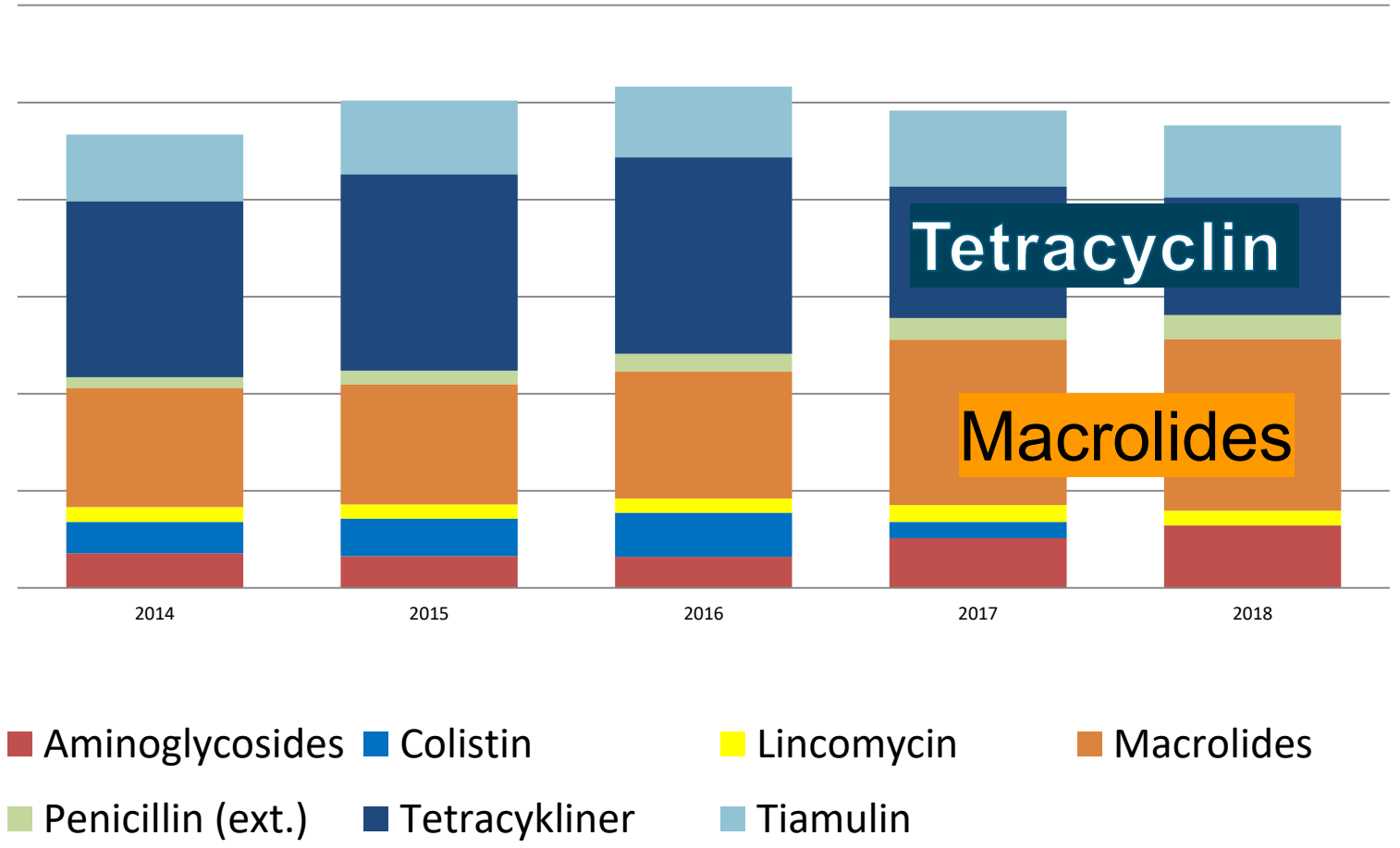


Source: VetStat database, DVFA

Effect of intervention on tetracycline and colistin

More prudent choice of antimicrobials

Kg-doses for weaner pigs (standard weight 15 kg)

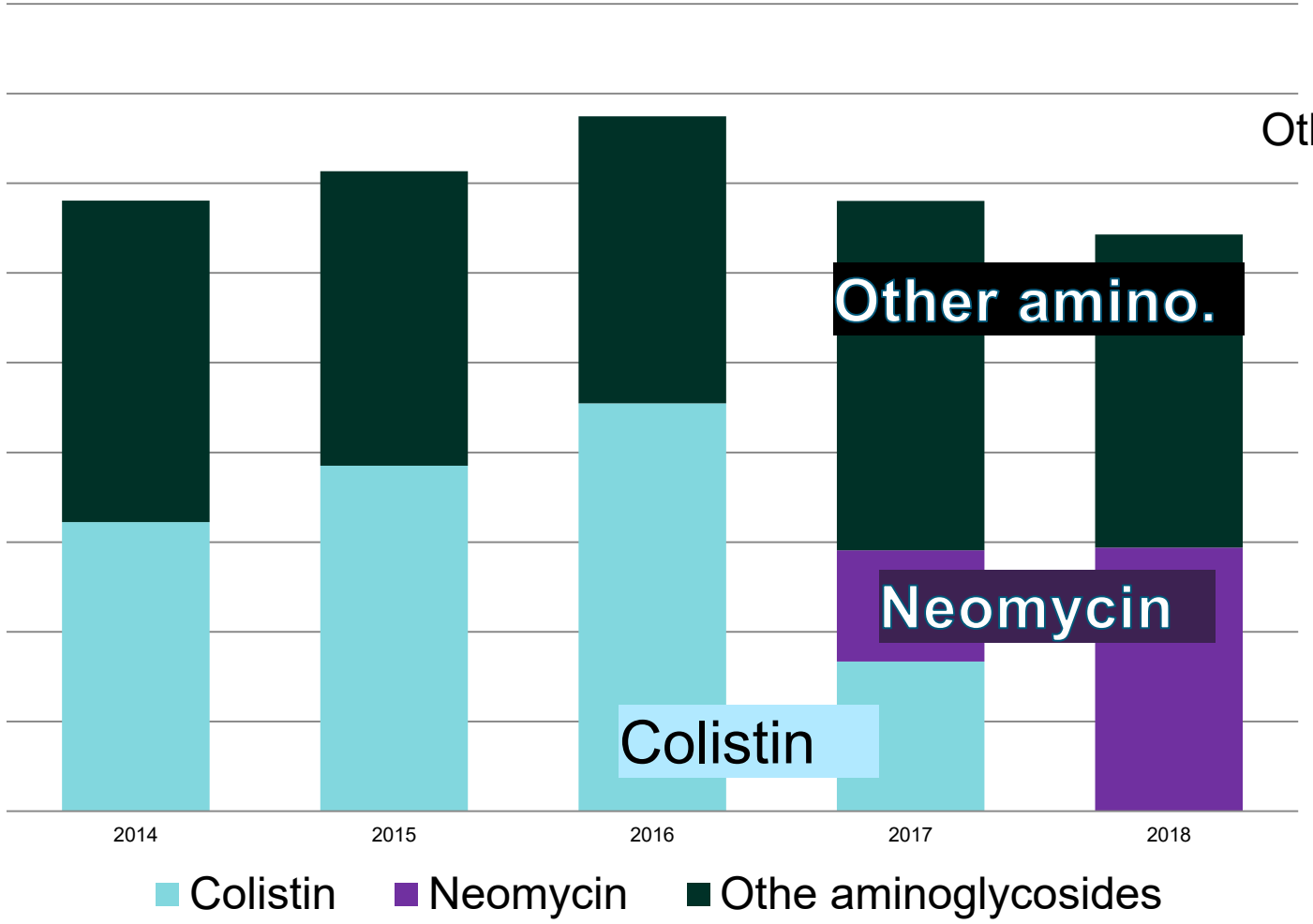


Tetracyclins ↓ 40% (kg-doses) (~ 5 tons) from 2016-2018

Macrolides ↑ 35% (kg-doses) (~ 2 tons) from 2016-2018

More prudent choice of antimicrobials

Kg-doses for weaner pigs (standard weight 15 kg)



Other aminoglycosides ↑ 9% (kg-doses)

Colistin ↓ 100% (kg-doses)
(~ 1 tons to **ZERO**) from 2016-2018

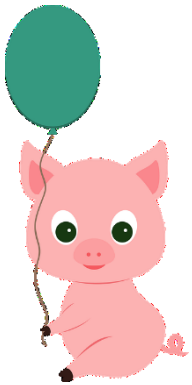
Neomycin ↑ 100% (kg-doses)
(~ 4 tons) from 2016-2018

Guideline on choice of antimicrobial in 2018

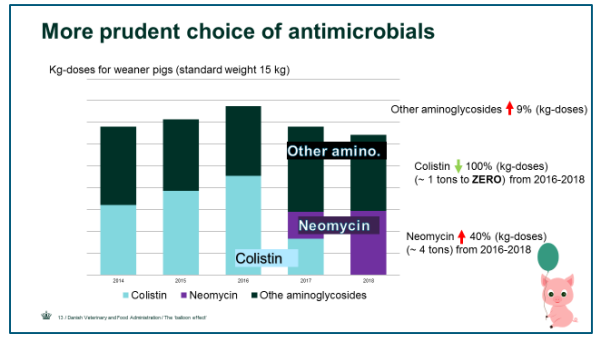
Sensitivity of Important Intestinal Bacteria to Different Antimicrobials* First choice antimicrobials are highligted in bold green.			
Porcine intestinal bacteria	**Sensitive (>75%)**	**Intermediate sensitivity**	**Less sensitive/resistant**
E. coli **	Amoxicillin/ clavulanic acid Florfenicol Neomycin Apramycin Colistin Gentamicin	Ampicillin Spectinomycin TMP-sulfa Streptomycin Tetracycline	

* Data from sensitivity testing of pathogenic bacteria in pig in Denmark can be found on the homepage of Danish Technical University

** It is recommended that E. coli (F4 and F18) is examined for resistance for optimal treatment outcome



Kilo vs animal doses



Colistin dropped from app. 1,000 kilo to less than 1 kilo active compound

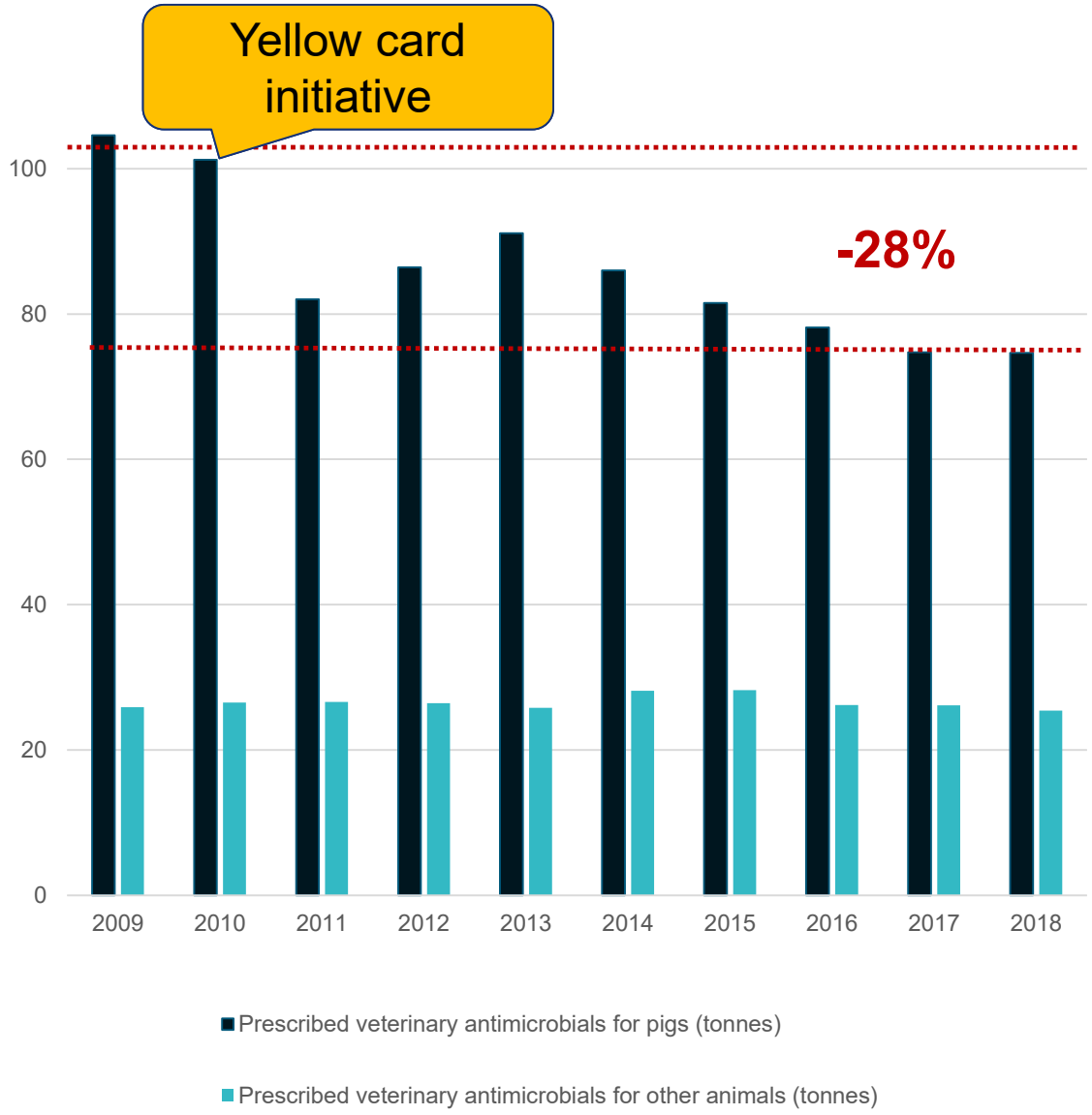
The reduction in colistin was shifted to

an increase in aminoglycosides – primarily Neomycin

Neomycin was reintroduced into DK-market in 2017

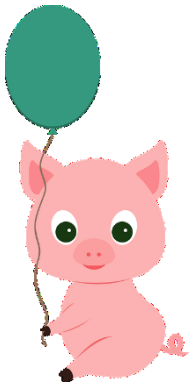
– immidiately increase – 3,600 kg

The pig sector has reduced the antimicrobial by 28%



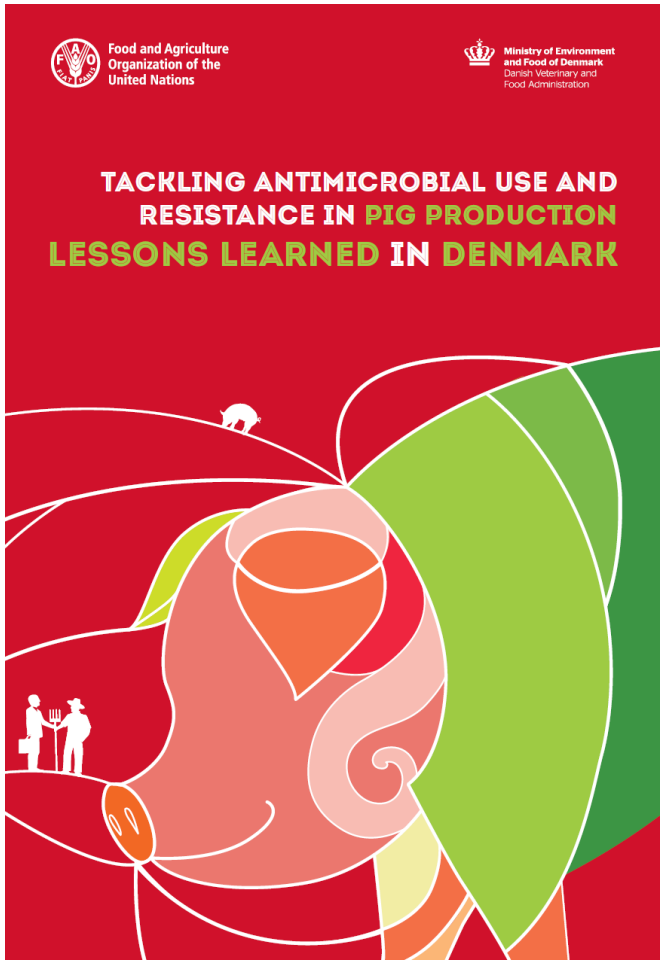
All most no use of antimicrobials critically important to treatment of humans. The consumption of colistin, fluoroquinolones and 3rd and 4th gen. cephalosporins is ≈ 1 kg

The pig sector has reduced the antimicrobial by **28%** **from 2010 to 2018**



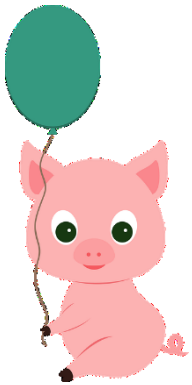
Source: DVFA

Lessons learned in Denmark on AMU and AMR is available



Danish Veterinary and Food Administration
Danish Veterinary Association
Danish Agriculture and Food Council
SEGES Danish Pig Reseach Centre
Technical University of Denmark
Statens Serum Institut

FAO and Denmark Ministry of Environment and Food – Danish Veterinary and Food Administration. 2019. Tackling antimicrobial use and resistance in pig production: lessons learned from Denmark. Rome. 52 pp. Licence: CC BY-NC-SA 3.0 IGO



Thank you for your attention

Questions?

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AACTING, Bern

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Effects of the differentiated Yellow Card