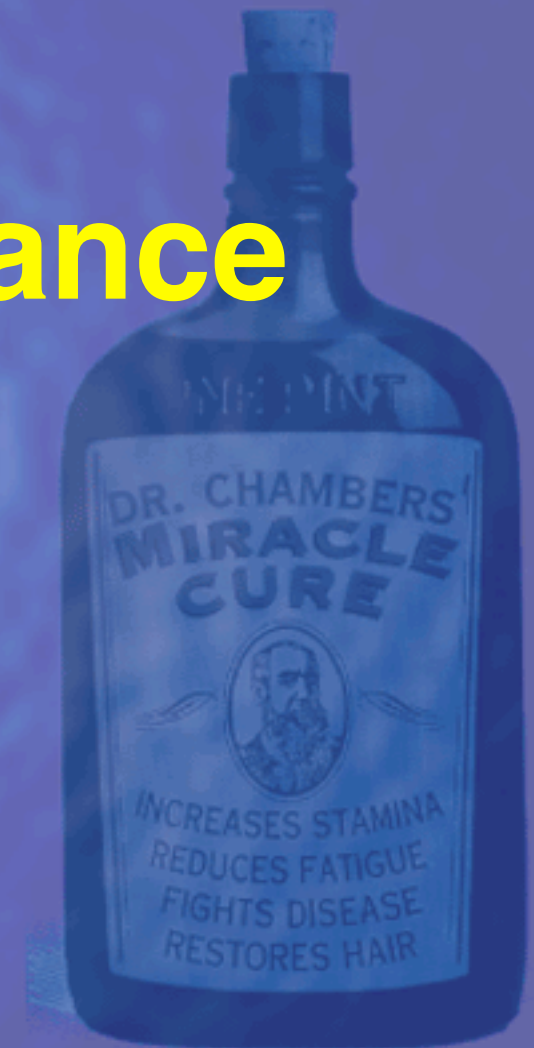


Antibiotic Resistance



**Every time you use an
antibiotic you exert
selection pressure for
resistance on pathogens
and commensals**



resistance mechanisms

- drug does not reach its target
 - Pseudomonas
- drug is inactivated
 - Staph aureus
 - E.coli
- target is changed
 - MRSA
 - streps



resistance

- intrinsic
- acquired



resistance genes

- chromosomes
- plasmids
- transposons
- integrons
- gene cassettes



acquired resistance

- **conjugation**
 - coliforms
 - cocci
- **transduction**
 - Staphs
- **transformation**
 - cocci?

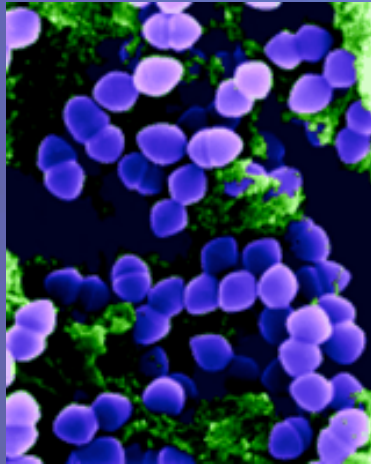
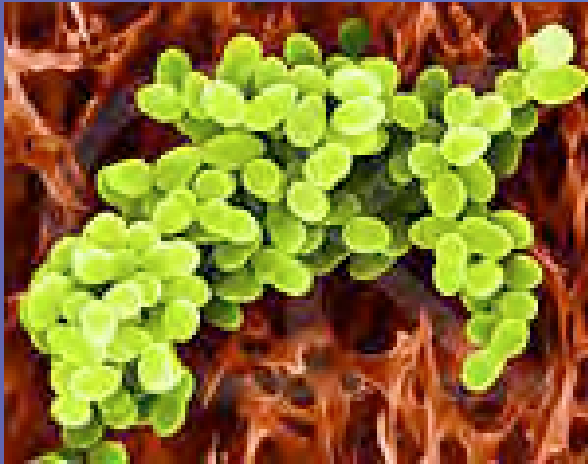


resistance

- pathogens
- commensals



human pathogens



- **MRSA**

- Methicillin resistant *Staph. aureus*

- **VRE**

- Vancomycin resistant enterococci



MRSA

- **14% SA isolates 2001**
- **Western Samoan phage pattern**
 - 39% MRSA isolates 2001
 - community acquired
 - Pacific islanders
 - Auckland
- **epidemic MRSA 15**
 - 40% MRSA isolates 2001
 - from UK
 - acquired in hospital

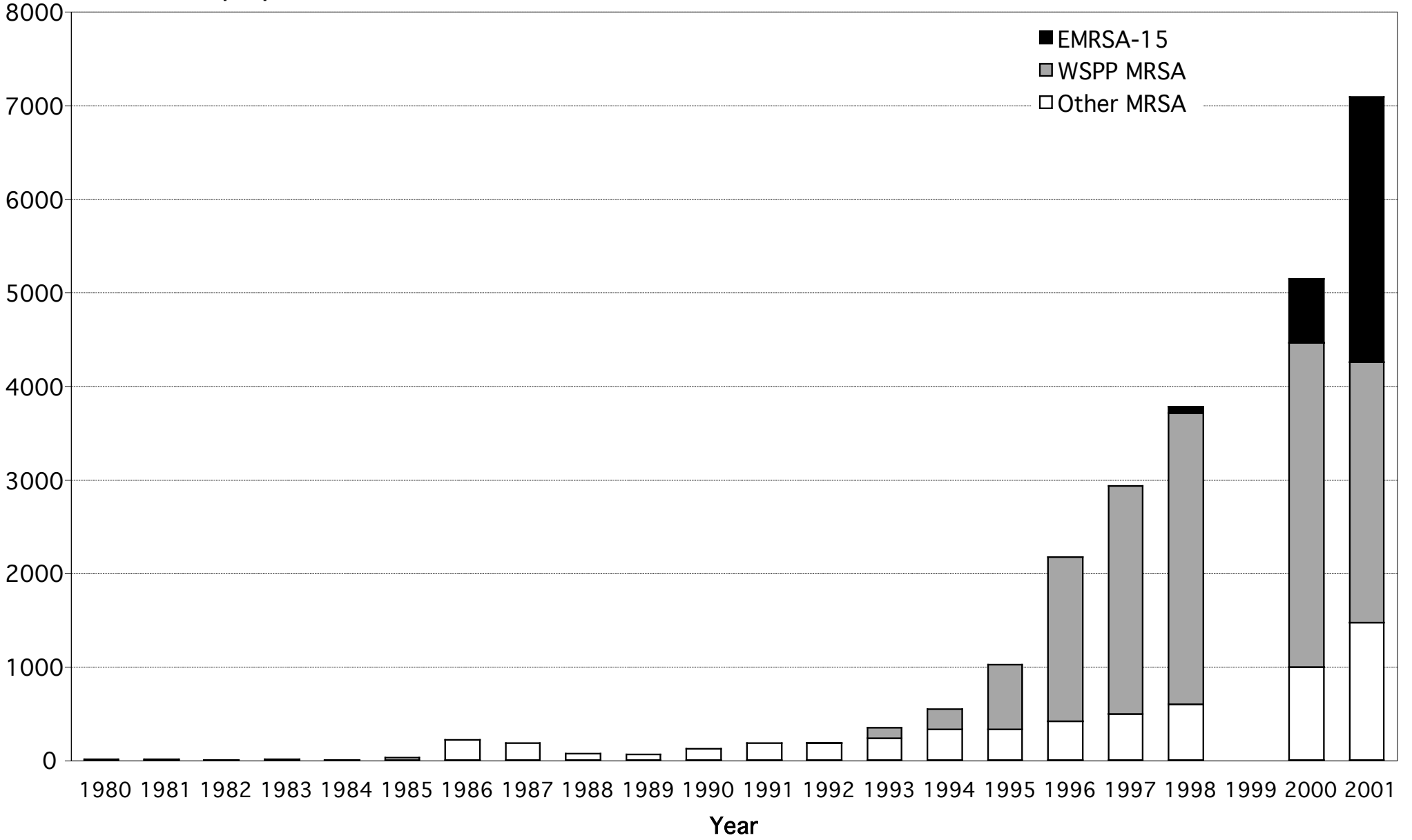


MRSA 2002

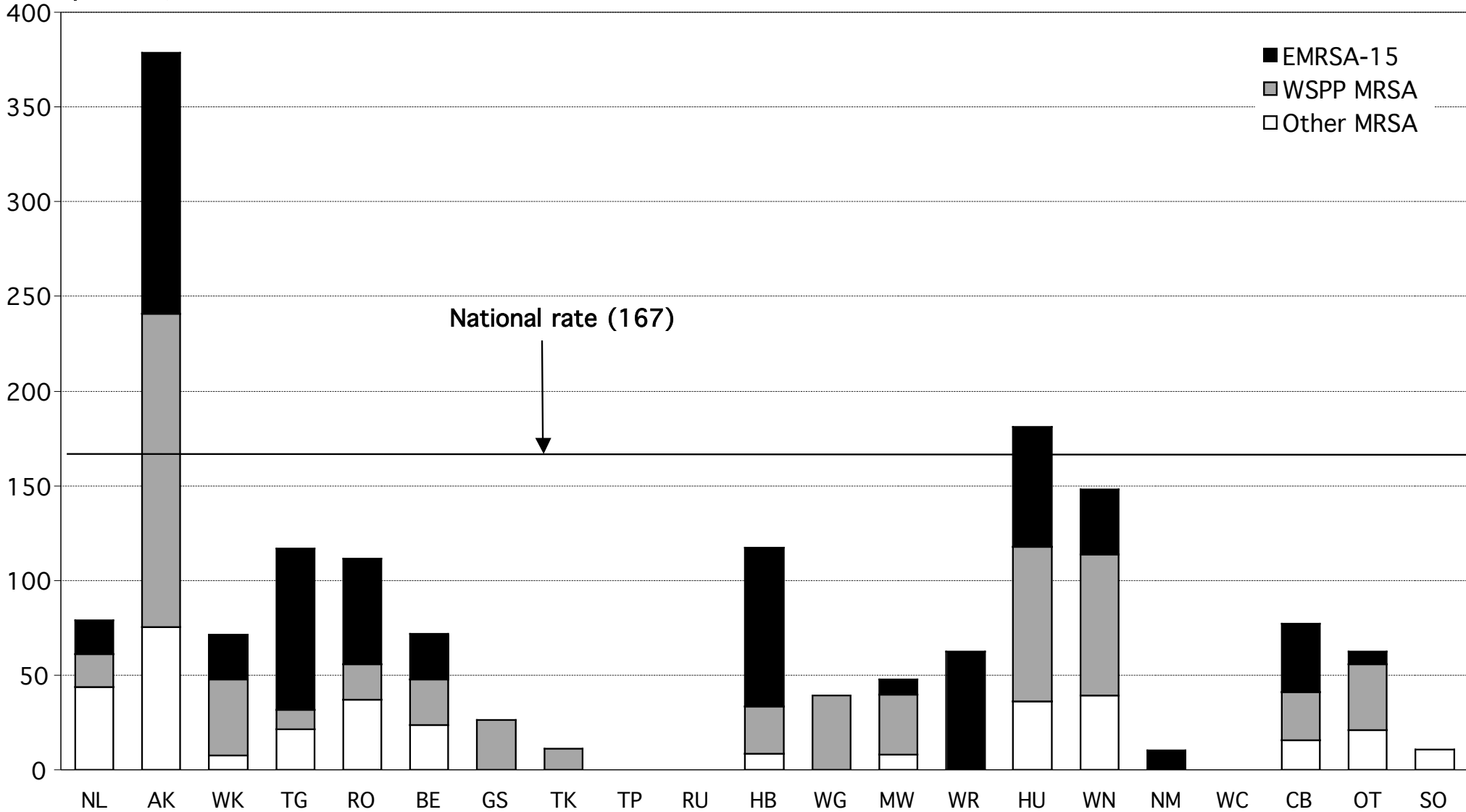
- **EMRSA 15 (UK)**
 - 67.5% isolates
- **AKh4 (Aus)**
 - 12.3%
- **WR/AK1**
 - 7.1%
- **WSPP (Samoa)**
 - 2.1%



Number of people



Number of people MRSA isolated from per 100,000



Year



VISA

- **vancomycin intermediate**
Staphylococcus aureus
 - 2 isolates this year
 - MRSA patients treated with vancomycin



VRE

- 15 human isolates in NZ so far
- chickens in Otago



animal *Staph aureus*

- more resistant than human to
 - clindamycin / licomycin
 - co-trimoxazole
 - fluoroquinolones
 - gentamicin
 - tetracyclines



animal *Staph aureus*

- **fluoroquinolone resistance**

- 1999 – 0%
- 2000 – 6.6%
- 2001 – 12.5%
- mostly dogs



food poisoning

- **Salmonella spp (DT104)**
 - rare in NZ
 - 39 human & 3 animal isolates 1992 – 2001
- **Campylobacter**
- **E.coli O157**
- **(Shigella)**



fluoroquinolone resistance

- **Salmonella spp (DT104)**
 - NZ 1998 0%
- **Campylobacter**
 - no figures but high
- **E.coli (all)**
 - animals 2000/1 2.4%, 1999 0.9%
 - 2001 4.3% dog isolates
 - people 2000 1.3%
- **(Shigella)**



TB

- 2002 0.6% MDR, 13% single drug resistant
- most cases in people born overseas



TB drugs

- rifampicin
- clarithromycin / azithromycin
- ethambutol
- isoniazid
- pyrazinamide
- streptomycin



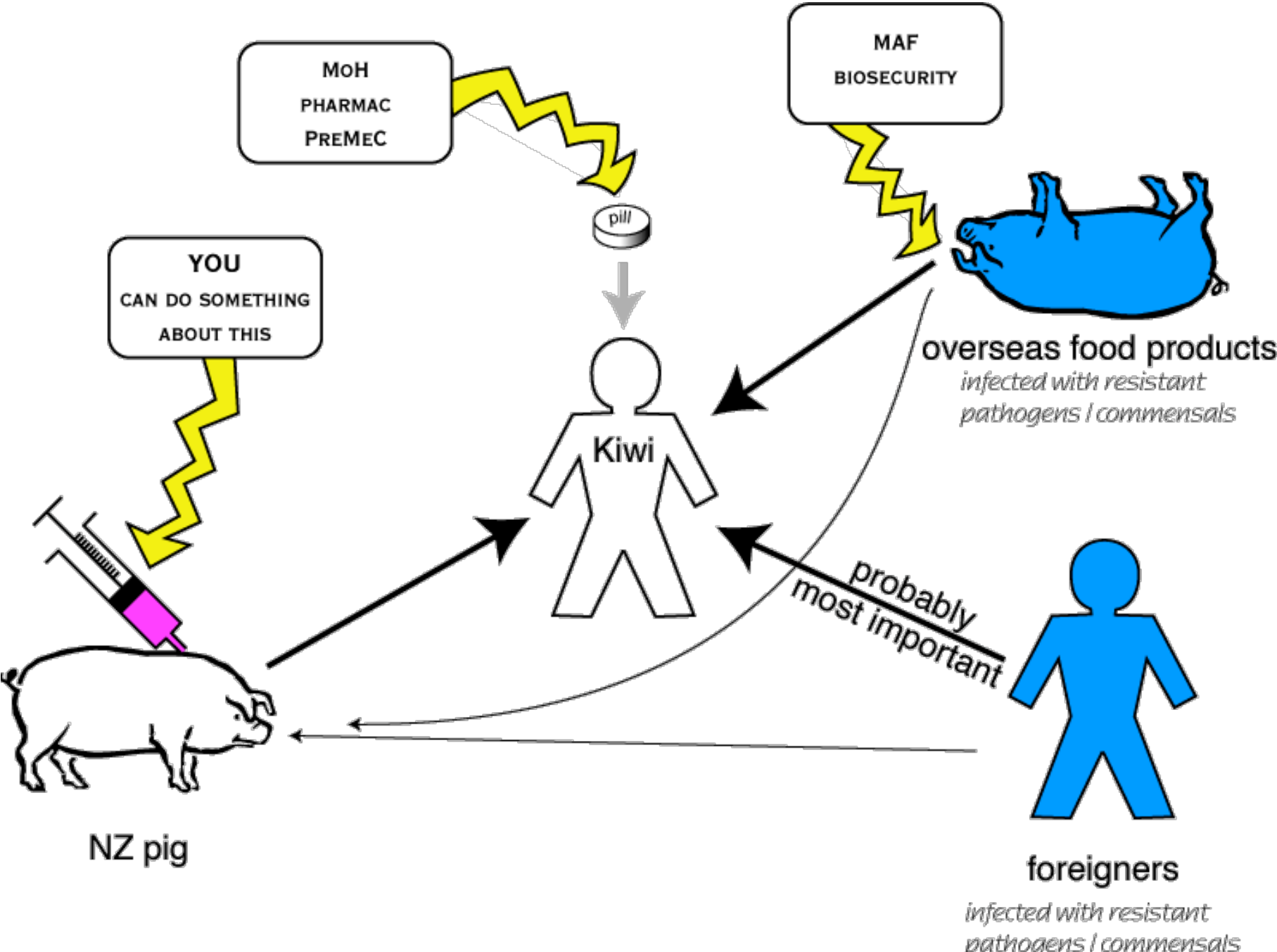
veterinary pathogens

- **Pseudomonas aeruginosa**

- large genome
- lots of drug efflux pumps
- lots of redundant systems
- common after inappropriate antibiotics
- causes problems in people too

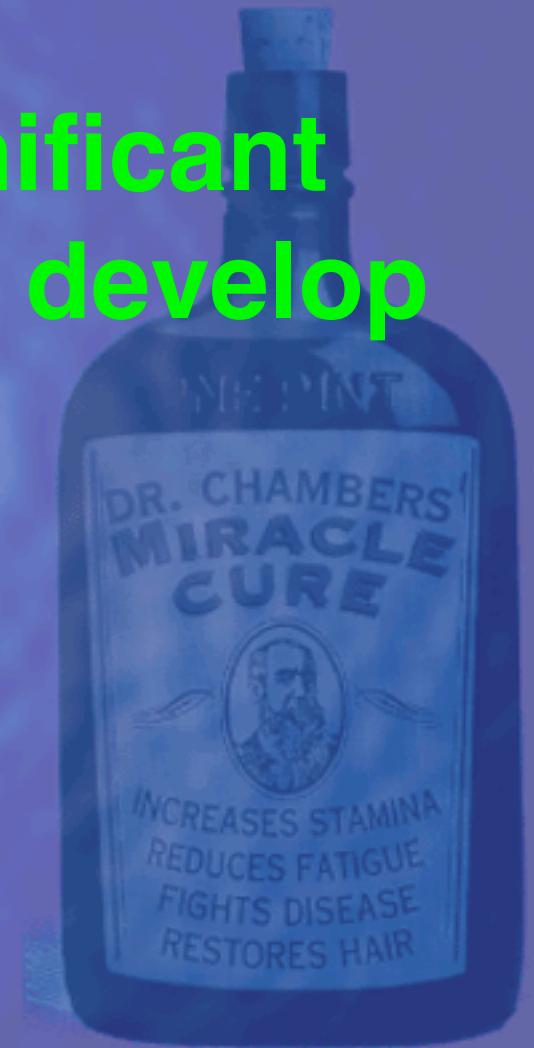


Where do resistant bacteria come from?



controlling resistance

- use drugs to which significant resistance is unlikely to develop
- infection control



4 yr old bull terrier

- **scratching ears**
- **previously treated**
 - broad spectrum antibiotics
 - steroids
 - acaricides



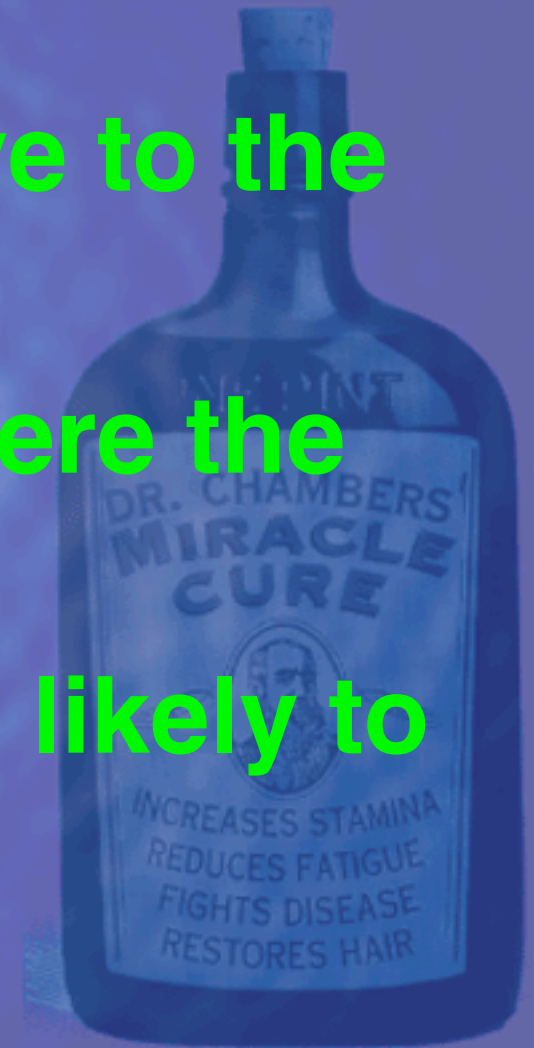


What do you do?



antibiotic treatment

- are the bacteria sensitive to the drug?
- does the drug get to where the bacteria are?
- is significant resistance likely to develop?



What do you do?

- check for generalised skin disease
- flush and check ear
- culture and sensitivity?
- parenteral antibiotics?
- parenteral steroids?
- non-antibiotic treatment?
- alter environment?



reducing resistance

- Choose a drug on resistance testing, where practicable.
- Use narrow spectrum antimicrobials whenever possible.
- Use the full effective dose for as short a period as possible.
- Isolate the patient (and wash your hands / gumboots!).
- Use antibacterials not prone to producing resistance.
- Restrict the prophylactic use of antimicrobials to high risk patients only.
- In chronic care patients, regularly (but not frequently) change antimicrobial drugs.
- With aminoglycosides, use the longest effective dosage interval.

