

The consequences of in feed medication with antibiotics on the occurrence of antimicrobial resistance of public health concern

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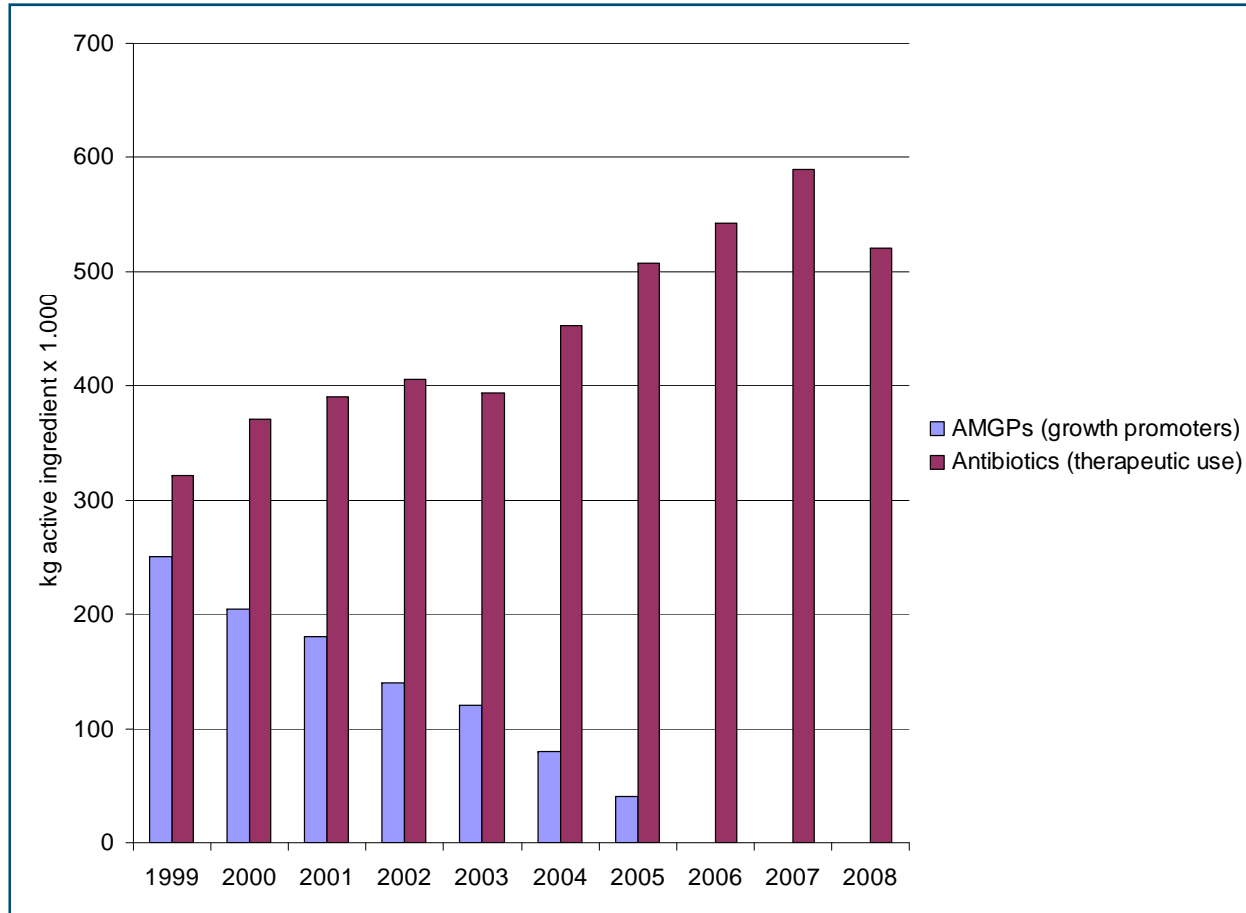


Content

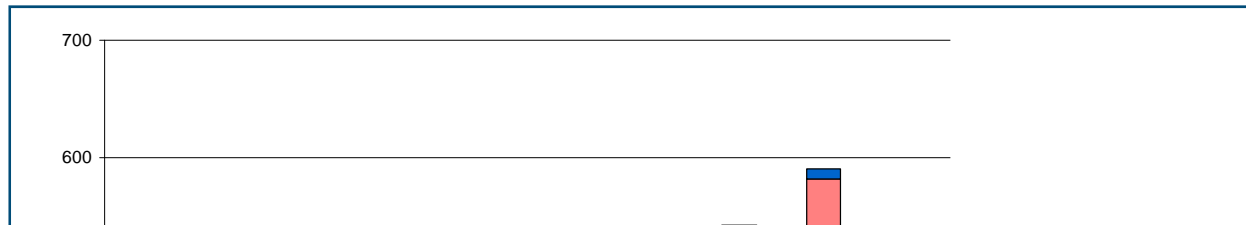
- Antibiotic usage in animals
- Resistance Development examples
 - Effect of in-feed medication
- Consequences for public health

Total usage and trends in NL in kg x 1000

(source FIDIN)



By antibiotic class



90% of these antibiotics licensed for oral administration by group medication

In feed means:

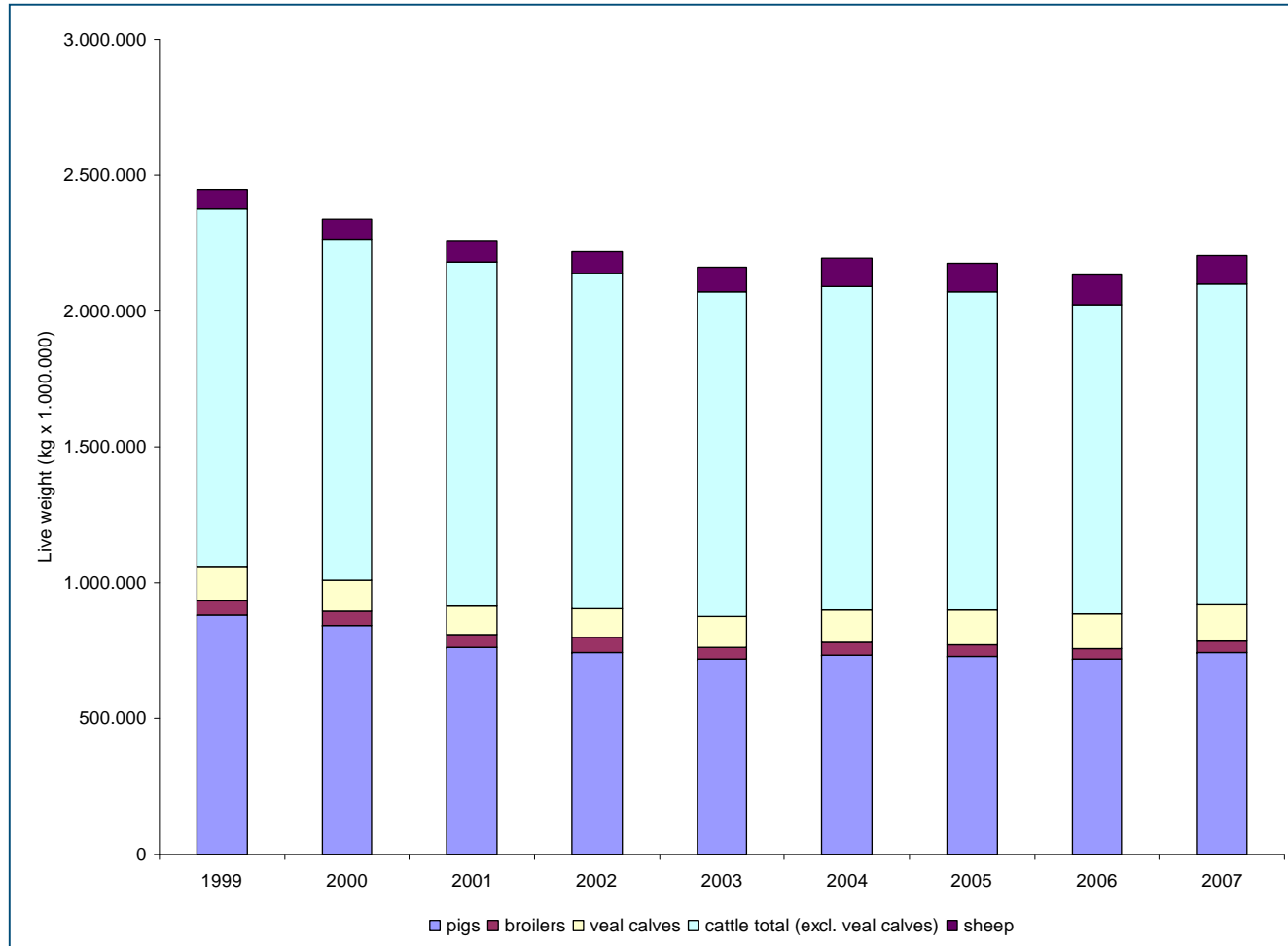
- Animals feed
- Water
- Milk (replacer)
- Topdressing

1999 2000 2001 2002 2003 2004 2005 2006 2007 2008

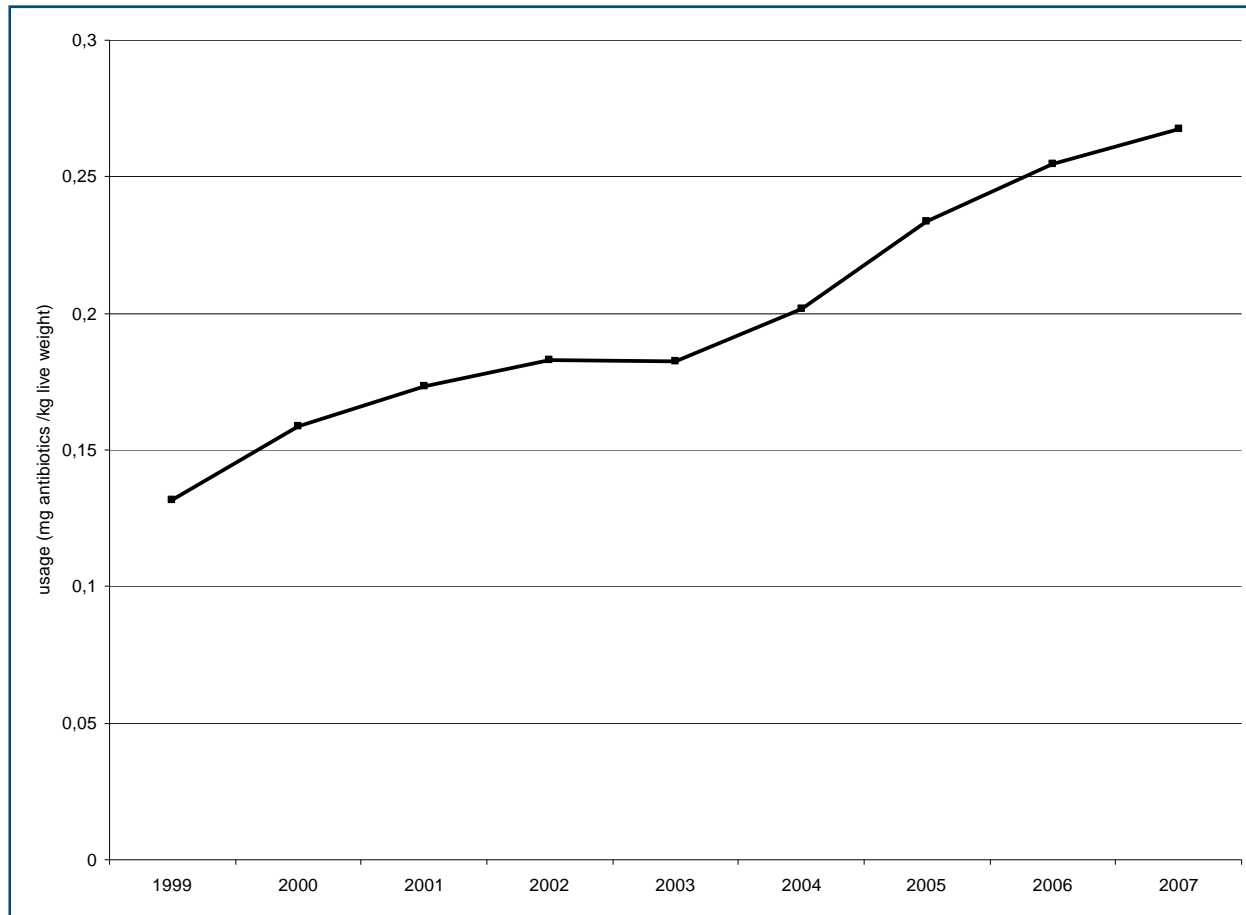


Denominator data

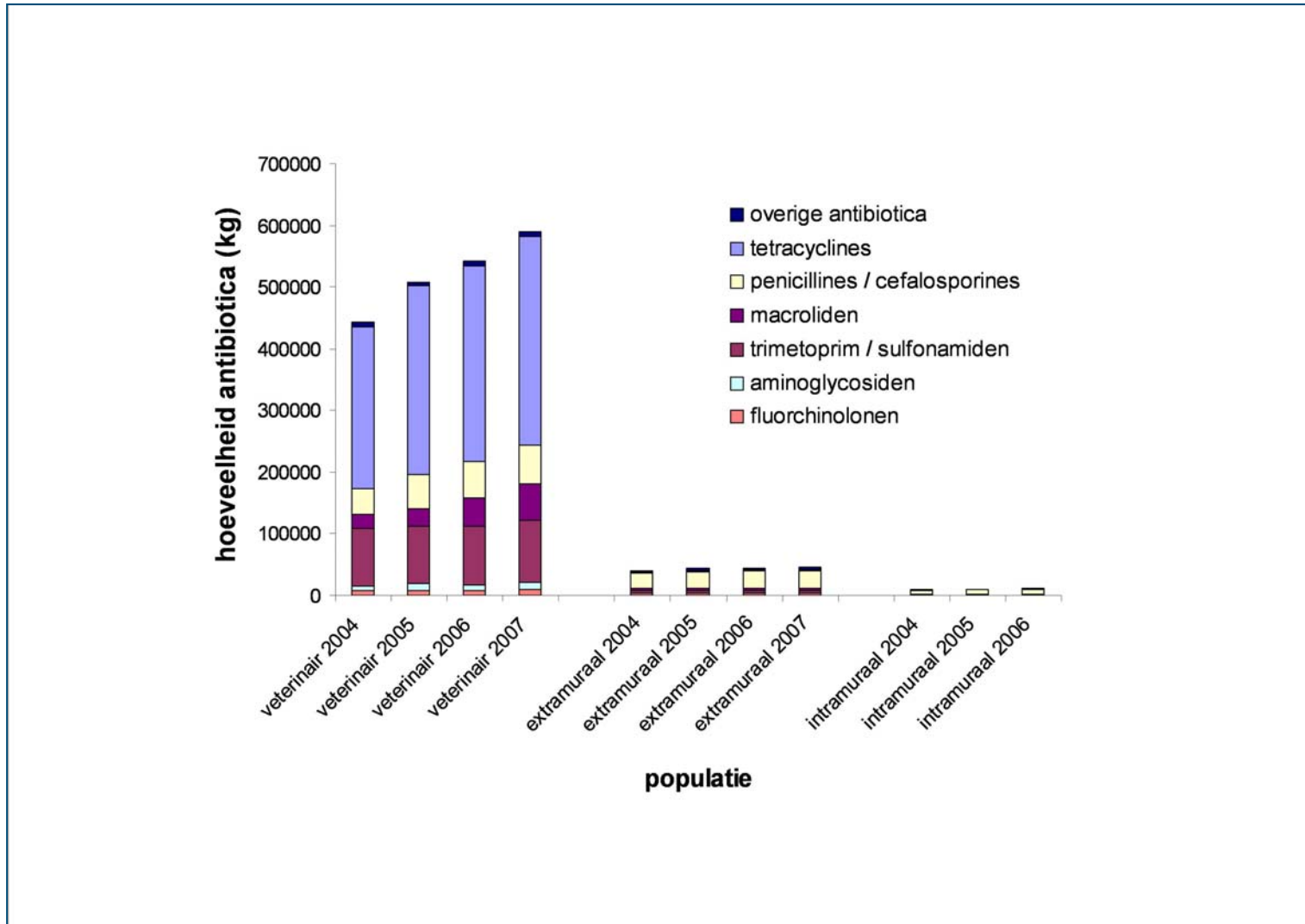
Live weight produced (kg x 1000)



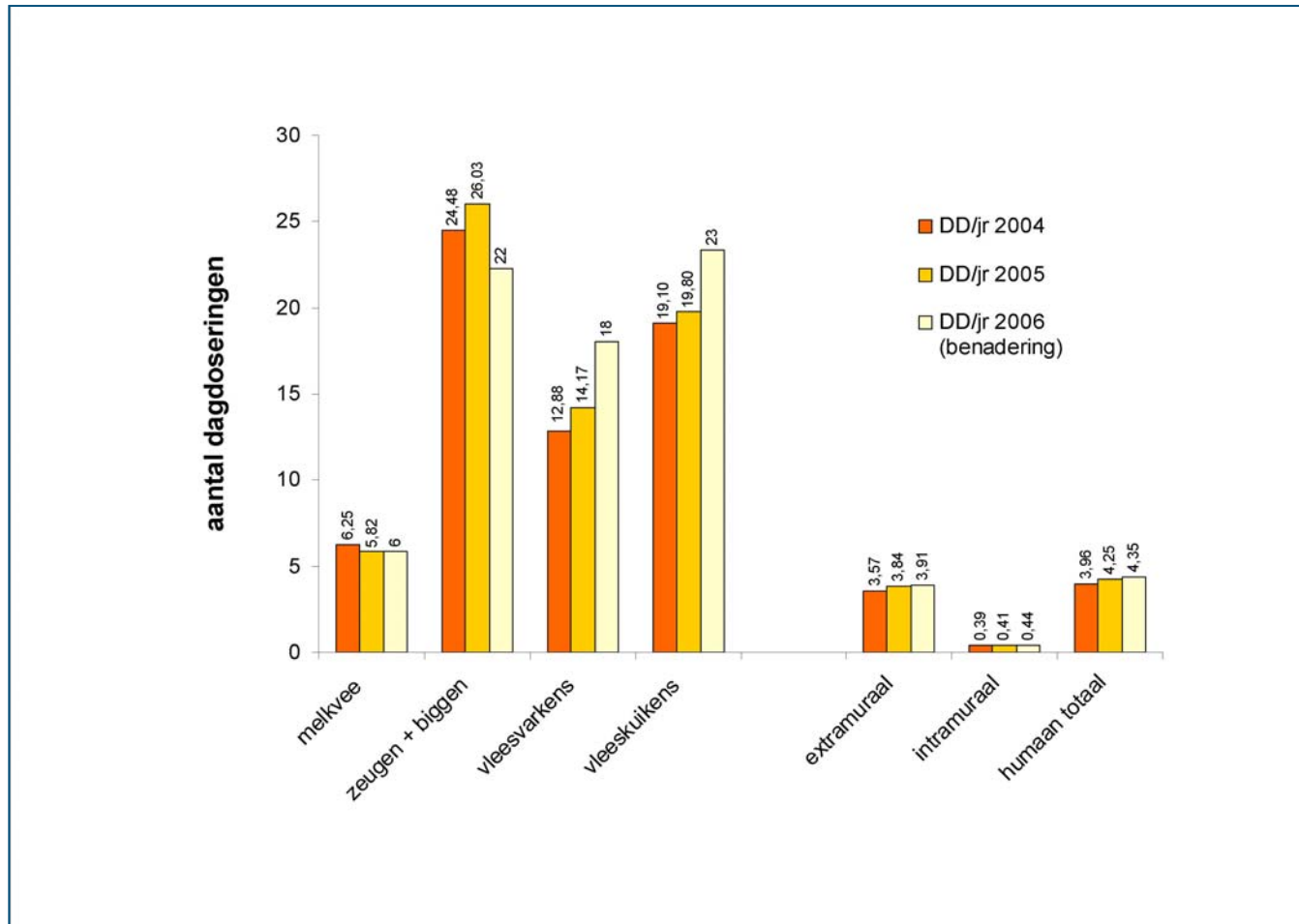
Usage mg/kg live weight produced



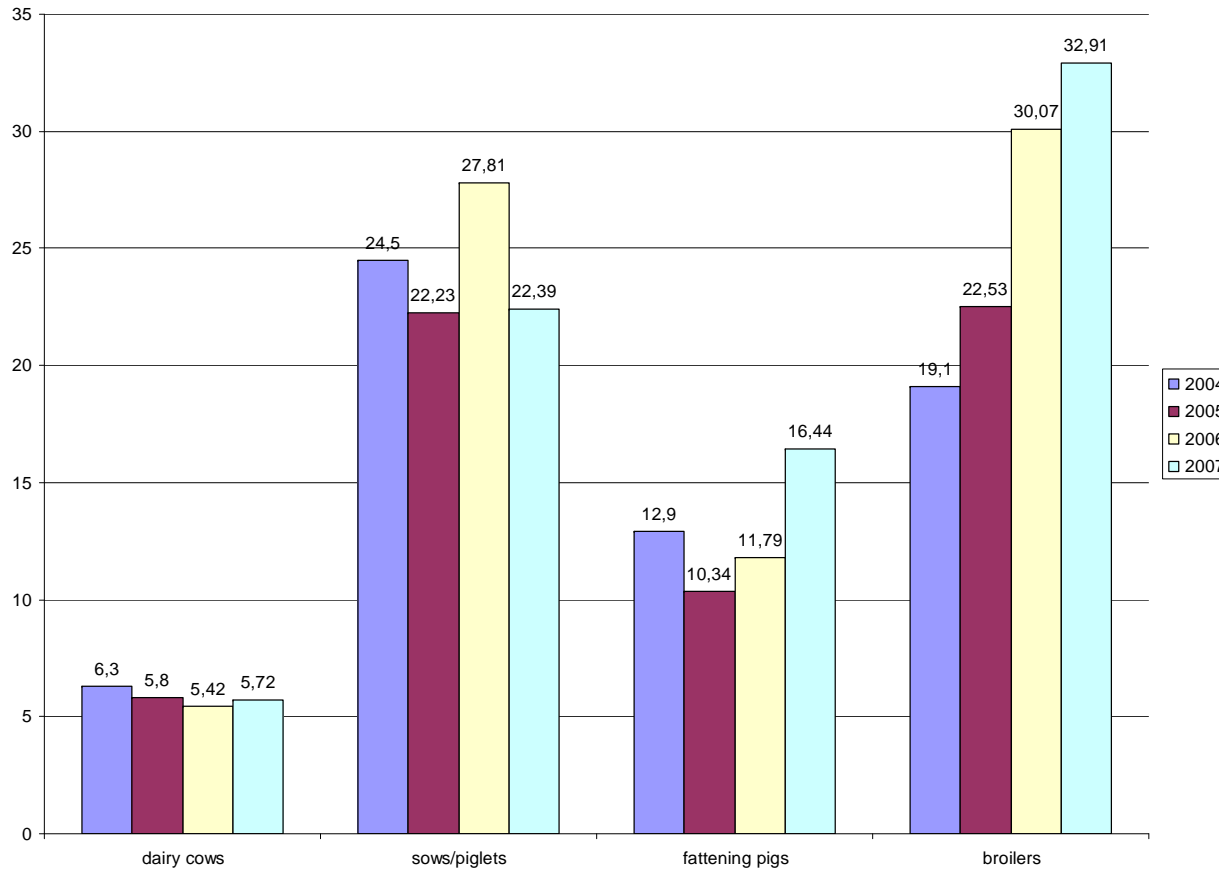
Animals versus humans



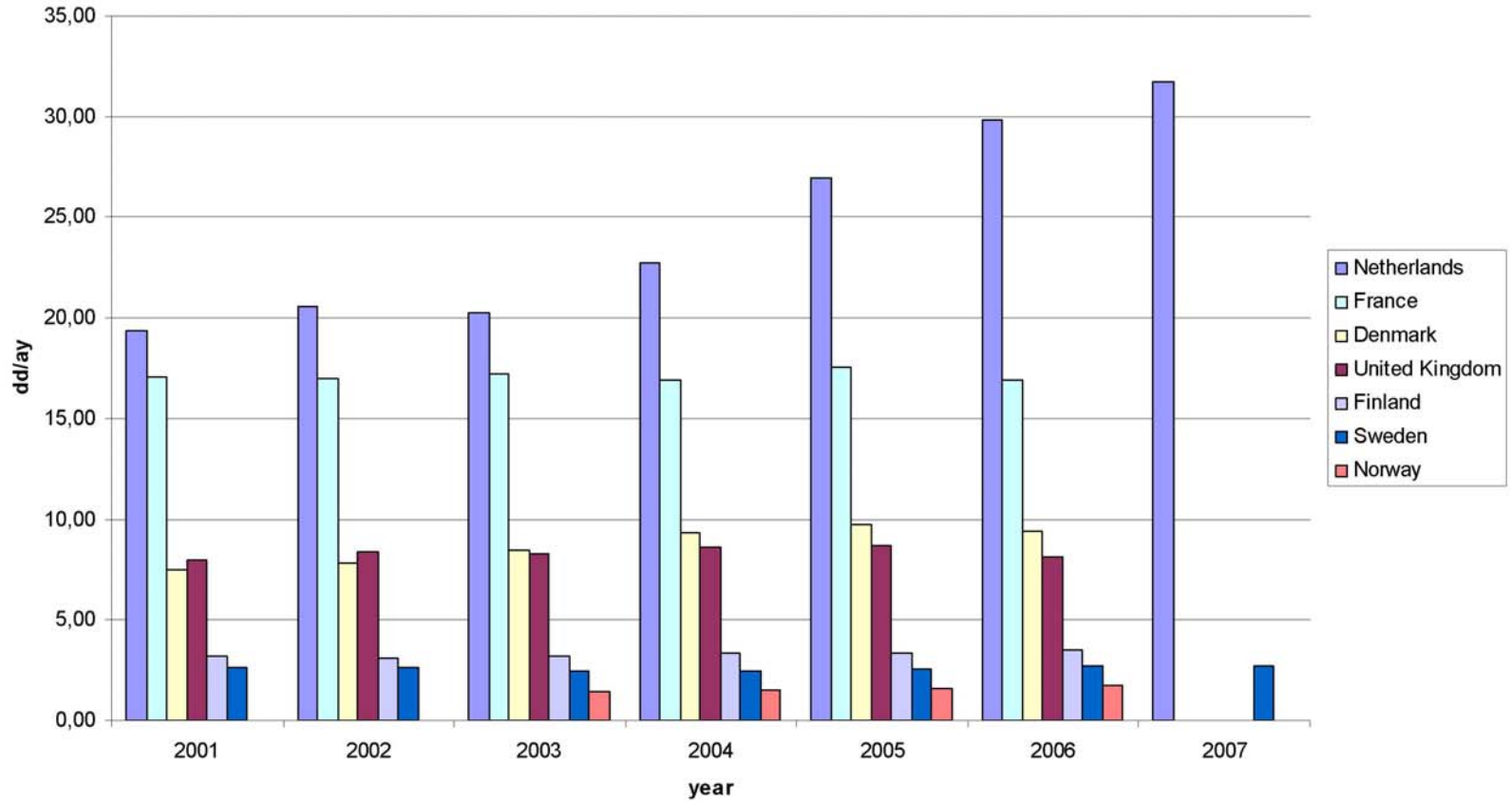
Daily dosages (LEI, Fac. Vet Medicine)

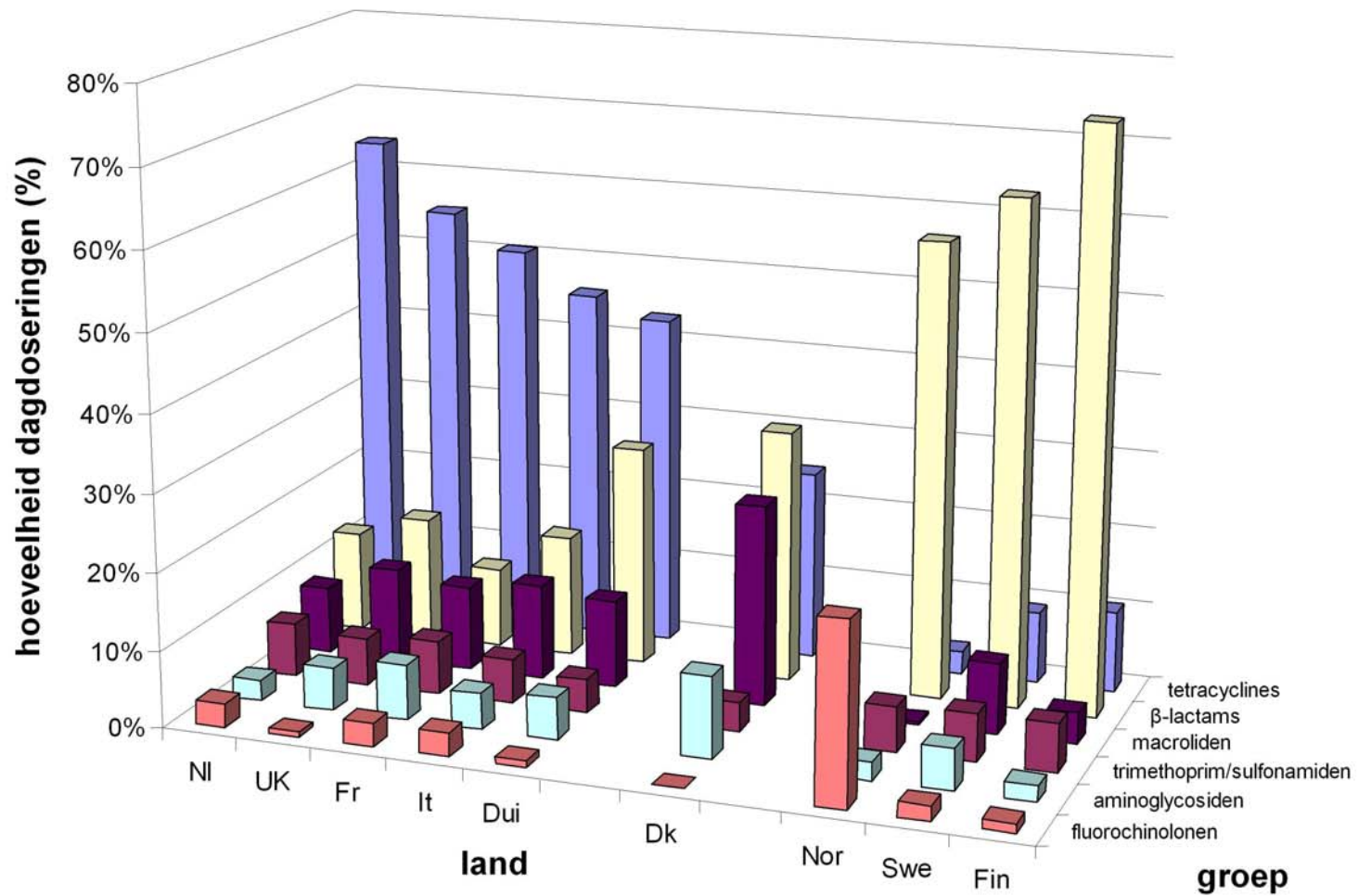


Trends in Daily dosages



daily doses per animal year







Productschap Diervoeder

GMP⁺-certificatieschema diervoedersector 2006

Productnormen (inclusief residunormen)

Bijlage 1

© Productschap Diervoeder (Den Haag, Nederland)

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4 RESIDUNORMEN KRITISCHE DIERGENEESMIDDELEN

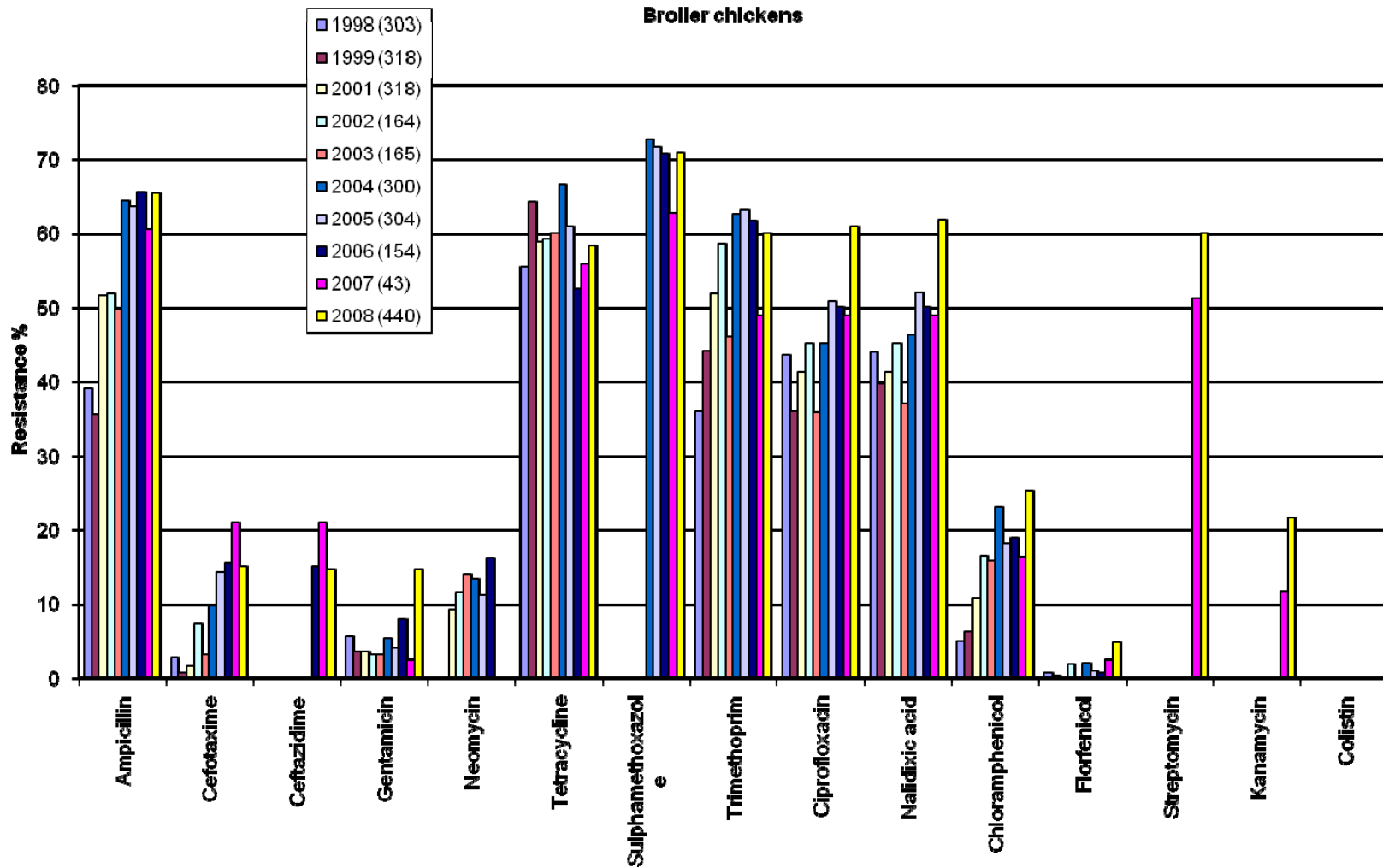
4.1 Samenvatting residunormen kritische diergeneesmiddelen

Diergeneesmiddel	Vastgestelde maximum residunormen in diervoeders ¹¹ in ppm				Vast-gestelde voor-zorgs-maatregel
	leg-hennen ¹²	Vleeskuikens ¹³ vleeskalkoenen ¹³	vleesvarkens ¹⁴	melkvee ¹⁵	
Sulfadiazine	5	8	1 ¹⁷	1 ¹⁷	1 charge ¹⁷
Sulfamethoxazol	5	8	1 ¹⁷	1 ¹⁷	1 charge ¹⁷
Doxycycline	8	8	10	- ¹⁷	1 charge ¹⁷
Oxytetracycline	1 ¹⁸	10	10	- ¹⁷	1 charge ¹⁷
Chloortetracycline	- ¹⁸	- ¹⁸	- ¹⁸	- ¹⁸	1 charge ¹⁸
Flubendazol	- ¹⁶	- ¹⁶	3	- ¹⁷	1 charge ¹⁷
Ivermectine	0.1	0.1	0.1	- ¹⁷	1 charge ¹⁷
Amoxicilline	1 ¹⁸	4	8	- ¹⁷	1 charge ¹⁷
Tiamuline	1 ¹⁸	8	10	- ¹⁷	1 charge ¹⁷
Tilmicosine	1 ¹⁸	4	10	- ¹⁷	1 charge ¹⁷
Trimethoprim ¹⁵	Gekoppeld aan sulfadiazine en daarmee voldoende geborgd				
voor export (niet in NL voor diervoeder geregistreerde middelen) en voor eventuele nieuwe registraties in Nederland	1	1	1	1 ¹⁷	1 charge ¹⁷

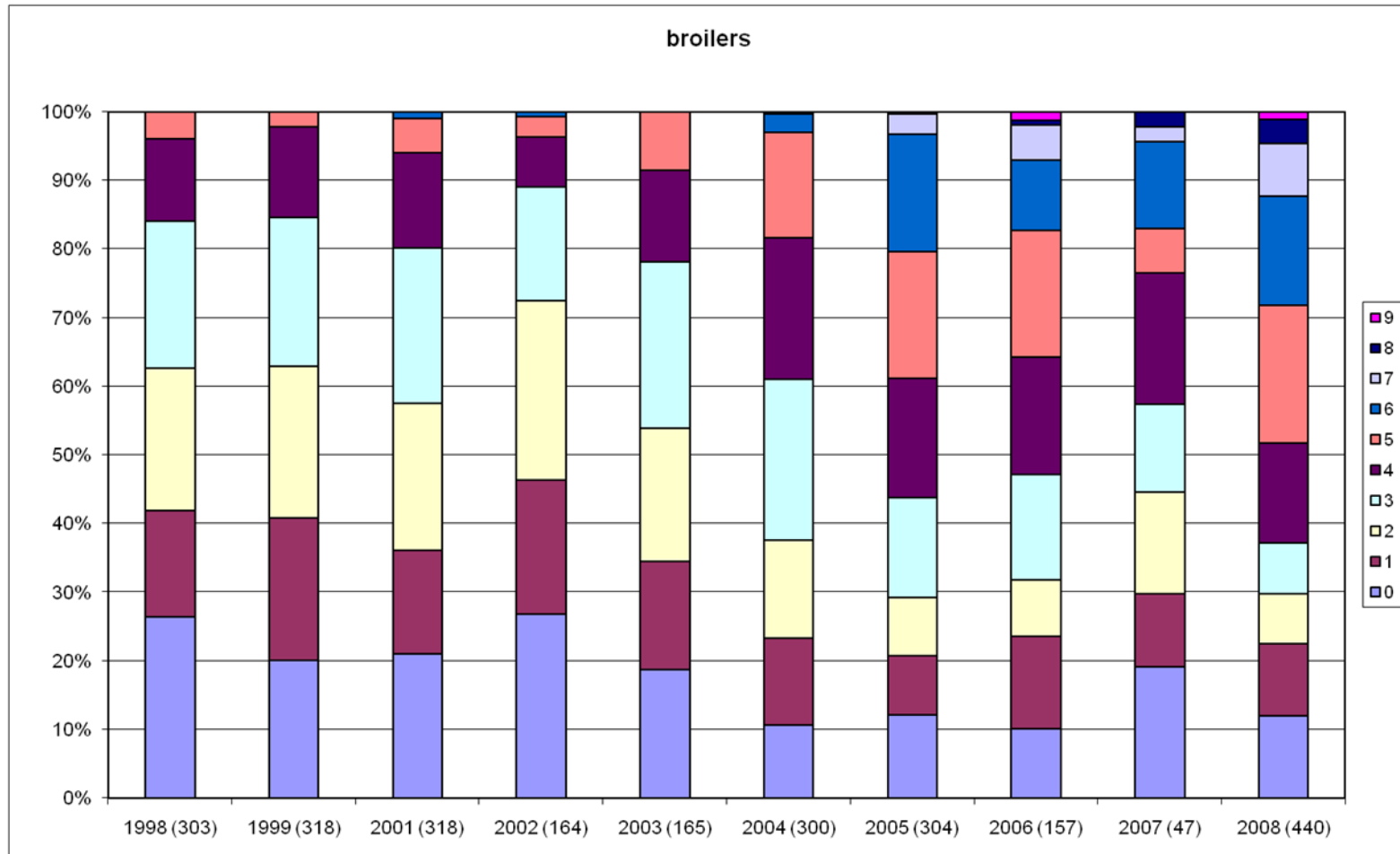
In conclusion

- Usage of antibiotics results in exposure of animals and animal bacteria to antibiotics
 - Selection pressure in resistant variants
 - Mainly in GI-tract

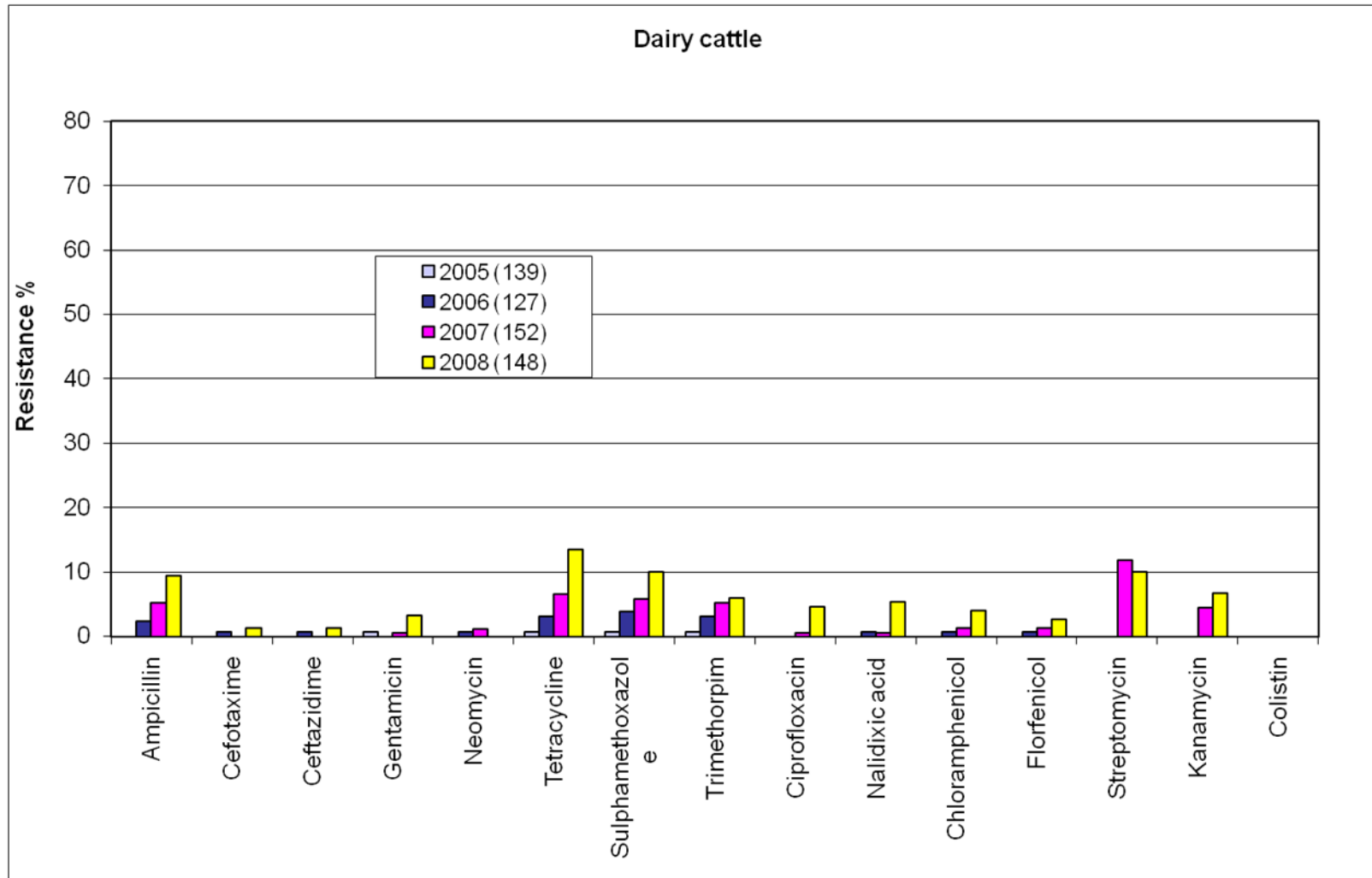
Increase of resistance in E. coli



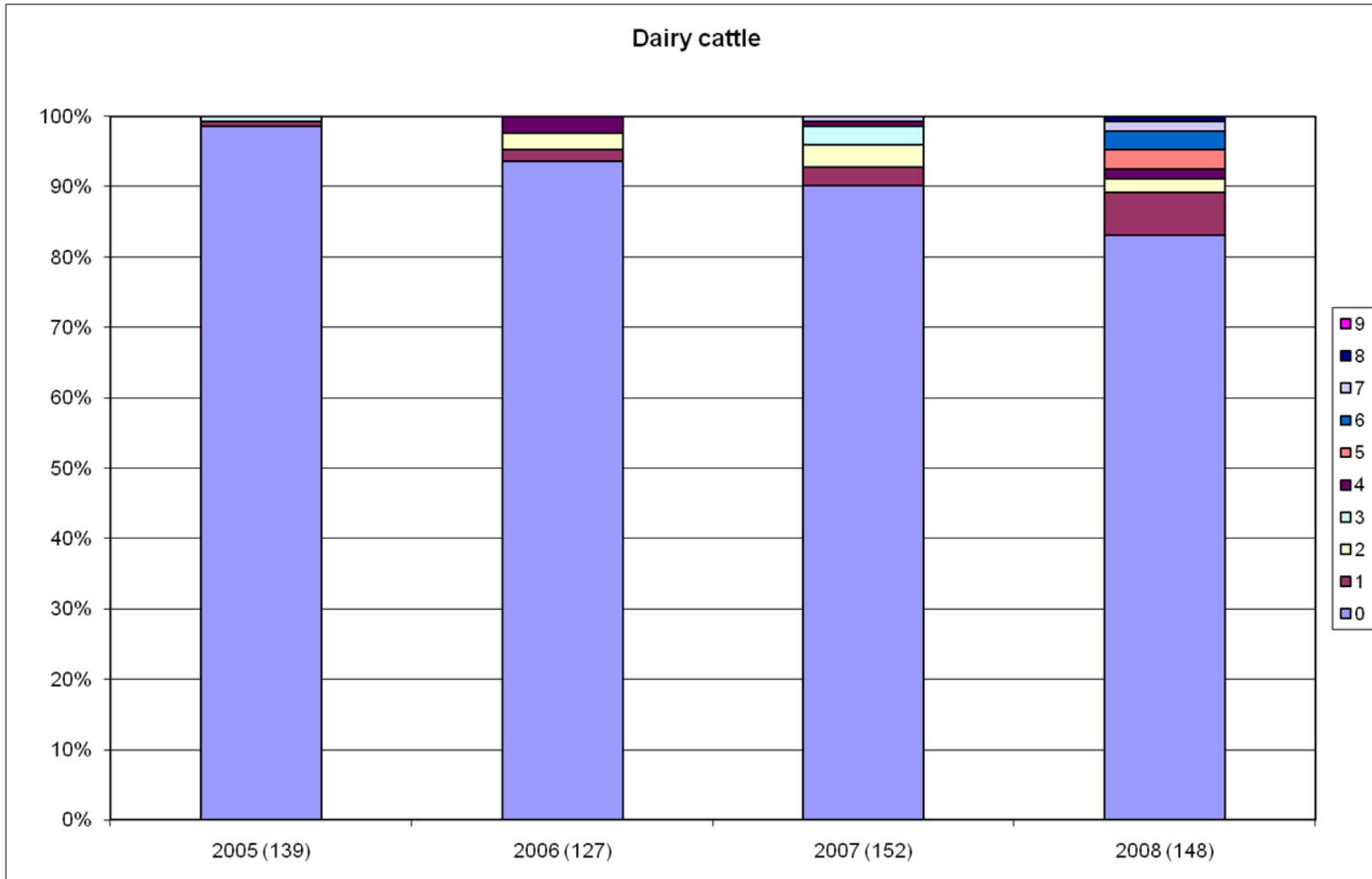
Multi drug resistance in E. coli



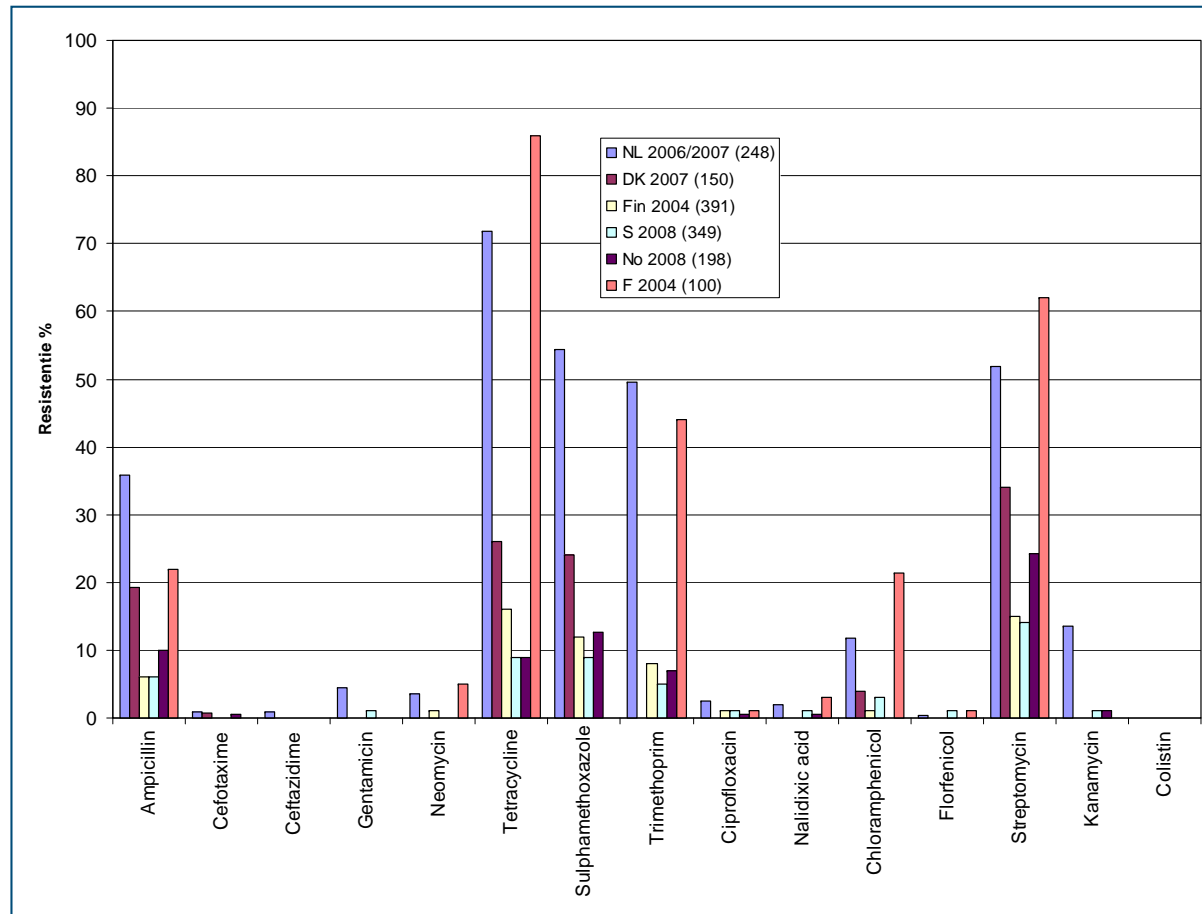
E. coli Dairy cattle



MDR Dairy Cattle



Comparison of resistance in *E. coli* from pigs from European countries



What are the consequences??

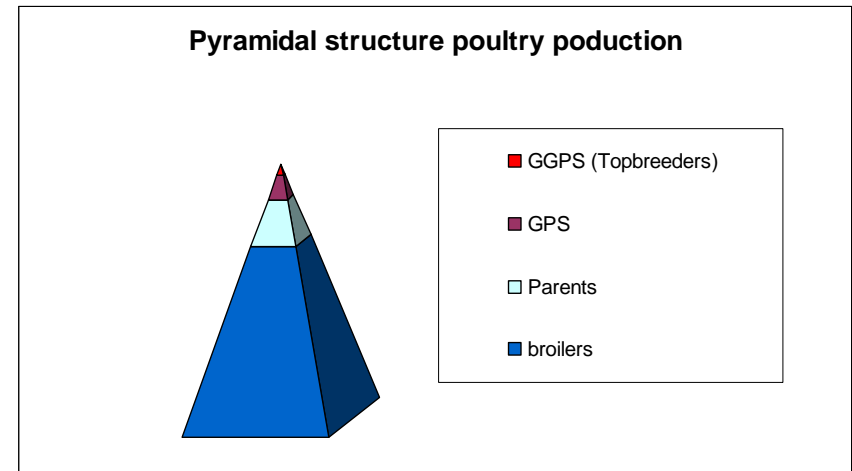
- Very large animal reservoir of resistant organisms
- Structure of animal husbandry systems facilitates rapid spread of (resistant) organisms
 - Nationally and internationally
 - S. Enteritidis Pt4 in poultry,
 - S. Typhimurium DT014 in pigs, cattle and poultry
 - MRSA in pigs, veal calves and currently in many other animal species
 - ESBLs in poultry

MRSA

- First detected in pigs 2003
 - Now omnipresent in food-producing animals globally (pigs)
 - Relation with antibiotic usage (tetracyclines)
 - Regional differences in prevalence
 - High prevalence in people at risk
 - Measurable public health effects
 - Infections
 - Major effect on infection control policies and costs in health care

ESBLs

- Transferable resistance determinants in a.o. Enterobacteriaceae
- Global increase in health care and community (mainly CTX-M) since app. 2000
- Rapid increase in broiler chickens (animals) since 2003
 - Related to ceftiofur usage in reproduction animals
 - Pyramidal structure of poultry production
 - Selection of MDR ESBLs by other in feed antibiotic usages



In conclusion

- In food-producing animals ideal circumstances exist for selection and spread of resistant organisms
- Measurable effect on public health related to MRSA (and ESBLs) and other organisms of concern
- In feed antibiotic usage major determinant

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