Antimicrobial use in dairy cattle in New Zealand: evidence for change

Scott McDougall
UK Five Year Antimicrobial Resistance Strategy
2013 to 2018
NZVA aspirational statement (2015)

“By 2030 New Zealand Inc. will not need antibiotics for maintenance of animal health and wellness”
NZVA role in awareness & training

- NZVA policy statements
- Conferences, roadshows & webinars
- Species specific guidelines
Prescribing guidelines
Antimicrobials for first line therapy under therapeutic conditions
1. Procaine penicillin
2. Penethamate hydriode
3. Oxytetracycline

Antimicrobials restricted to specific indications or used as second line therapy under therapeutic conditions
1. Aminoglycosides
2. Semi-synthetic penicillins (ampicillin/clavulanic acid, cloxacillin)
3. 1st and 2nd generation cephalosporins
4. Lincosamides
5. Potentiated sulphonamides

Antimicrobials considered important in treating refractory conditions in human and veterinary medicine. These will only be used following veterinary diagnosis on a case by case basis with sufficient evidence to indicate need.
1. 3rd and 4th generation cephalosporins
2. Fluoroquinolones
3. Macrolides
Infection prevention & control

This section explains how to minimise mastitis and somatic cell counts on your farm using SmartSAMM.

SmartSAMM covers everything from what mastitis is and why it's important to the best ways to manage it on a seasonal basis and where to get help.

Get started today and improve udder health and milk quality:

- Use the Seasonal Approach to find better ways to minimise mastitis at each stage of lactation.
- Use the SmartSAMM Gap Calculator to work out the economic benefit of achieving your goals.
- Use Healthy Udder for quick tips and the right procedures to prevent, find and treat mastitis.
- Use Find an Advisor for links to trained professionals who can help improve mastitis and milking management in your herd.

Seasonal Approach

Calving

Lactation
Current usage by animal industries?

Antibiotic Sales Analysis

New Zealand Veterinary Journal, 2016

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Scientific Article

Use of antimicrobials for animals in New Zealand, and in comparison with... A survey of antimicrobial use in dairy cows from farms in four regions of New Zealand

Anti-microbial usage on Waikato dairy farms

by Chris Compton, Veterinarian, Project Manager, Cognosco, and Dr Scott McDougall, Veterinarian, Director, Cognosco
Antimicrobial usage in cattle in NZ
ADUR by indication (1,251 herd-seasons)

85% for mastitis
Veterinarian/farmer interactions
Milk quality review & Restricted Veterinary Medicines consultations

- Benchmark disease incidence & AM usage
- Identify over/inappropriate usage
  - Overall & by class
- Disease incidence ~ treatment use?
  - i.e. disease diagnosis sensitivity/specificity
- Animal health plans in conjunction with prescribing
- Develop an antibiotic usage action plan for the farm
# Stewardship plan

**Herd owner:**

**Supply number:**

**Email address:**

**Vet:**

**Date:**

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<th>Who</th>
<th>When by</th>
<th>Completion date</th>
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\(^1\) **SMART:** Specific, Measurable, Achievable, Realistic & Time bound
Plan examples

• Improved mastitis control
  – Develop & use on-farm treatment protocols
  – More culture & sensitivity
  – Improve teat antisepsis
  – Identify multiple repeat clinical cases & stop treating them
  – Improve culling rules
  – Teat seal heifers
  – Use of vaccines
Change in PCU (mg/cow/yr)

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<tr>
<td>Vet visit</td>
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P=0.06
Not affected by herd size or island
Point of care diagnostics
On-farm culture

General
Gram positive
Others
Coliforms

Strep uberis

Scientific Article

Antimicrobial usage and risk of retreatment for mild to moderate clinical mastitis cases on dairy farms following on-farm bacterial culture and selective therapy

S McDougall*, J Niethammer* and EM Graham*
Pyrexic (>40°C) and/or sick?  

- **Yes**: Immediate treatment with oxytetracycline & meloxicam  
  
  - **Blanket group?**  
    - **Yes**: 3 x 1g b.i.d. penicillin intram, or 3 x 5g s.i.d. penethamate i.m.  
    - **No**: Re assess at 48 hr  
    - **No growth or Gram -ve?**  
      - **Yes**: No treatment & observe  
      - **No**: Staph aureus?  
        - **Yes**: 3 x 200mg s.i.d. cloxacillin intram, or 3 x 5g s.i.d. tylosin i.m.  
        - **No**: 3 x 1g b.i.d. penicillin intram, or 3 x 5g s.i.d. penethamate i.m.
On-farm culture reduces antibiotic use

Culture-based $\ln ADD = 1.00$ (SEM 0.03) vs Standard $\ln ADD = 1.22$ (SEM 0.03)

$p=0.005$
Use of isolates from bulk tank milk for antimicrobials sensitivity testing

• Low proportion of infections sampled for culture & sensitivity
• Farmer perception of lack of timeliness, lack of value, and hence low benefit
• Hence sourcing isolates from the bulk tank milk
  – Reduces ‘hassle’ factor for vet/farmer
  – May provide a better estimate of MIC across herd
S. aureus

S. aureus, Penicillin

S. aureus, Cloxacillin

S. aureus, Ampicillin

S. aureus, Cefazolin

S. aureus, Tylosin

S. aureus, Amoxicillin/clavulanic acid

S. uberis

S. uberis, Penicillin

S. uberis, Cloxacillin

S. uberis, Ampicillin

S. uberis, Cefazolin

S. uberis, Tylosin

S. uberis, Amoxicillin/clavulanic acid
‘Selective’ dry cow therapy

• Intramammary infusion of antimicrobials “Dry Cow Therapy; DCT” is the most common indication for use of antibiotics in the dairy industry
• “Blanket” DCT is standard in many countries

• But not every cow is infected at dry off
• For uninfected cows, options include
  – No treatment
  – Internal teat sealants
The NZVA recognises that the use of DCT in non-infected cows is no longer appropriate in an era of effective alternatives such as internal teat sealants (ITS) and improved management practices.

By 2020, DCT (Dry Cow Therapy) will only be used in the treatment of existing intramammary infections.
DCT (dry cow antibiotics) for infected cows only.

This position is supported by:
TECHNOTE 14

Decide dry cow management strategy
Have we seen change in antimicrobial usage?
Dry cow approaches - 400+ farmers/annum

Was 70%, now 48% whole herd DCT

All cows DCT+ITS | All cows DCT | Part Combi, part DCT
--- | --- | ---
17 | 15 | 14
18 | 15 | 15

Was 27%, now 45% part herd DCT

Part Combi, part ITS | Part DCT, part ITS | Part DCT, part Nil | All cows Nil
--- | --- | --- | ---
4 | 7.2 | 6 | 3
12 | 5 | 2 | 2
19 | 3 | 5 | 6
9 | 18 | 17 | 17
14 | 15 | 17 | 3
10 | 2 | 5 | 6

<10% do Nil

Jane Lacy Hulbert et al 2020
Where to next?

• The relationship between AMU & AMR in animal industries?
  o Has reducing AMU resulted in reduced AMR?
  o Has there been any negative impacts of reduced AMU on animal welfare or disease outcomes?

• Effect of changes in animal management strategies (disease management and control, effluent management, stock movements et cetera) on AMU/AMR?
Summary & conclusions

• National Antimicrobial Resistance Action Plan in place (2017)
• Veterinary profession has taken a leadership role
• Increased awareness in veterinary & farming communities of AMU/AMR
• Evidence for changes in overall usage & prescribing patterns
Acknowledgments

• Farmers and staff involved in studies
• Lab & tech teams from Anexa/Cognosco
• DairyNZ
• Sustainable Farming Fund
Thanks

Questions?