

ANTIMICROBIAL USE AND RESISTANCE ISSUES IN FOOD ANIMAL PRODUCTION

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- Defra policy on antimicrobial use
- Regulatory framework
- Types and amounts of antimicrobials used
- Key resistance issues



Defra Policy

- Antimicrobials important for animal health and welfare
- Antimicrobials should be used responsibly – not replacement for farm management/husbandry
- Monitor use and resistance
- Use only under veterinary prescription



Regulatory Framework

- Regulatory controls set by EC Directive
- All veterinary medicines have to have a marketing authorisation
- Pharmaceutical companies have to prepare dossiers to international standards
- EMEA or national authorities assess dossiers to same standards for benefit risk balance of safety, quality and efficacy
- Human regulatory authorities involved in assessment of antimicrobials for food producing animals



Types and Amounts of Antimicrobials Used

- Why Monitor Amounts of Antimicrobials Used
 - Government takes the issue of AMR seriously with increasing concern about AMR in humans, animals, agriculture and horticulture
 - Government published a comprehensive strategy to address this issue
 - Key element is to detail the quantity of AMs sold annually
 - ACMSF recommended data collection was necessary. VMD have undertaken this for 13 years (1993-2005)



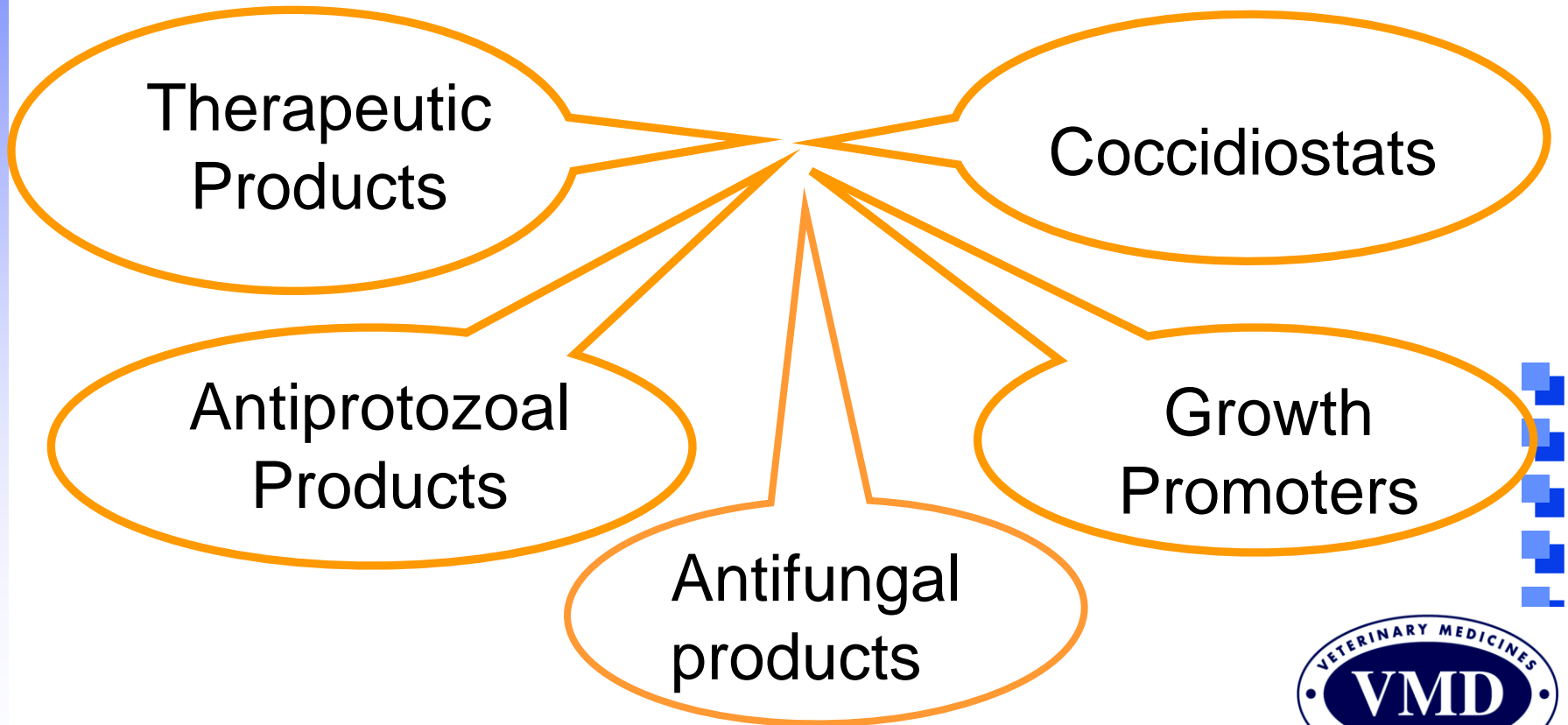
Data Collection

- Annually collect data on sales of veterinary antimicrobial products from pharmaceutical companies as a statutory requirement (EC Directive 2001/82 as amended)
- Sales added to spreadsheet along with further information
- Calculate amounts of active ingredients sold
- Data QA checked in-house
- Eight reports published for 1993-2005
- Report for 2006 published later this year
- All reports available at www.vmd.gov.uk



Sales Report Publication

- Products are classified into one of five main categories:



Sales Report Publication

- The therapeutic products are divided into one of the following chemical classes:

Tetracyclines

Others

Macrolides

Fluoroquinolones

Sulphonamides/
Trimethoprim

β -lactams

Aminoglycosides



Sales Report Publication

- Some therapeutic antimicrobials are sub-divided for reporting purposes:

Coccidiostats

Non-ionophores

Ionophores

Therapeutic Antimicrobials

Beta-lactams

Macrolides

Tetracyclines

Aminoglycosides

Fluoroquinolones

Sulphonamides/Trimethoprim

Others

Cephalosporins

Penicillins

Others

Streptomycins

Neomycin &
Framycetin

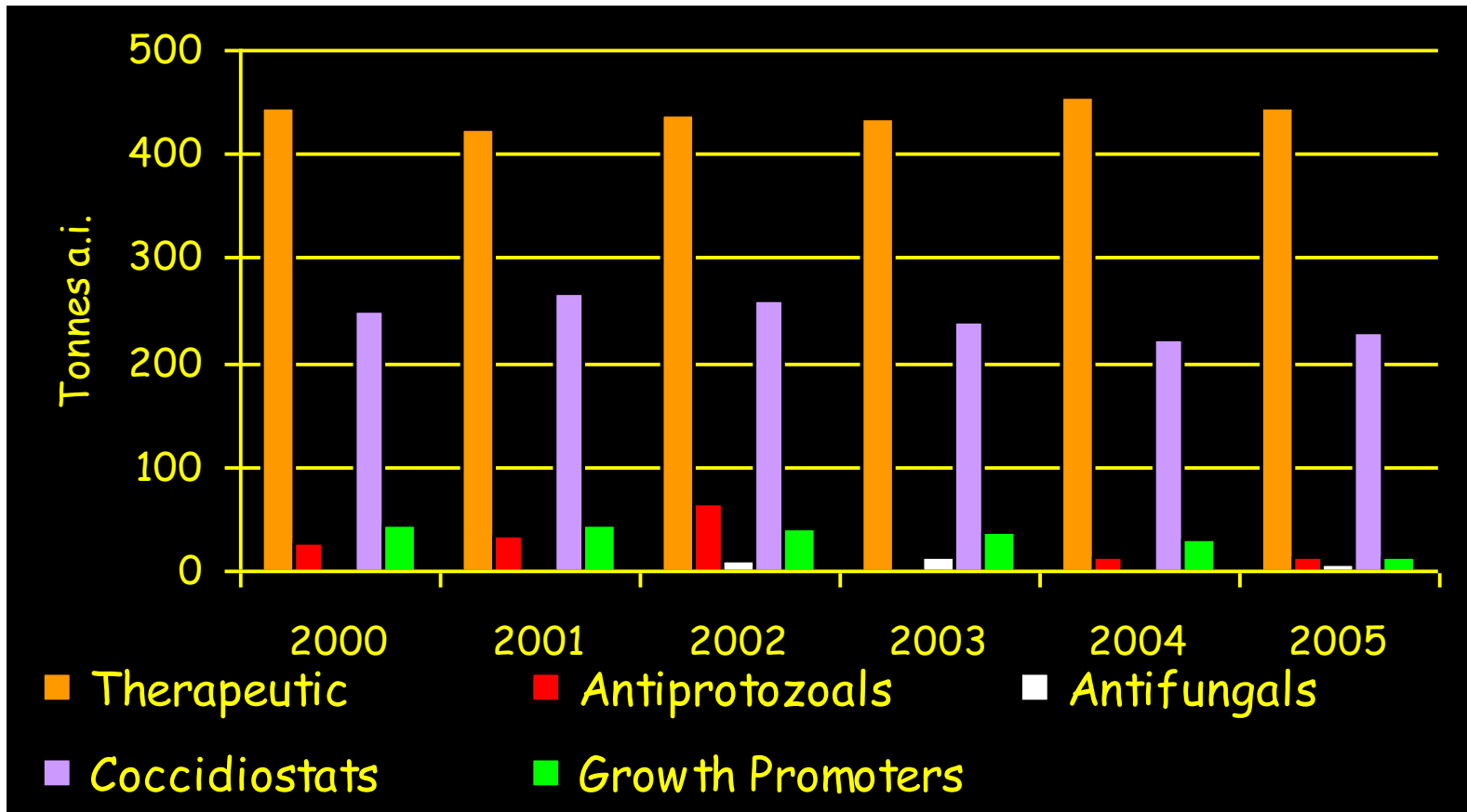
Others

Sulphonamides

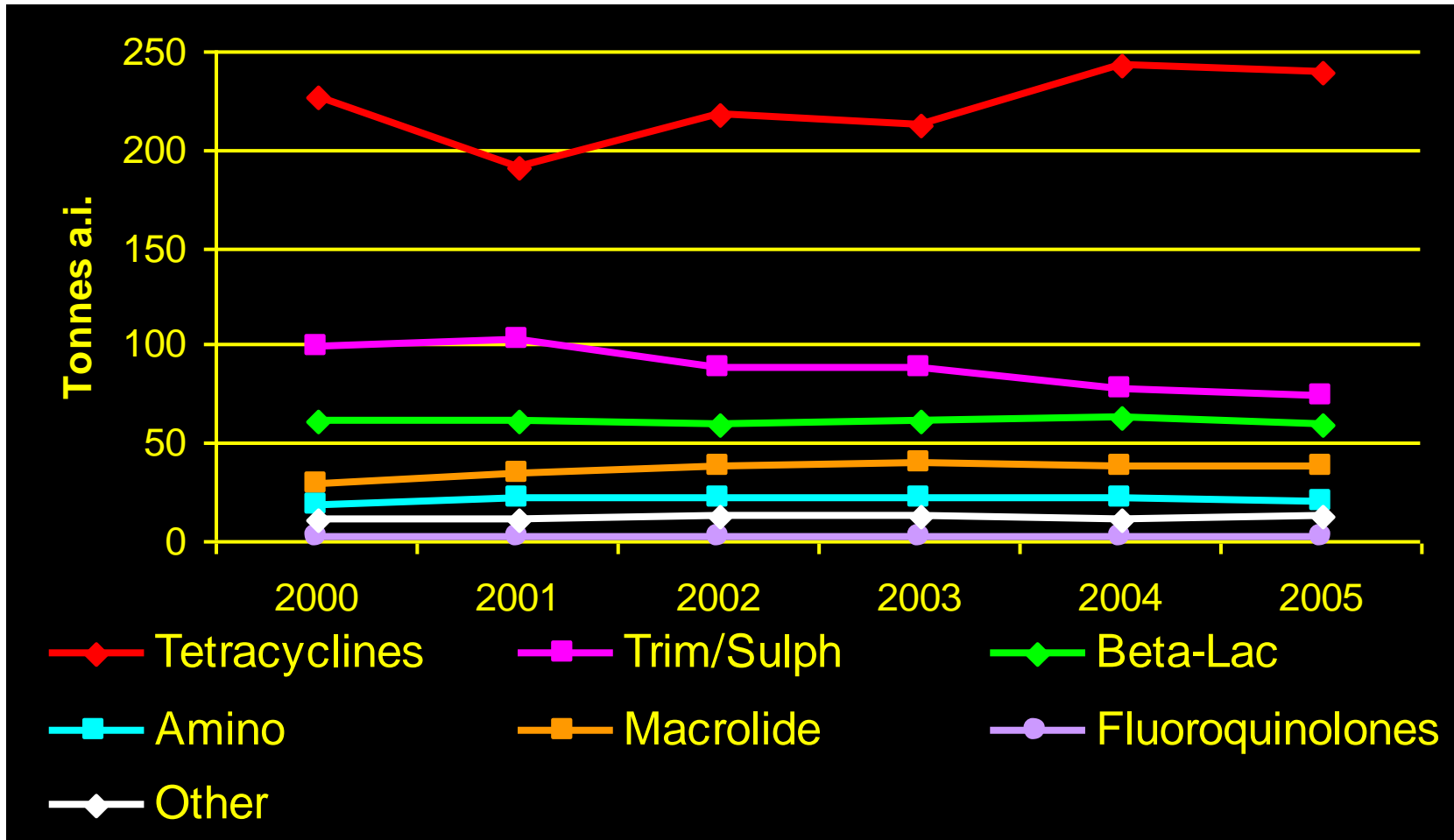
Trimethoprim



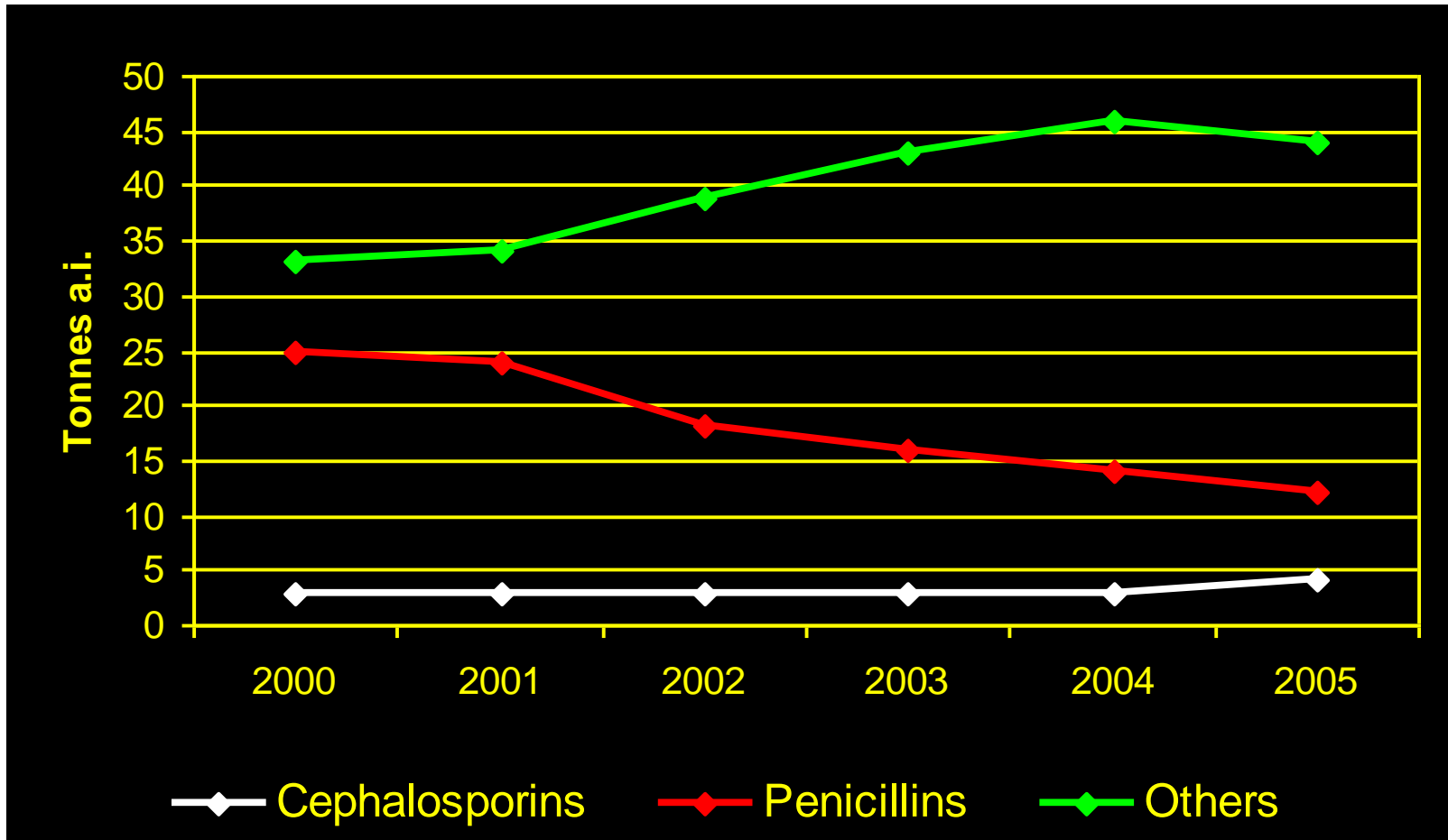
Example Results



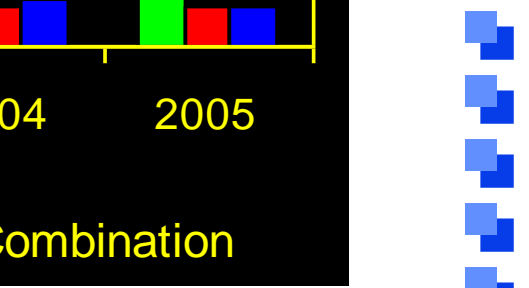
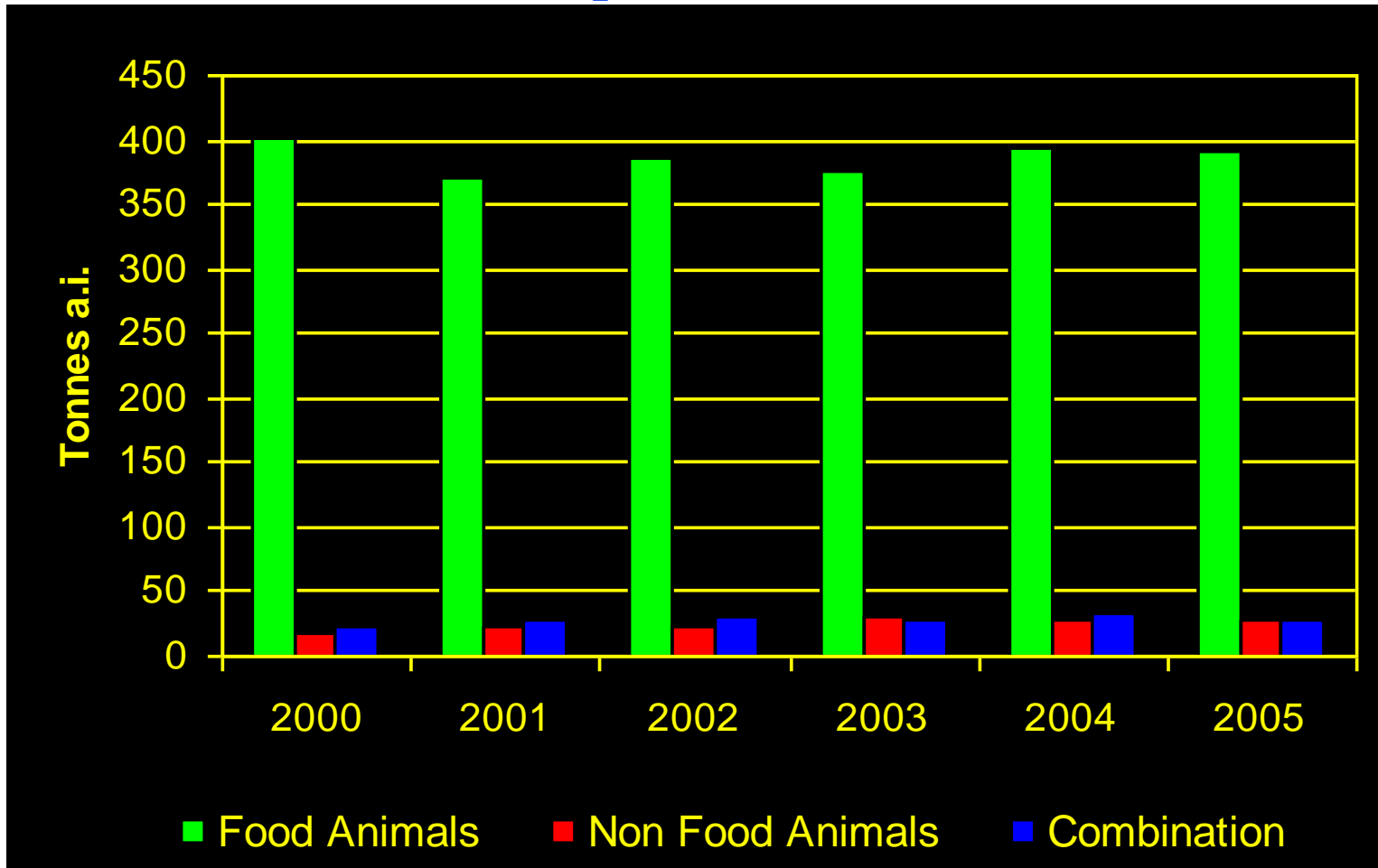
Example Results



Example Results



Example Results



NICK COLDHAM



Antimicrobial resistance surveillance

Passive (incidents – trend analysis)

- All *Salmonella* isolations reportable (clinical disease & others).
- *Salmonella* voluntary surveillance (e.g. Lion code for layers).
- Diagnostic submissions to VLA RLs. (Gram +ve *Staph* & *Strep*; Gram –ve *E. coli*, *Klebsiella* and *Pasteurella*).
- Enhanced Surveillance, hazard detection , ESBLs and MRSA.

Active (structured surveys - prevalence estimation)

- EU baseline surveys (*Salmonella* in layers & broilers).
- *Salmonella*, national control plans (breeders, layers and broilers, turkeys and pigs).
- Abattoir surveys of FBZs & *E. coli* (cattle, sheep & pigs).
- Research studies (*Salmonella* in cattle).

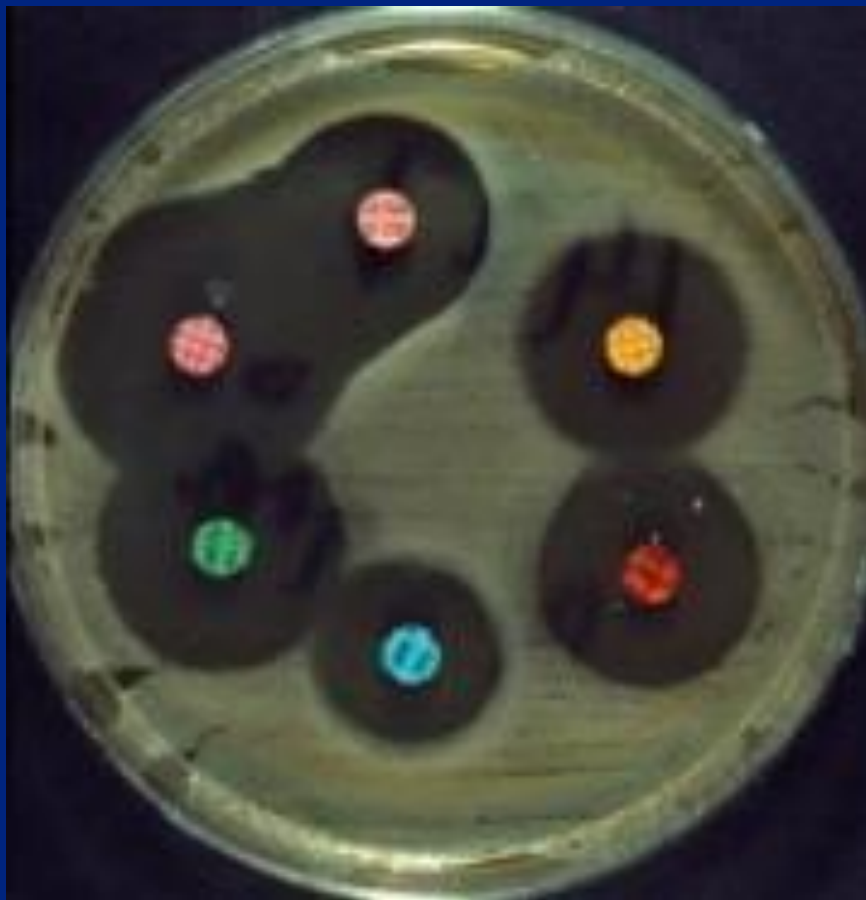
AMR testing of isolates:- SENSITEST (disk diffusion)

BSAC Disk Diffusion Antimicrobial sensitivity testing

- UK std method
- Isosensitest agar
- Semi confluent inoculum
- Choose disks
- Disk diffusion
- 13 mm cut-off zone
- Harmonised with human medicine

	Antimicrobial	Conc (µg)	Code
1	Nalidixic acid	30	NA
2	Tetracycline	10	T
3	Neomycin	10	N
4	Ampicillin	10	AM
5	Furazolidone	15	FR
6	Ceftazidime	30	CAZ
7	Sulphamethoxazole/trimeth	25	TM
8	Chloramphenicol	10	C
9	Amikacin	30	AK
10	Amoxicillin/clavulanic acid	30	AMC
11	Gentamycin	10	CN
12	Streptomycin	25	S
13	Sulphonamides	300	SU
14	Cefotaxime	30	CTX
15	Apramycin	15	APR
16	Ciprofloxacin	1	CIP

Disk Diffusion for assessing AMR



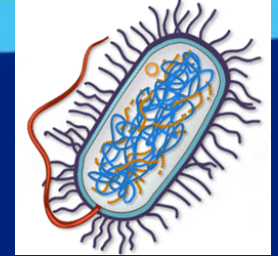
Further molecular characterisation of isolates:-

- Micro-array AR genes
- Mutation analysis (*gryA*)
- Sequencing (CTX-M)
- MLST (sub-typing)
- VNTR (sub-typing)
- PFGE (clonality)

Survey of the prevalence of *Salmonella* species on commercial laying farms in UK.

- Zoonoses regulation 2160/2004/EC – control plan.
- Prevalence survey to establish baseline level.
- 454 layer flocks survey 2004-05.
- 54 flocks 11.7 % *Salmonella* positive.
- *S. Enteritidis* 5.8%, *Typhimurium* 1.8%.
- *S. Virchow* & *Infantis* (1 flock), *Hadar* 0.
- 76% of isolates were sensitive to all 16 drugs tested.
- All isolates sensitive to cip, cn, caz, apr, ctx.
- Similar survey in broilers.

(Snow *et al.*, 2007)



Enhanced Surveillance

Hazard detection of new and emerging FBZs.

- ESBL (CTX-M) *E. coli* – UTIs & bacteraemias.
- MRSA community acquired - PVL toxin.
- Targeted surveys/investigation of farms & infections.
- Molecular typing & phenotypic analysis – links to human strains.
- Control measures e.g. identify high risk husbandry or AMR/ co-selection.
- Proactive provision of detection and typing for assessing/ reducing risk to food chain.

Further reading

- Salmonella in livestock production in G.B. VLA
<http://www.defra.gov.uk/corporate/vla/science/science-salm-intro.htm>
- Trends in Antimicrobial Resistance in England and Wales. HPA
http://www.hpa.org.uk/infections/topics_az/antimicrobial_resistance/publications.htm
- Overview of antimicrobial usage and bacterial resistance in selected human and animal pathogens in the UK:2004. VMD
<http://www.vmd.gov.uk/publications/antibiotic/antimicrob120707.pdf>