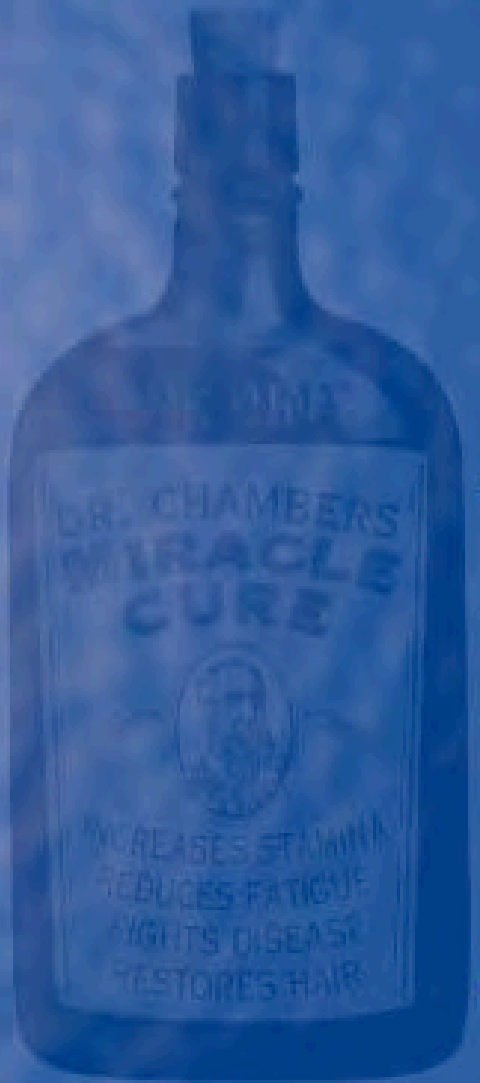
Antibiotics

used for promoting growth

growth promoters

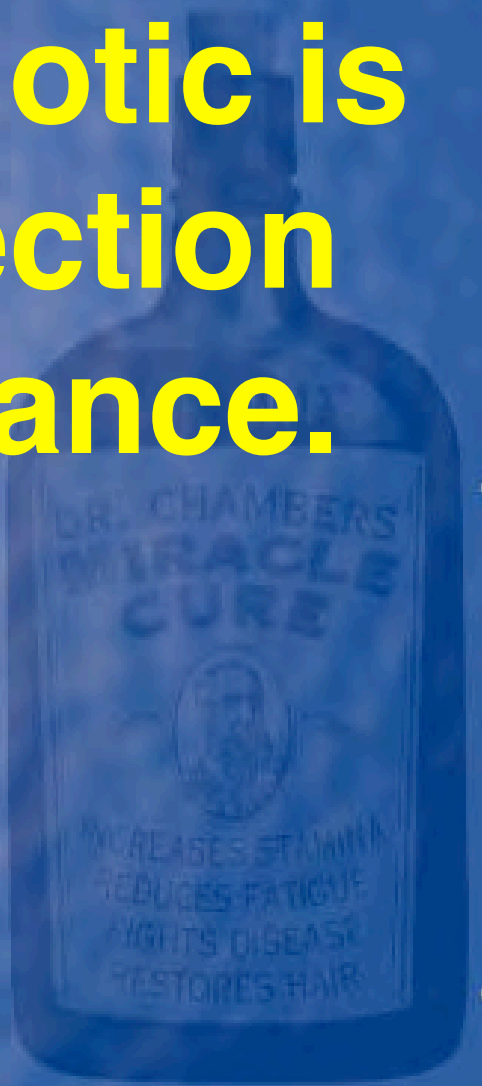
- anabolic steroids
- antibiotics
- somatotropins
- probiotics
- banned drugs



use of antibiotics

- **treatment**
  - sick animals, full doses
- **metaphylaxis**
  - healthy contact animals, full doses
- **prophylaxis**
  - healthy animals, low doses
- **growth promotion**
  - healthy animals, (very) low doses

Every time an antibiotic is given, there is selection pressure for resistance.



history

- **1949**
  - pigs fed old cultures of *S. rimosus* for vit B12 grew faster
- **1967**
  - Swann report - only non therapeutic drugs to be used for growth promotion
- **1997**
  - Denmark gets EU to ban avoparcin

mechanism

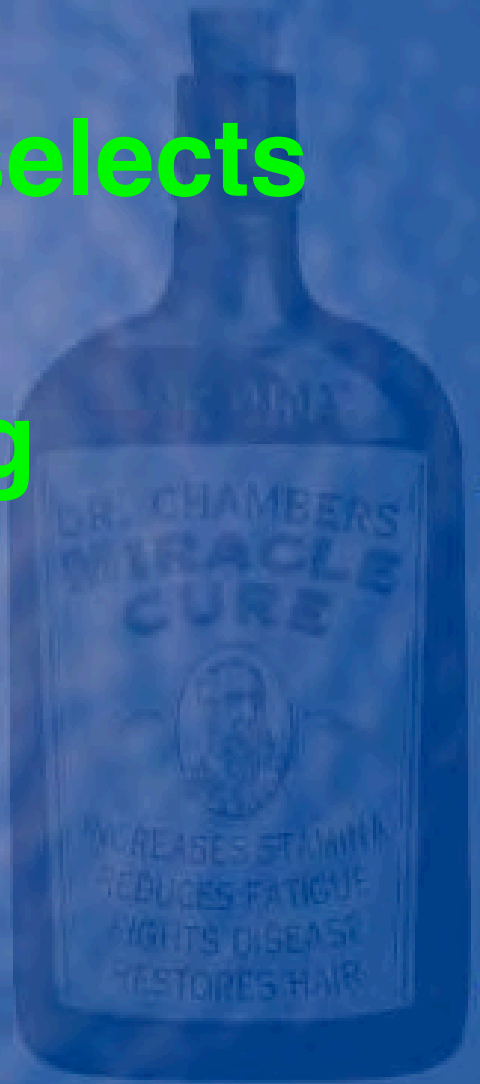
- gnotobiotic animals grow about 5% faster
- inhibition of G+ bacteria in gut
- inhibition of protozoa in ruminants???

residues

- fed at very low level
- most are not absorbed
- no residues at GP doses
- may be residues at prophylactic doses

resistance

- exposure to antibiotics selects for resistance
- animals exposed for long periods

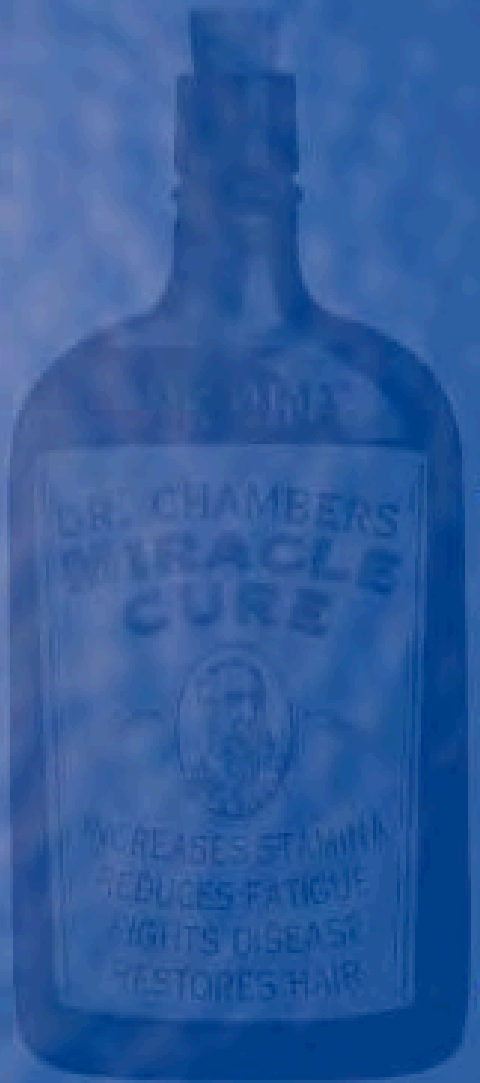


resistance

- pathogens
- commensals
- targets unknown in growth promotion

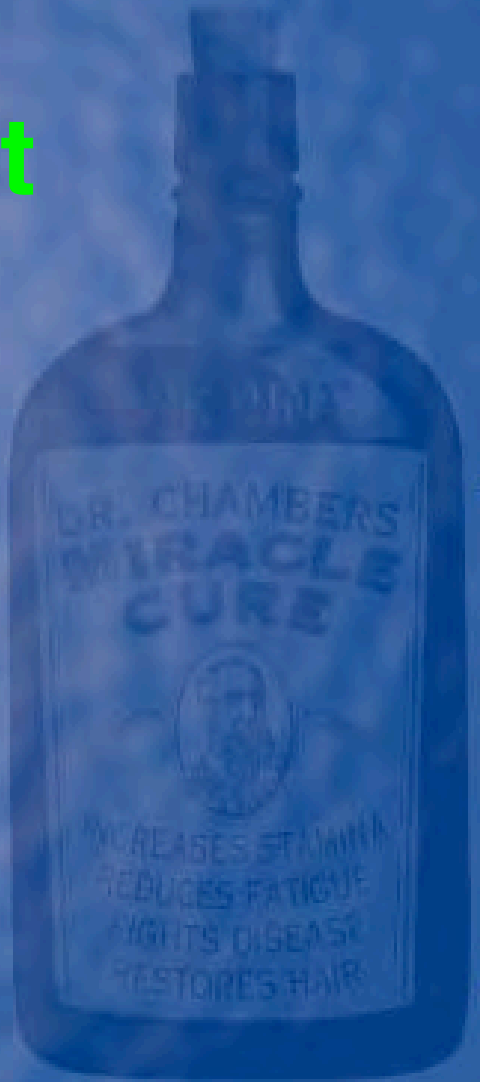
species

- poultry
- pigs
- feedlot cattle
- calves
- grazing cattle



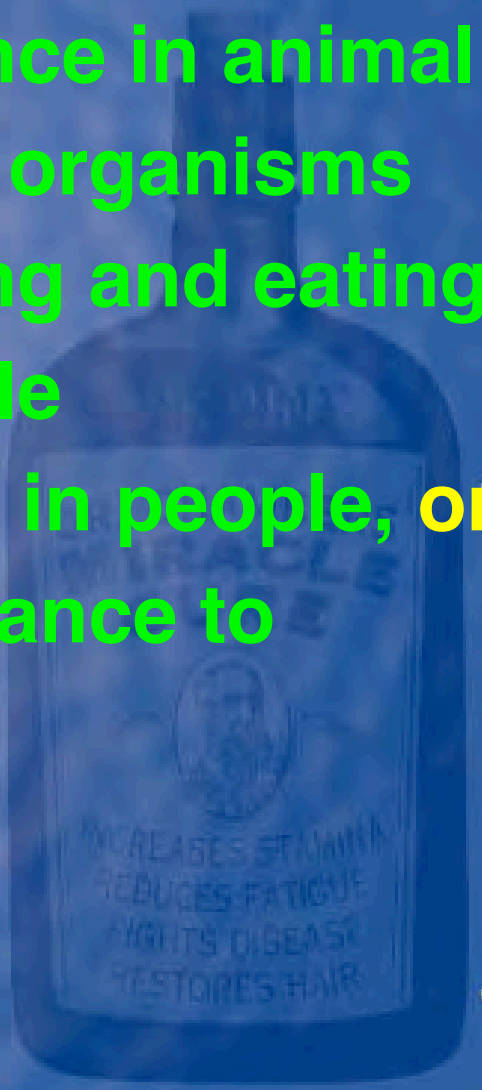
zoonoses

- **fluoroquinolone resistant**
  - *Salmonella* spp (DT104)
  - *Campylobacter*
  - *E.coli* O157



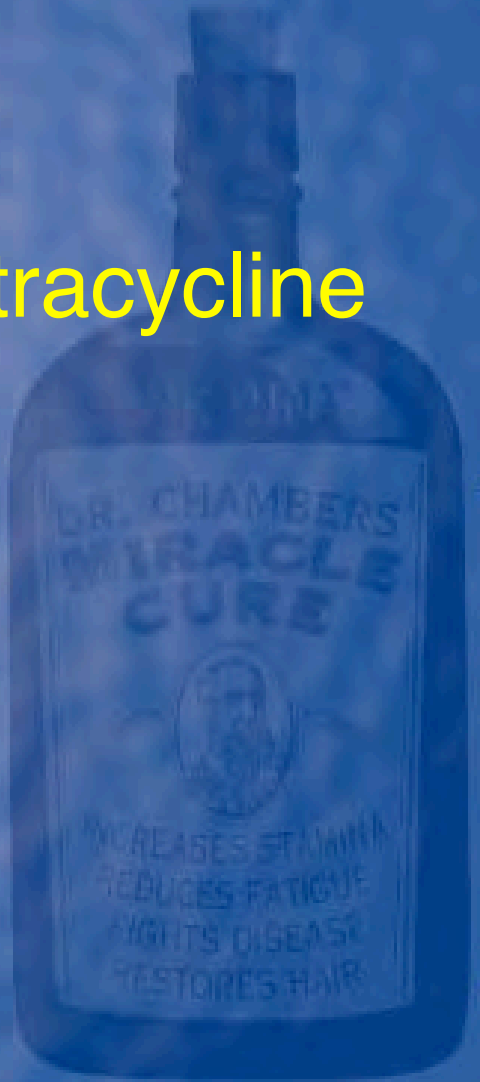
transfer of resistance

- drug causes emergence of resistance in animal
- carcase contaminated by resistant organisms
- resistant organisms survive cooking and eating
- resistant organisms colonise people
- resistant organisms cause disease in people, or
- resistant organisms pass on resistance to human pathogens



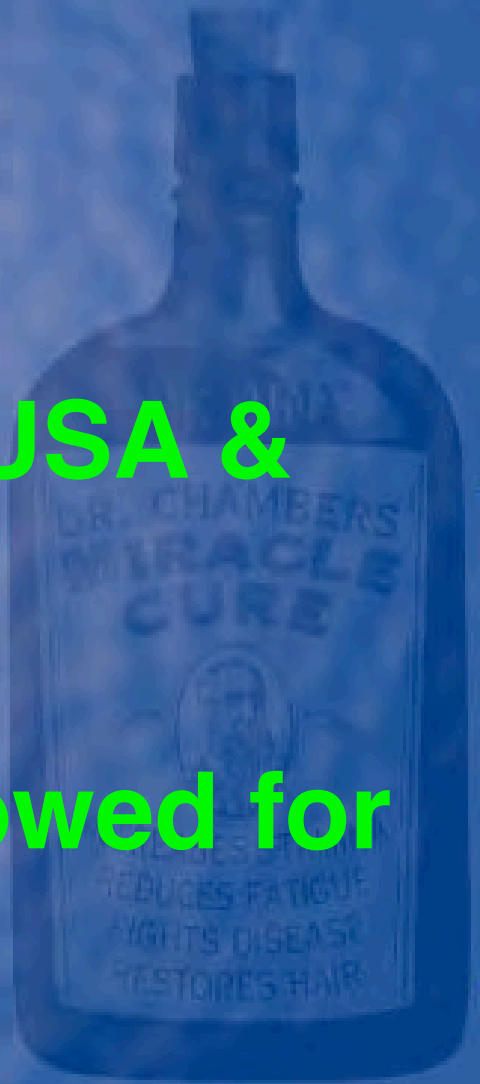
politics

- **1960s**
  - widespread emergence of tetracycline resistance
- **1967**
  - Swann report
- **1980s / 1990s**
  - emergence of VRE & MRSA



politics now

- WHO recommendations
- most banned in EU
- most under pressure in USA & Australia
- Most banned as growth promoters in NZ, but allowed for prophylaxis



drugs

- avilamycin
- avoparcin
- bacitracin
- dimetridazole
- macrolides
- monensin
- quinoxalines
- virginiamycin

avilamycin

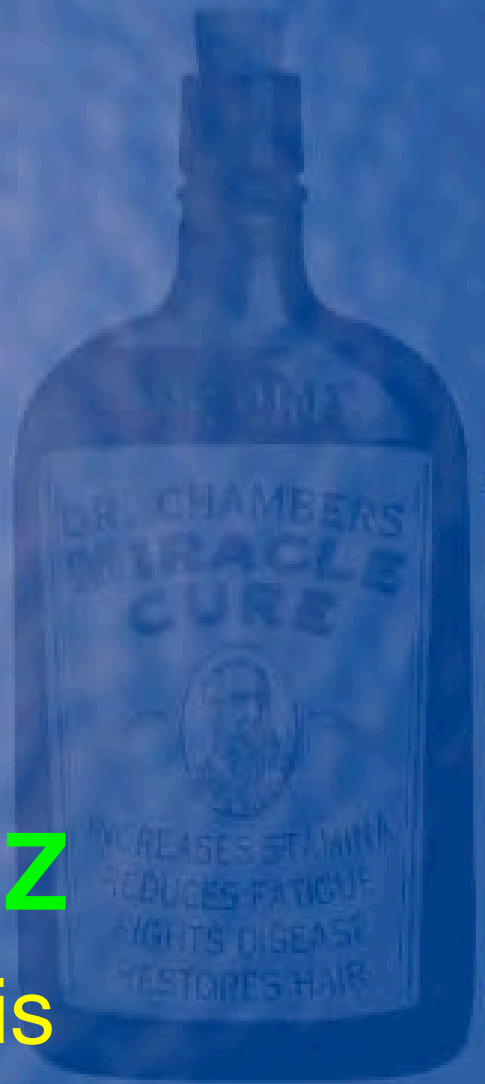
- broiler chickens
- pigs
- cross resistance
  - everninomycin
- still used in NZ, recently banned in EU

avoparcin

- **cross resistance**
  - vancomycin
- **now history - not manufactured any more**

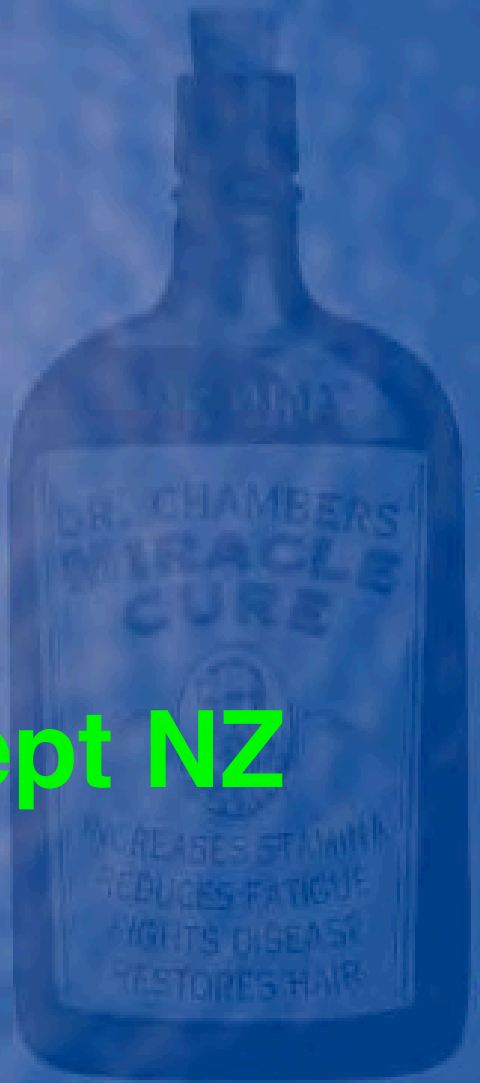
bacitracin

- broiler chickens
- pigs
- calves
- no cross resistance
- toxic parenterally
- banned in EU, PAR1 in NZ
  - prevention of necrotic enteritis



dimetridazole

- **pigs**
- **carcinogenic**
- **cross resistance**
  - other nitroimidazoles
- **banned everywhere except NZ**
  - swine dysentery



macrolides

- tylosin
- spiramycin
- tiamulin
- pigs
- cross resistance
  - other macrolides
- PAR in NZ and EU

monensin

- **cattle & broiler chickens**
- **toxic to horses and dogs**
  - pigs in combination with macrolides
- **no relevant cross resistance**

oxytetracycline

- **PAR 1**
  - respiratory disease in pigs
- **grossly over / ab used**

quinoxalines

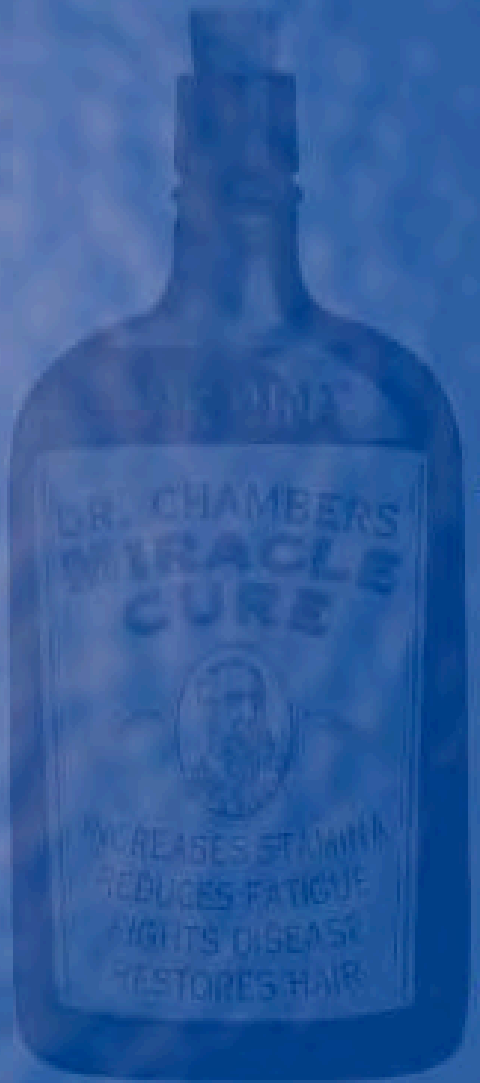
- carbadox
- olaquindox
- dinitro-o-toluamide
- carcinogenic
- banned everywhere except NZ
- do not use
  - swine dysentery

virginiamycin

- broiler chickens and horses
- (feedlot cattle overseas)
- cross resistance
  - other streptogramins - Synercid
- PAR1 level 4
- avoid if at all possible

legal status

- **growth promoters**
  - general sales
  - being phased out
- **disease preventers**
  - PAR 1



The future??

- more paperwork
- surveillance system
- vets will have to be able to justify their actions

role of the vet

- ensure good husbandry before use
- do not use drugs for disease prevention without evidence of disease
- provide written protocols for farmers (with withholding times)
- keep records
- monitor results - culture & sensitivity
- investigate outbreaks of disease properly