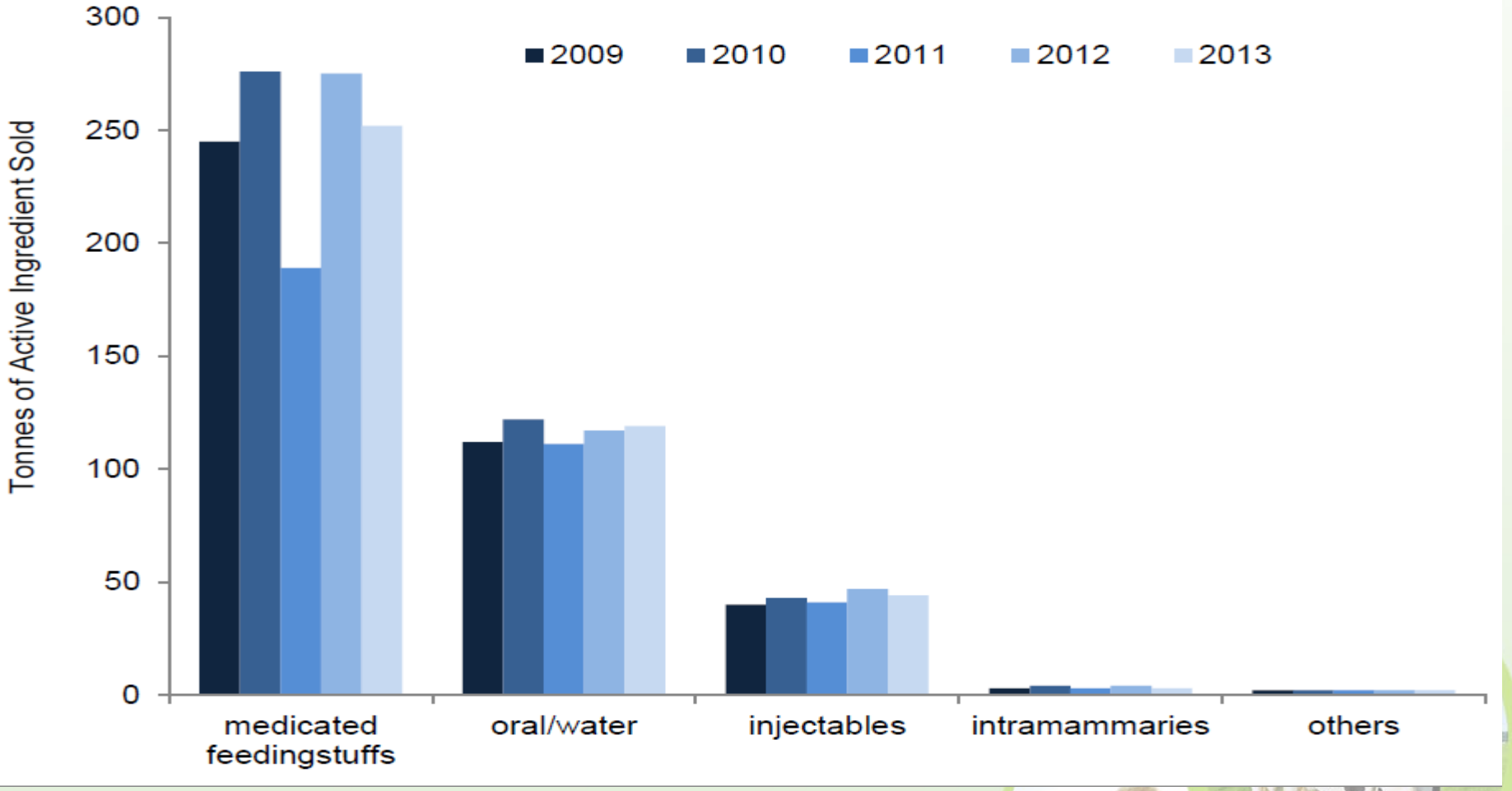
Targeted treatment for clinical mastitis

A Soil Association/Duchy Originals/

The Prince's Trust Field Lab

Peter Plate MRCVS
Endell Veterinary Group, Salisbury

Antibiotics in livestock – UK sales figures



Source: VMD

Five Year Strategy for Reducing Antibiotics 2013-2018

- ONE HEALTH APPROACH
- Seven key areas:
  1. **Improving infection prevention and control**
  2. **Optimising prescribing practice**
  3. **Improving professional training, education and public engagement**
  4. Developing new drugs, treatments and **diagnostics**
  5. Better access to and use of surveillance data
  6. Better identification and prioritisation of AMR research needs
  7. Strengthened international collaboration

Bacteriological Cure Rates of Bacteria in 2nd + Lactation Cows, adapted from Pinzon-Sanchez et al 2011

Bacterium	No Treatment	5 day treatment

Bacteriological Cure Rates of Bacteria (2nd + Lactation Cows)

Bacterium	No Treatment	5 day treatment
Staph aureus	0 %	20 %
CNS	55 %	75 %
Strep uberis	25%	65 %
E coli	75 %	85 %
Klebsiella	35 %	45 %
No growth	90 %	90 %

What has been done

- Previous field lab on reducing cell counts with ‘Uddermint’ (Zaralis, Waterfield, Padel)
- Work in the US and Canada on on-farm culture followed by selective treatment

US study design (Lago et al 2011)

- Eight conventional herds
- Herd sizes 144 to 1795 cows
- Yields 9545 to 12818 kg per cow per year
- SCC 182,000 to 535,000 cells/ml
- Four herds were using on farm culture before the study
- Random assignment of each case to either on farm culture or standard treatment
- Standard conventional treatment:
  - Cephapirin tube, two tubes 12 hours apart.
- Four days meat and milk withdrawal

US study outcomes (Lago et al 2011)

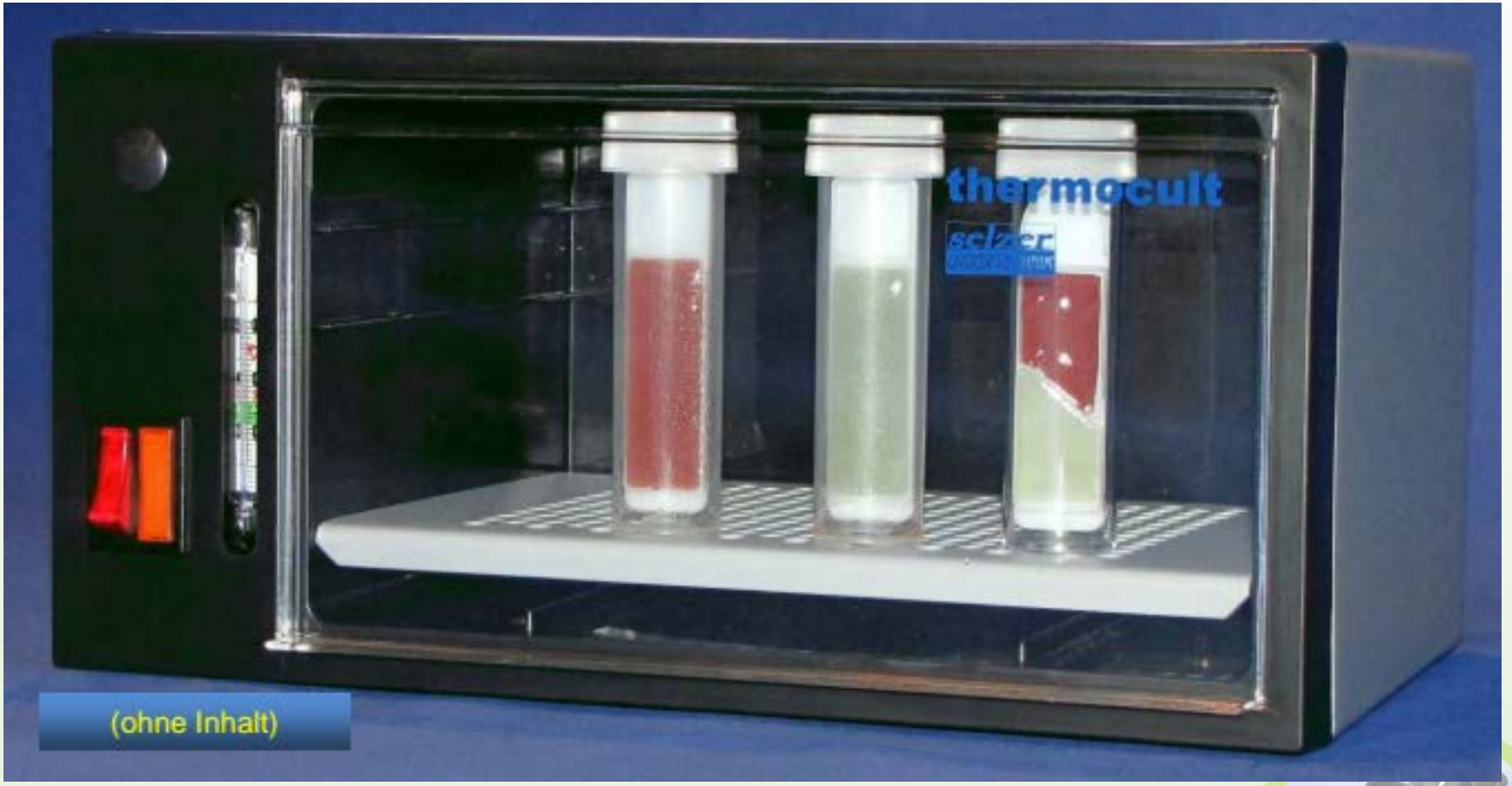
- Reduction of antibiotic usage by 50 %
- Trend towards earlier return to the bulk tank
- No significant differences in
  - Days to clinical cure
  - Percentage of bacteriological cure
  - Risk of new intramammary infection within 21 days
  - Treatment failure risk
  - Risk of recurrence in the same quarter
  - Linear somatic cell count
  - Daily yield
  - Risk of culling

Canadian work (MacDonald 2011)

- Used different test kit (3M Petrifilm)
- Small farms
- 82% correctly identified if at least one clinical case per month
- 64% if less than one case per month
- →overall lower probability of clinical cure and more days to clinical cure in culture group, but not in correctly diagnosed cases

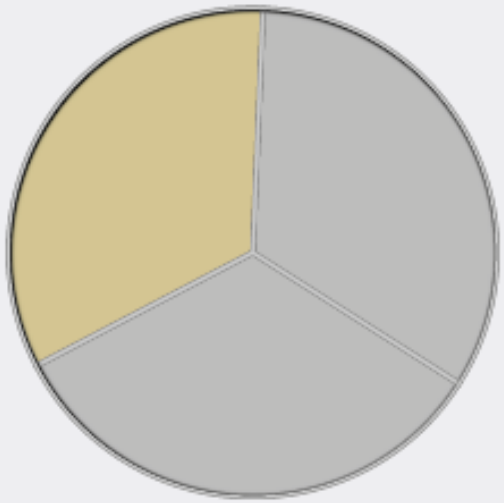
On-farm culture

- Only to be used for individual treatment decision
- For farm investigations your vet must be involved and an accredited lab must be used.
  - *Staph aureus* v coagulase negative *staphylococci*
  - *Strep uberis* v *Strep agalactiae*


thermocult
(ohne Inhalt)

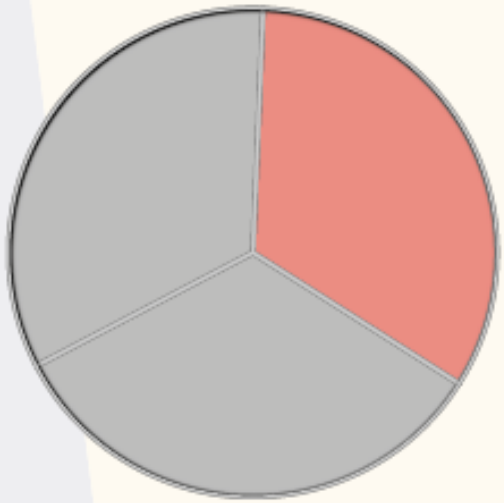
The Vetorapid on farm culture

Vetorapid dish compartments for bacterial identification:



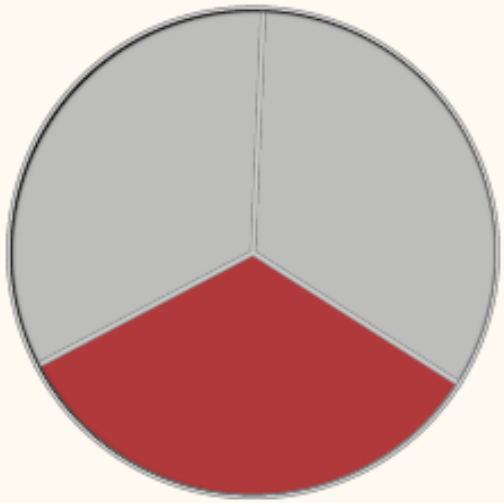
Section 1

Selective for Gram negative bacteria



Section 2

Selective for staphylococci



Section 3

Selective for streptococci and enterococci

Comparison with standard culture

TABLE 3: Comparison of hypothetical selective treatment choices for 68 cases of clinical mastitis based on results from milk samples cultured by standard laboratory culture and by 'VetoRapid' (Vétoquinol, Buckinghamshire, UK), a culture-based mastitis pathogen detection test kit

Treatment outcome based on '*Vetorapid*' test kit	Treatment outcome based on standard laboratory culture		
	Antimicrobials	No antimicrobials	Total
Antimicrobials	21	10*	31
No antimicrobials	2†	35	37
Total	23	45	68

Antimicrobial therapy was assigned only when a Gram-positive bacterium was isolated

*Plate result false positive for *Enterococcus* spp. (4), CNS (2), *Streptococcus uberis* (2), *Staphylococcus aureus* (*S. aureus*) and *S. uberis* (1), *Streptococcus dysgalactiae* (1)

†Plate result false negative for *S uberis* (1) and *S. dysgalactiae* (1)

CNS, coagulase-negative staphylococci

Viora et al 2014

Only mild or moderate cases (1 or 2) included in the trial

MASTITIS GRADES:

- Grade 1 (mild): milk changes only
- Grade 2 (moderate): milk changes plus inflammatory signs in the udder (heat, swelling, pain, redness)
- Grade 3: the above plus sick cow (depressed, off feed, dehydrated, temperature high or low, etc)

Trial protocol

Mild/moderate case of mastitis

Odd cow number

Even cow number

Culture

Gram +

Gram -, No growth

Treat with AB

Don't treat with AB

Treat with AB

Record details of drug usage, clinical cure, and time of milk withhold, monitor SCC

Outcomes

- Primary Outcomes
  - Antibiotic usage
  - Clinical cure rates
  - Recurrence rate
  - Cell counts for the remainder of the lactation

- Secondary Outcomes
  - Days to return to bulk tank
  - Economic cost benefit

Cost-benefit of on-farm testing

- Cost:
  - Price of kit and consumables
  - Cost of incubator
  - Time
- Benefit:
  - More saleable milk
- Wider benefits:
  - Better picture
  - More diagnostics
  - Less resistance
  - Less risk of residue failures

Cost of Mastitis

• Treatment cost (drugs + time)	£ 12.00
• Discarded milk (9 days, 20 l, 32ppl)	£ 57.60
• Reduced yield (5%/300l @ 25ppl margin)	£ 75.00
→Total direct cost	£144.60
• Cull cost	£900
• 10 % increased chance of cull (indirect cost)	£ 90
→TOTAL COST PER CASE	***£234.60***

Thank you to…

- The participating farmers and their vets
- Soil Association and Duchy Originals Future Farming Programme for funding and coordinating the field lab
- Kristen Reyher from Bristol University for helping with study design and statistics
- Vetoquinol for providing the Vetorapid test plates