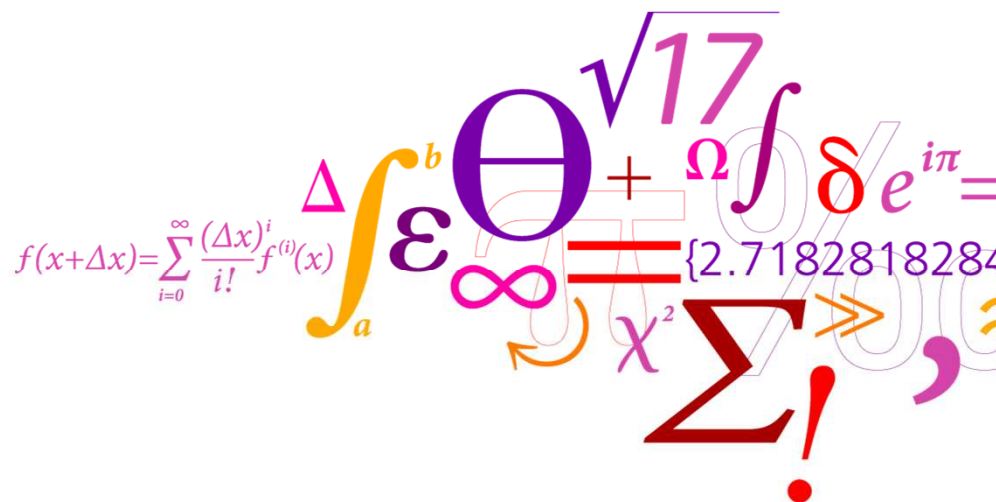


Integrated Surveillance of Antimicrobial Resistance in Denmark – Lessons Learned

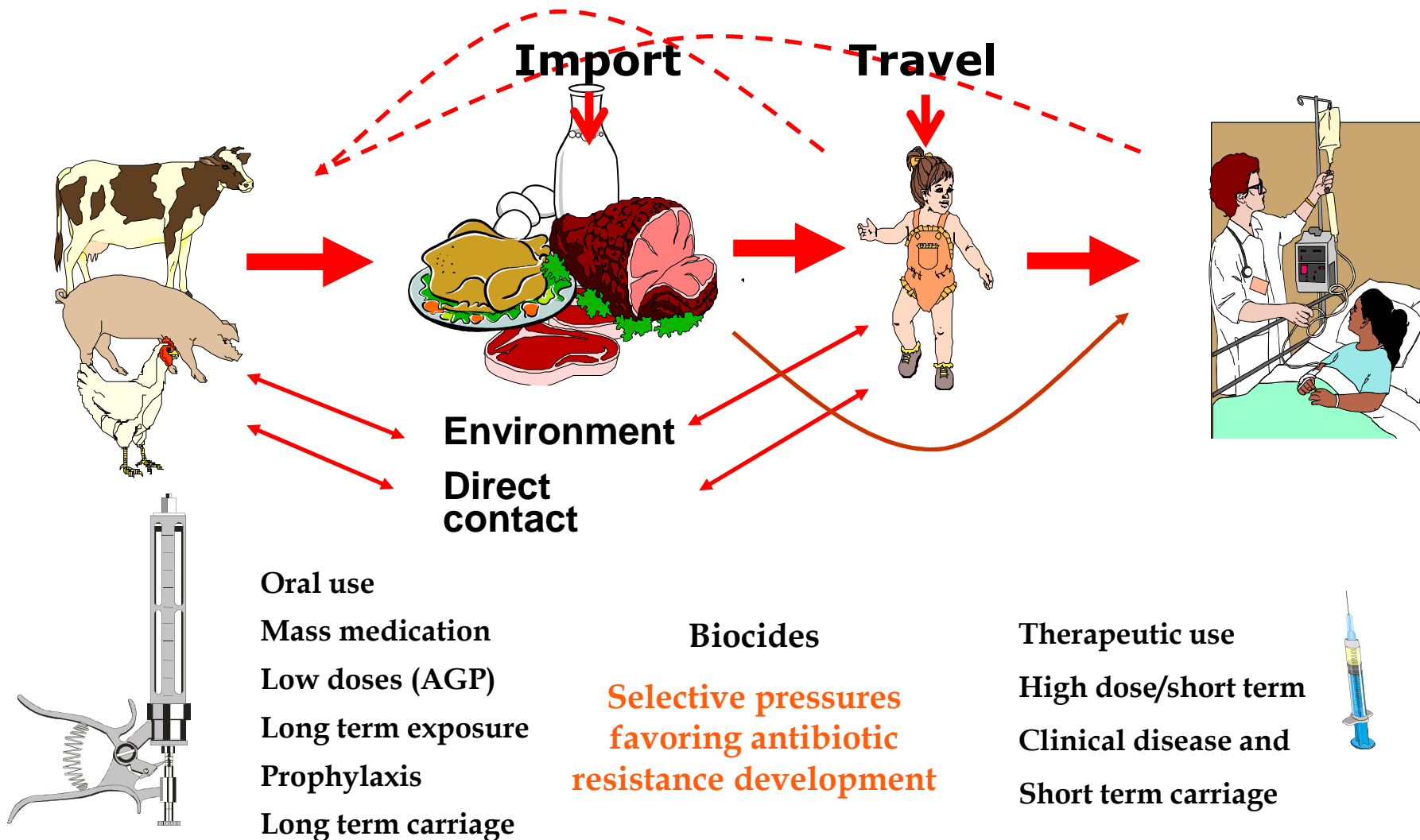
Henrik C. Wegener

Director, National Food Institute, Denmark

- WHO Collaborating Centre
- EFSA Collaboration Centre
- EU Community Reference Lab.
- ECDC Competent Body

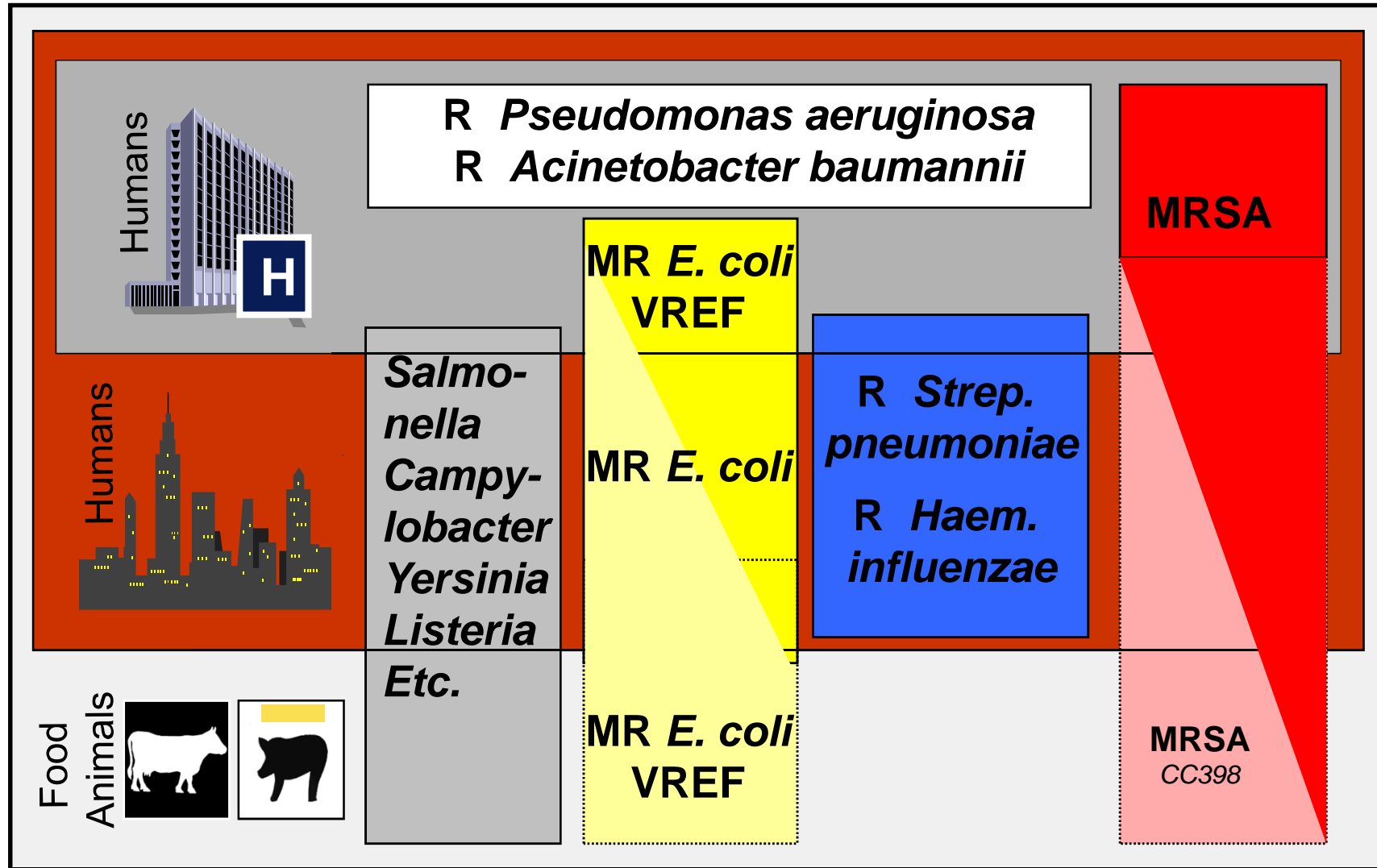


AMR in the food production chain - A One Health Issue



The World of Antimicrobial Resistance

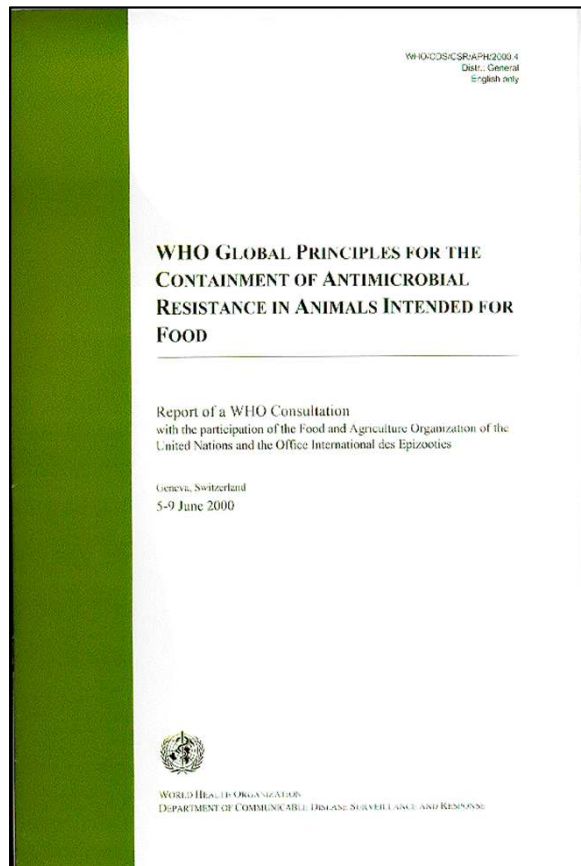
Human Bacterial Pathogens and Their Habitat



WHO Global Principles for the Containment of Antimicrobial Resistance in Animals Intended for Food, June 2000



The EU's check list



- Pre - and post licensing safety evaluation
- Monitor usage
- Monitor resistance
- Prescription only
- Phasing out of AGP's
- Treatment guidelines
- Marketing and financial incentives

(✓)

✓

✓

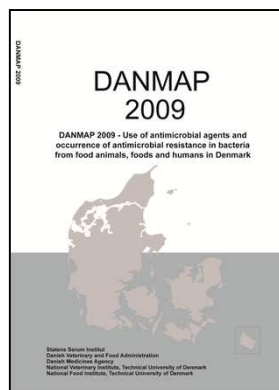
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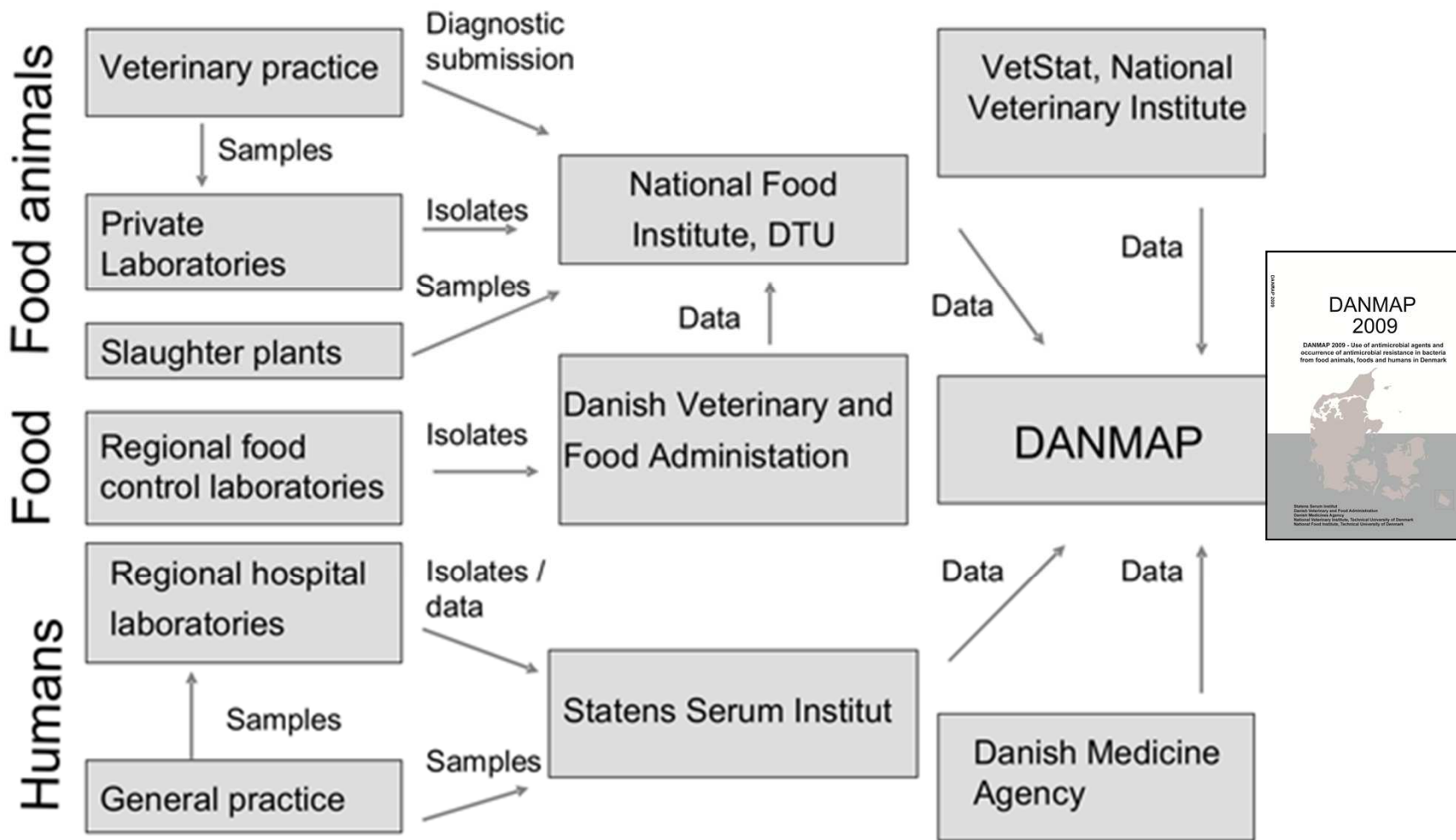
Surveillance of Zoonotic AMR in Denmark



- Integrated surveillance of AMR and AMU since 1995
- Strong intersectoral collaboration
- Improved risk assessment
- Enhanced and improved risk management
- AMR in the food animal reservoirs and in the food supply has been reduced

DANMAP

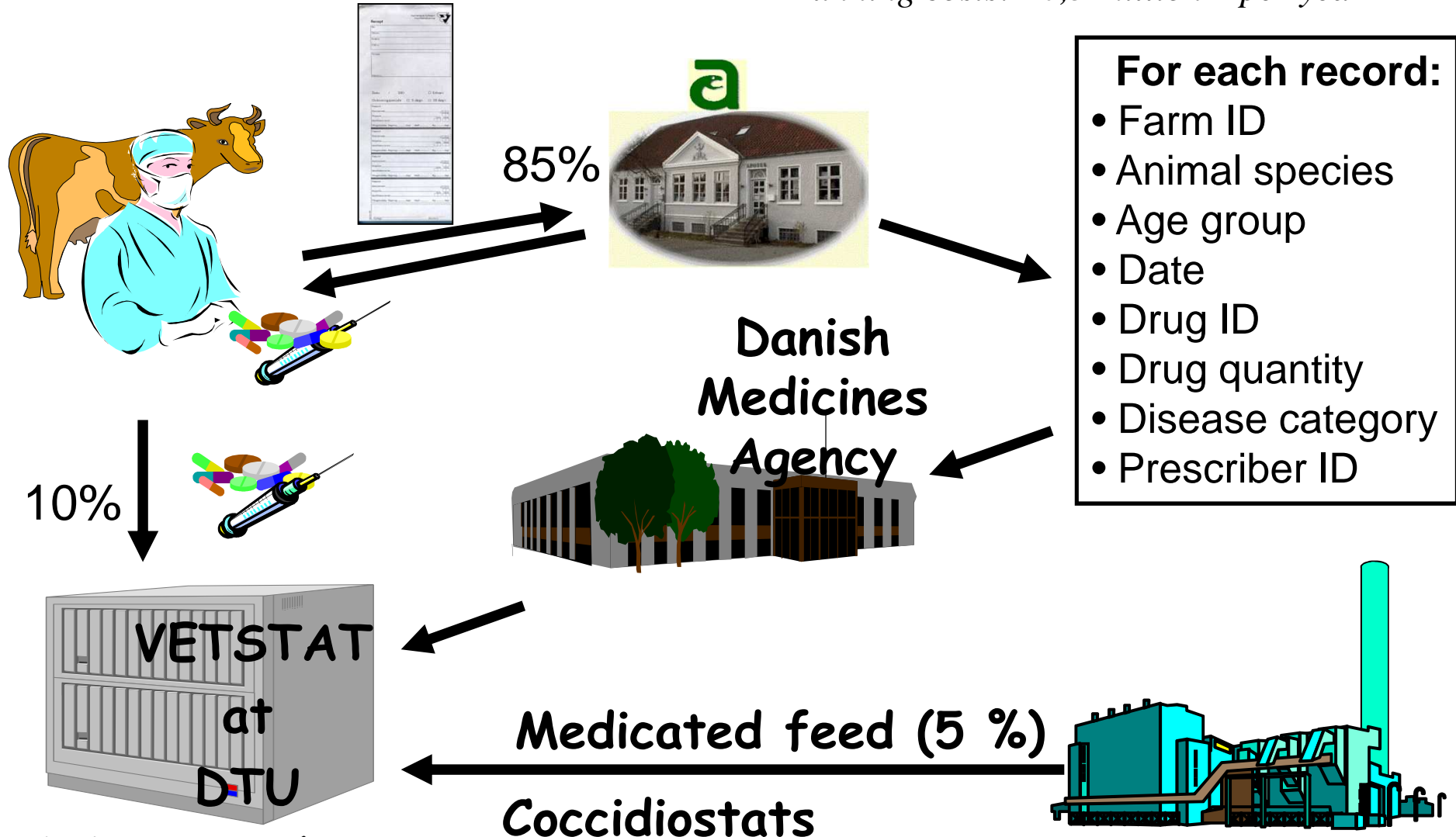
Integrated Surveillance of Antimicrobial Resistance and Antimicrobial Usage in Denmark (est. 1995)



National monitoring of usage - VETSTAT



Running costs: ~0,5 million € per year



Thanks to D. Monnet, National Reference Institute, Technical University of Denmark

Resistant *Campylobacter jejuni* from animals, food and humans



DANMAP 2009

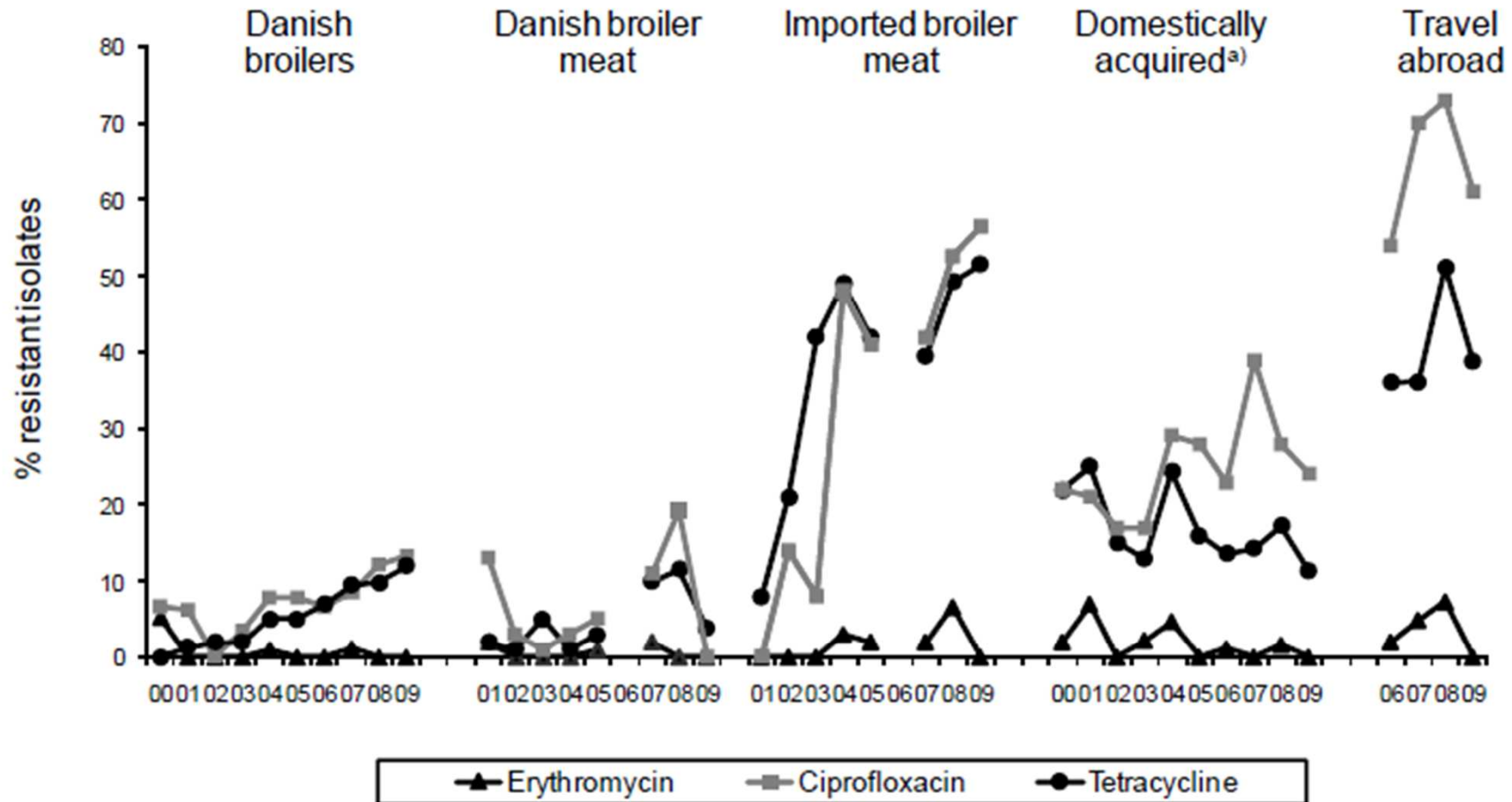


Figure 29. Trends in resistance to selected antimicrobial agents among *Campylobacter jejuni* isolates from broilers, broiler meat and human cases, Denmark

a) Until 2007, including cases where origin of infection was not documented and may therefore include isolates acquired abroad but not documented as such

Salmonella Typhimurium in animals, food and humans

DANMAP 2009

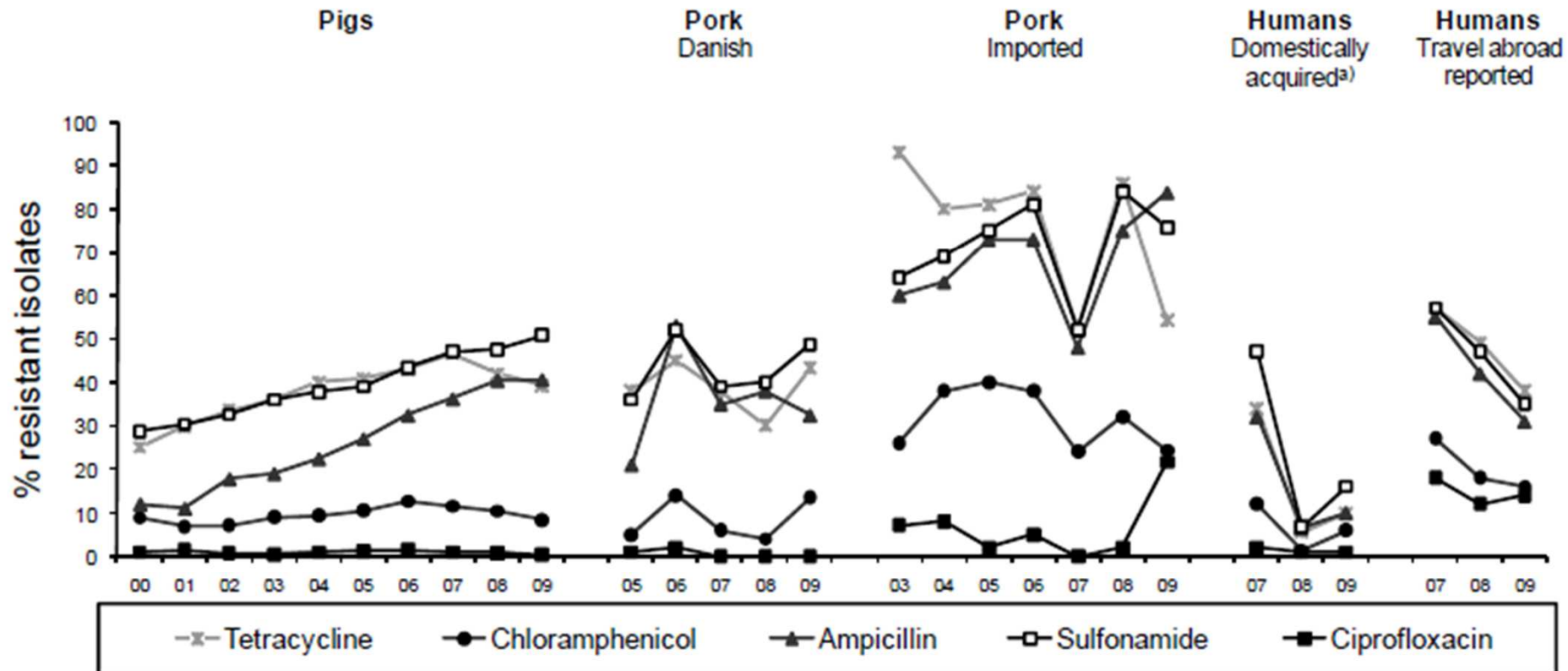


Figure 28. Trends in resistance to selected antimicrobial agents among *Salmonella Typhimurium* isolated from pigs, pork and from human cases, Denmark

The number of isolates varies between years and between source. For pigs, the annual number of isolates were between 216 and 736. For Danish pork, number of isolates was between 64 and 99, 2005-2009; data before 2005 not shown due to low number of isolates. For imported pork, the number of isolates varied between 21 and 56, except in 2007 when only 21 isolates were available

a) Until 2007, includes cases where origin of infection is not documented; therefore only data from and after 2007 are included

Lessons about resistant foodborne zoonoses from 10 years of integrated surveillance in Denmark



- There is a close association between AMU and AMR in food animals, however other factors such as co-selection and clonal spread also plays a part
- There is a close association AMR in the food supply and AMR in foodborne human infections/commensals:

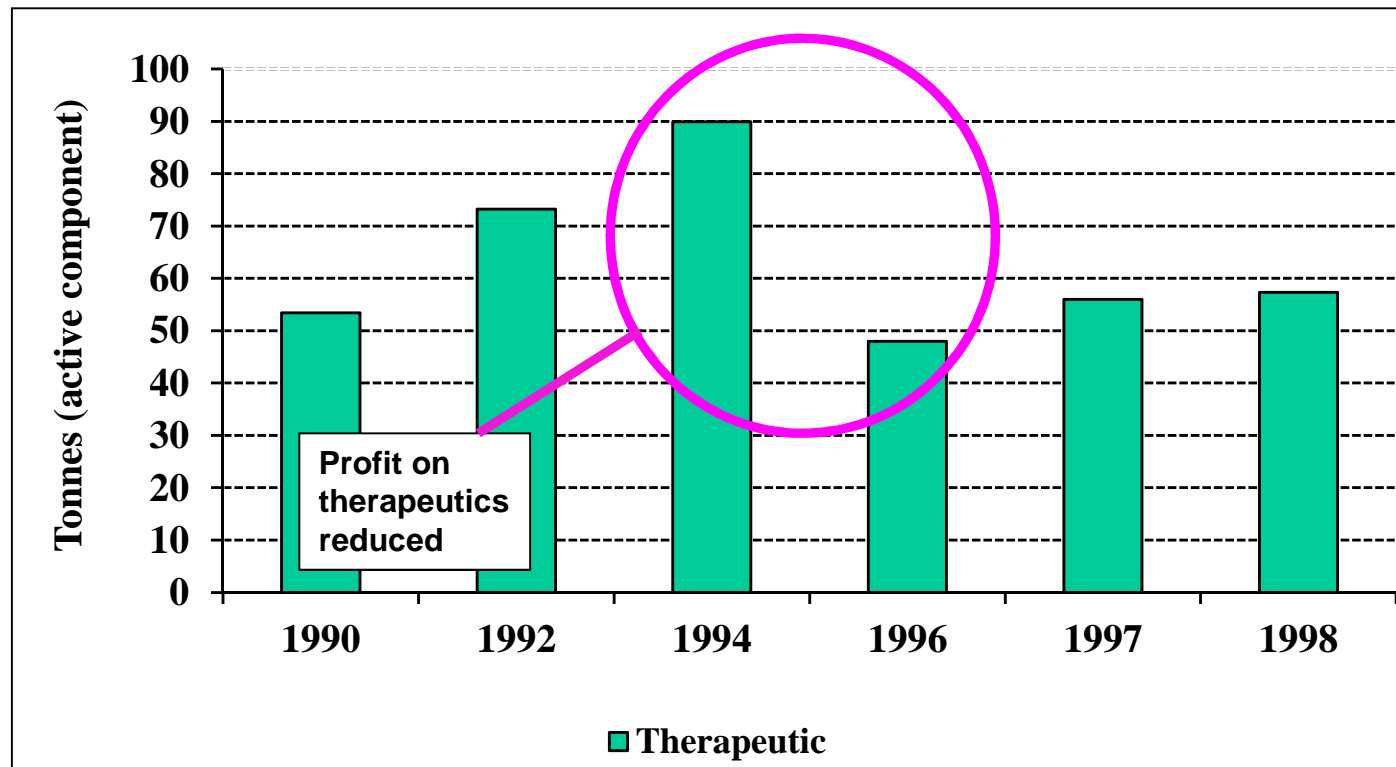
$$R_{\text{human}} \approx X * R_{\text{domest. food/animals}} + Y * R_{\text{imported food}} + Z * R_{\text{travel abroad}}$$

- Control of AMR should focus on the drivers – AMU!
- In Denmark, the impact of imported food stuffs and travel is increasing. This challenges our integrated monitoring as well as prevention and control efforts, and calls for coordinated global actions.

Risk management; focus on the environmental drivers: Banning routine prophylactic usage and limiting vet's profit from the sale of drugs



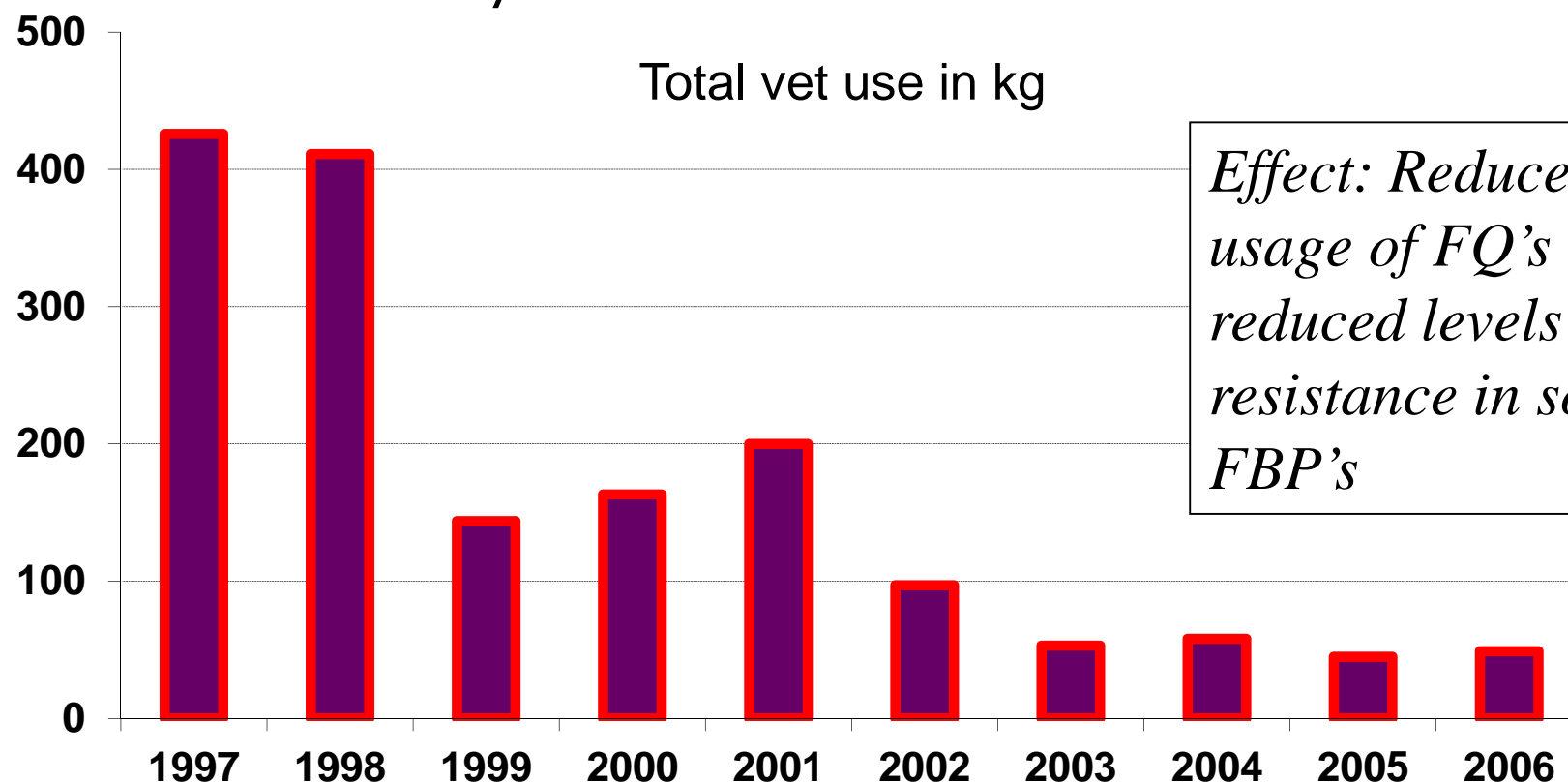
- New veterinary medicinal regulation adopted in 1995



Effect: Reduced the total usage of prescribed veterinary medicine by 30-40% from one year to the next

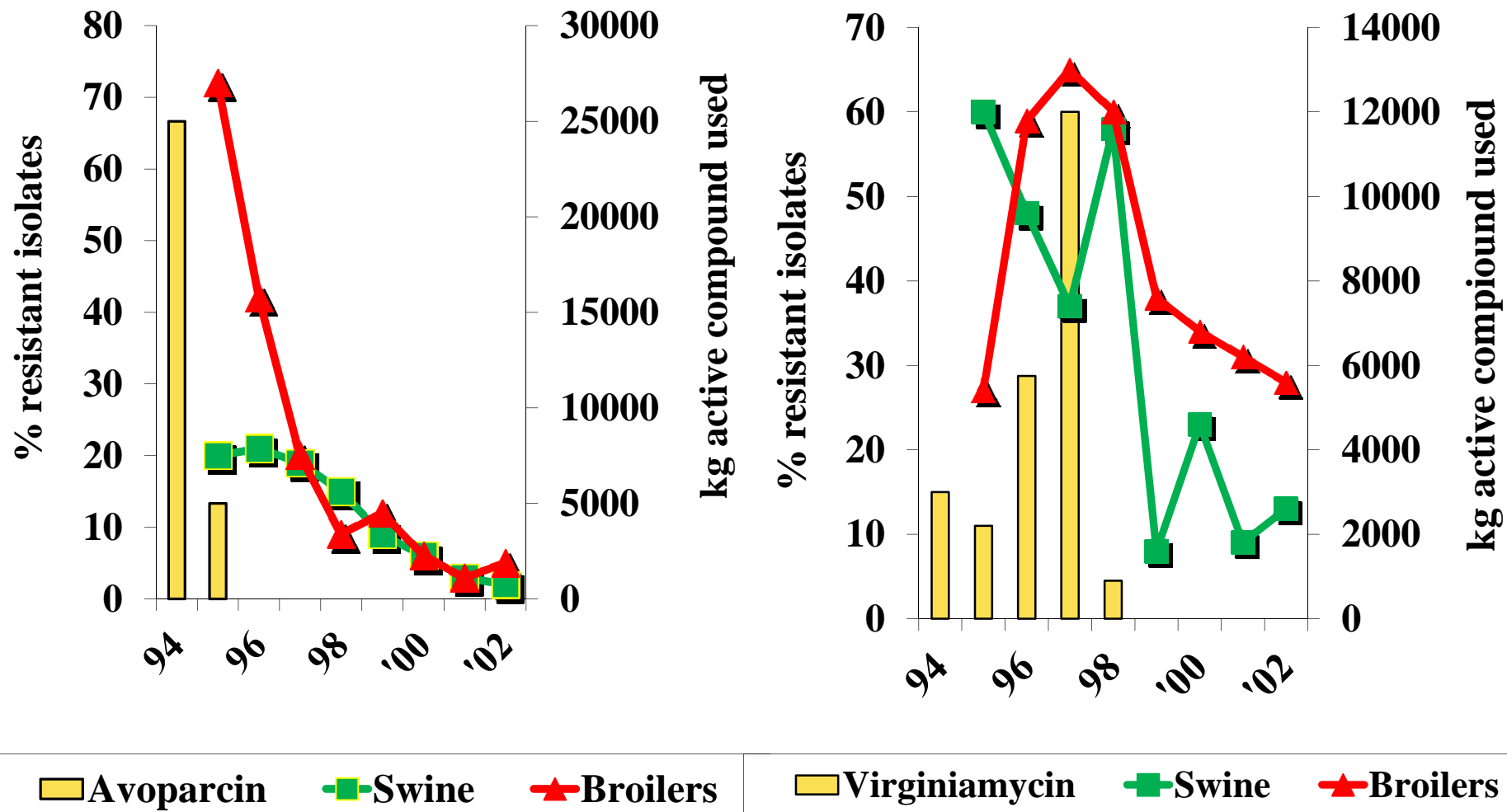
Preserving critically important drugs

- 1999 Voluntary terminating use of in-feed FQ's
- 2002 Special regulatory requirement for prescribing fluoroquinolones; Documented need (no alternatives), District veterinary officer notified, and only administered by the veterinarian

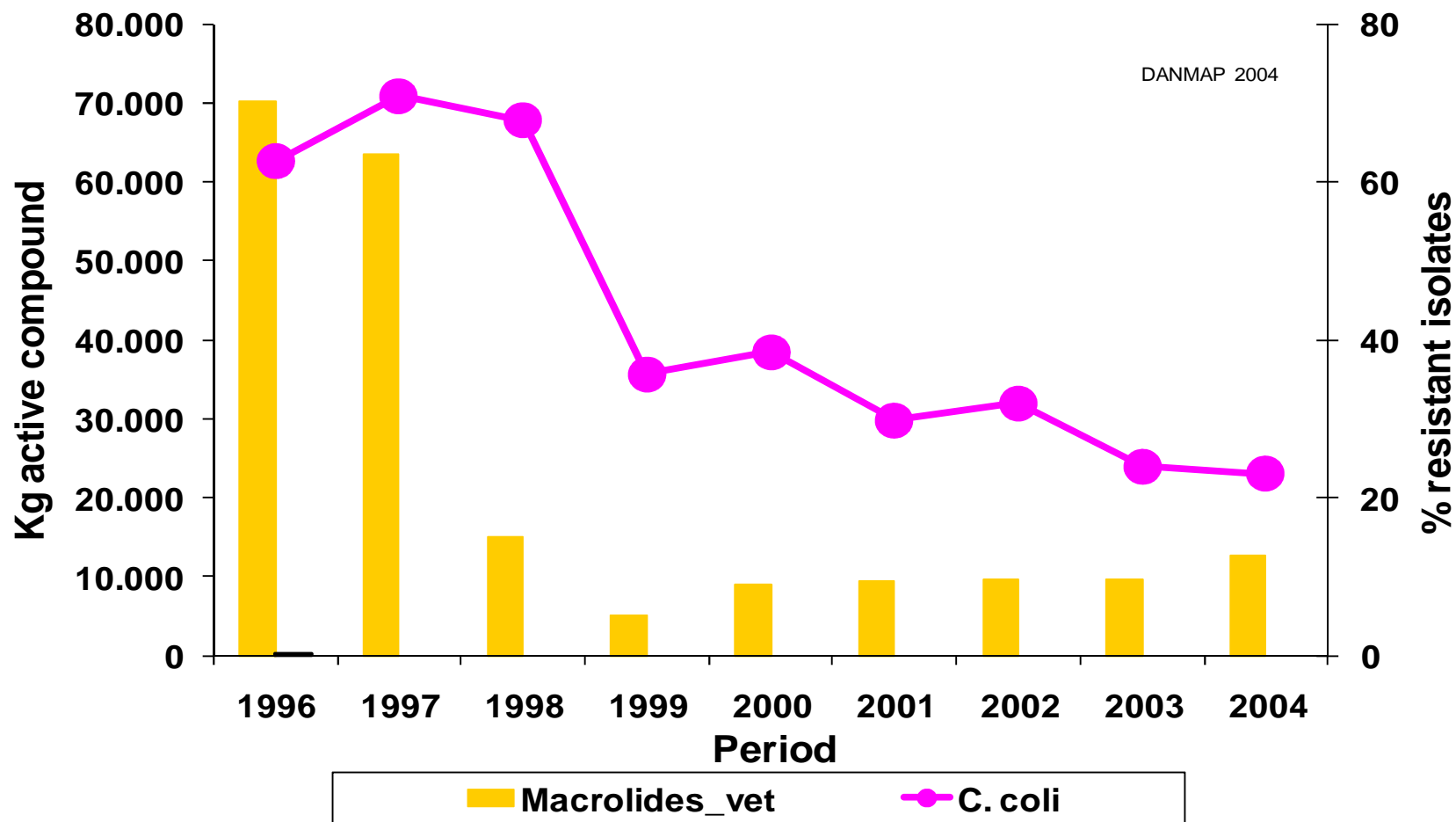


Effect: Reduced usage of FQ's and reduced levels of resistance in some FBP's

Banning Antimicrobial Growth Promoters effect on resistance to Vancomycin and Synercid in *E. faecium* in food animals



Campylobacter coli macrolide usage and resistance



Different food production systems – how low can we go?

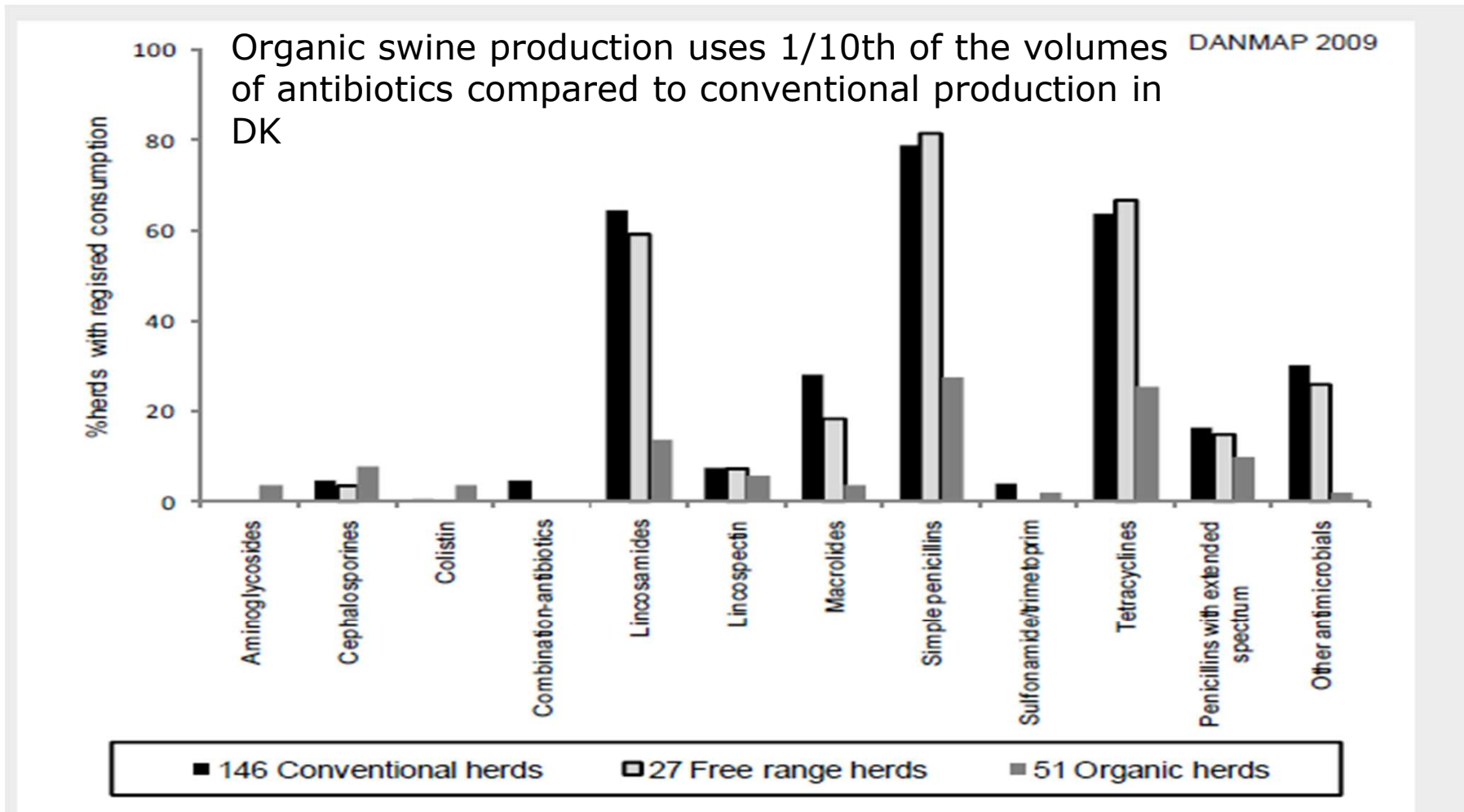


Figure 11: Proportion of finisher pig herds within study herd type with registered consumption of different types of antimicrobial agents in 2007 (Source: Vetstat). Only antimicrobial agents prescribed for finishers is included.

"Yellow card system" - monitoring of usage and follow up



Effect: Unknown
*Target: a 10%
reduction in 2011*

From the autumn 2010

Based on VETSTAT antibiotic
usage data

The producers who are in the top
in terms of antibiotic usage
(>1.244 farms) and their vet's
receive a "yellow card".

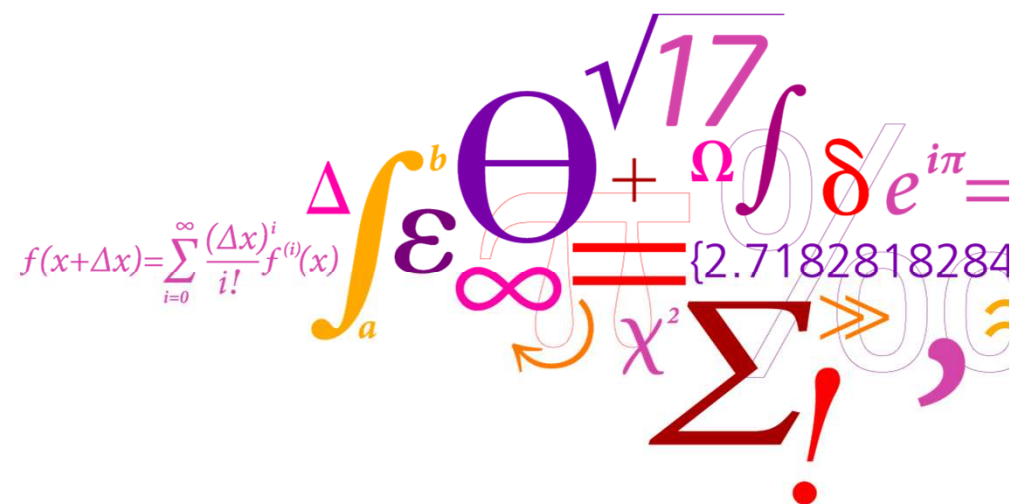
If usage is not reduced within 9
months of yellow card – the
district vet's office may impose
sanctions to reduce usage.

Emerging problems

- we are gradually moving from bad to worse

- *Salmonella*
 - Plasmid mediated fluoroquinolone resistance (qnr)
 - 3rd and 4th gen. cephalosporin resistance
- *E. coli* (UTI and blood stream infections)
 - Plasmidmediated quinolone resistance
 - 3rd. and 4th generation cephalosporin resistance
- *Staph. aureus*
 - Zoonotic MRSA (CC398) - emerged globally in few years
- *C. difficile* (?)
- Much more to be discovered

Thank you for your attention!



Comparison of the sales of veterinary antibacterial agents between 10 European countries *(Grave et al. 2010)*

~300 mg/kg

