



**Arwain DGC**  
Defnydd Gwrthficrobaidd Cyfrifol  
Responsible Antimicrobial Use

# Implementing a National Antimicrobial Stewardship Programme

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# Background

- Qualified as a vet 2009
- 6 years in farm and equine practice in Wales and New Zealand
- Teaching Fellow in population medicine at Bristol Vet School
- PhD Fellowship 2016-2019
- Post-doc – Diagnostic Innovation Agriculture & Livestock project
- Senior Research Associate – Arwain Vet Cymru
- Lecturer in Veterinary Science – Aberystwyth University
- Veterinary Development Manager – Menter a Busnes
- President – Welsh Branch of the British Veterinary Association



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# What do we know?



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**'It's cheaper than a dead cow': Understanding veterinary medicine use on dairy farms**

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**ARTICLE INFO**

**Keywords:**  
Dairy farming  
Veterinary medicine  
Ethnography

**ABSTRACT**

This study offers a detailed and original assessment of the practices of prescription veterinary medicine use on UK dairy farms. The emergence of antimicrobial resistance as a global threat has necessitated an increasing focus on medicine use in agriculture. While an abundance of studies have recently emerged to demonstrate and evaluate strategies for medicine reduction, this paper seeks to understand the context and the on-farm culture within which treatment practices occur on a sample of UK dairy farms. Arguing that the experiential knowledge, on-farm culture and informal information flows are as important as 'science' in the practice of treatment decision making and drawing on extensive participant observation fieldwork combined with semi-structured interviews, this paper identifies and discusses three key themes that develop and, in places, challenge our current understanding of farmer treatment practices. These areas - treatment knowledge and understanding, a duty of care and autonomy of treatment practice - are seen to have complex effects on the use of veterinary medicines in dairy cattle and, as such, highlight critical areas for further research and opportunities for policy interventions aimed at improving responsible medicine use.

ORIGINAL RESEARCH  
published: 04 September 2020  
doi: 10.3389/fvets.2020.00557

**frontiers**  
in Veterinary Science

**The Governance of UK Dairy Antibiotic Use: Industry-Led Policy in Action**

Stephanie Begemann <sup>1,2\*</sup>, Francine Watkins <sup>3</sup>, Ine Van Hoyweghen <sup>4</sup>, Roberto Vivancos <sup>5,6</sup>, Robert Christley <sup>2,7</sup> and Elizabeth Perkins <sup>8</sup>, University of Wageningen, Wageningen, Netherlands, <sup>2</sup> NHR-HPRU in Knowledge, Technology and Innovation Group, University of Wageningen, Wageningen, Netherlands, <sup>3</sup> NHR-HPRU in Emerging and Zoonotic Infections, Liverpool, United Kingdom, <sup>4</sup> Department of Public Health, Institute of Population Research, KU Leuven, Leuven, Belgium, <sup>5</sup> Field Service, Public Health England, Liverpool, United Kingdom, <sup>6</sup> Institute of Gastrointestinal Infections, Liverpool, United Kingdom, <sup>7</sup> Health Services Research, Institute of Psychology, Health and Society, University of Liverpool, Liverpool, United Kingdom, <sup>8</sup> Institute of Infection, Veterinary and Ecological Sciences, University of Liverpool, Liverpool, United Kingdom

**OPEN ACCESS**

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**Reviewed by:**  
Gwen Rees, Gardner University, United Kingdom  
Lisa Boden, University of Edinburgh, United Kingdom  
Dominic George Duckett, The James Hutton Institute, United Kingdom

This article analyses the progress made in the UK with regard to tackling antibiotic misuse and overuse in food-producing animals. Moving beyond statistical realities, the paper examines how the UK's industry-led policy approach is shaping practice. Using a multi-sited ethnography situated in Actor Network Theory and Callon's sociology of markets, the UK dairy supply chain policies and practices were studied. Findings reveal that dairy industry policies only partially address the complex network of people, animals, and the environment in which dairy antibiotics circulate. Antibiotic "misuse and overuse" in agriculture is far from a behavioural matter, with solely farmers and veterinarians to blame. Instead, antibiotic use in food animals is embedded in complex economic

**antibiotics**

**Article**  
**'Brave Enough': A Qualitative Study of Veterinary Decisions to Withhold or Delay Antimicrobial Treatment in Pets**

Ri O. Scarborough <sup>1,2,\*</sup>, Anna E. Sri <sup>1,2</sup>, Glenn F. Browning <sup>1,2</sup> , Laura Y. Hardefeldt <sup>1,2</sup> and Kirsten E. Bailey <sup>1,2</sup>

<sup>1</sup> Asia-Pacific Centre for Animal Health, Melbourne Veterinary School, University of Melbourne, Parkville, VIC 3010, Australia

<sup>2</sup> National Centre for Antimicrobial Stewardship, Peter Doherty Institute, Parkville, VIC 3052, Australia

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**Abstract:** Veterinarians sometimes prescribe antimicrobials even when they know or suspect that they are unnecessary. The drivers of this behaviour must be understood to design effective stewardship interventions. Semi-structured interviews were conducted with 22 veterinarians from companion animals in Australia. The Theory of Planned Behaviour was used to interview themes, focusing on a decision to withhold antimicrobial therapy in the absence of a clear indication. Many background factors influenced antimicrobial-withholding decisions, including the veterinarian's communication skills, general attitudes towards antimicrobial resistance (AMR), habits and energy levels. Client awareness of AMR and the veterinarian-client relationship were also important. Beliefs about the consequences of withholding antimicrobials (behavioural beliefs) were dominated by fears about the animal's condition deteriorating and of failing to meet client expectations. These fears, weighed against the seemingly distant consequences of AMR, were major barriers to withholding antimicrobials. Normative beliefs were primarily focused on the expected approval (or disapproval) of the client and of other veterinarians. Control beliefs about the difficulty of withholding

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# THE FUTURE...



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**Regulatory change works**

**Removing the antibiotic works**

**Voluntary reduction CAN work if:**

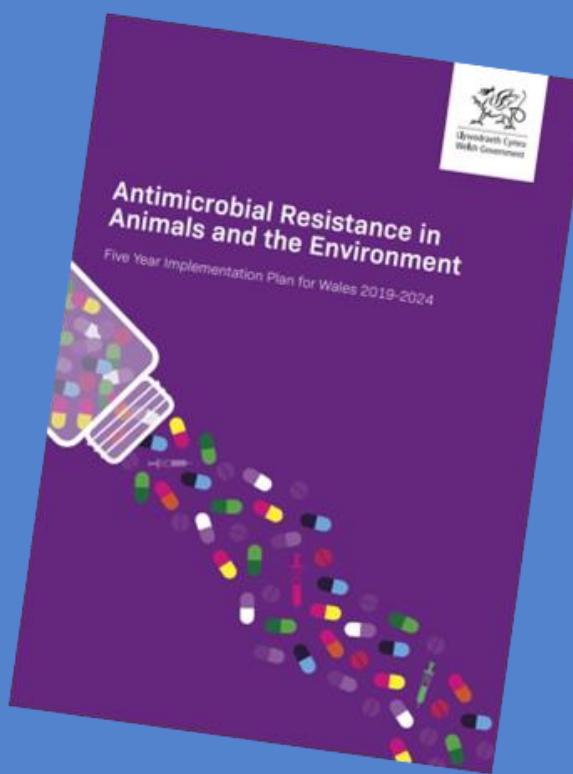
- Rooted in theoretical understanding of behaviour
- Participatory and co-designed
- Addresses intrinsic and extrinsic motivation
- Works best ALONGSIDE favourable policy and regulatory frameworks



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# In the beginning...



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# The Journey



## Arwain DGC

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### 2023 Arwain DGC2

Continue to expand on all workstreams

### 2021 Arwain DGC

AMU and AMR surveillance  
Develop clinical guidelines and a code of conduct

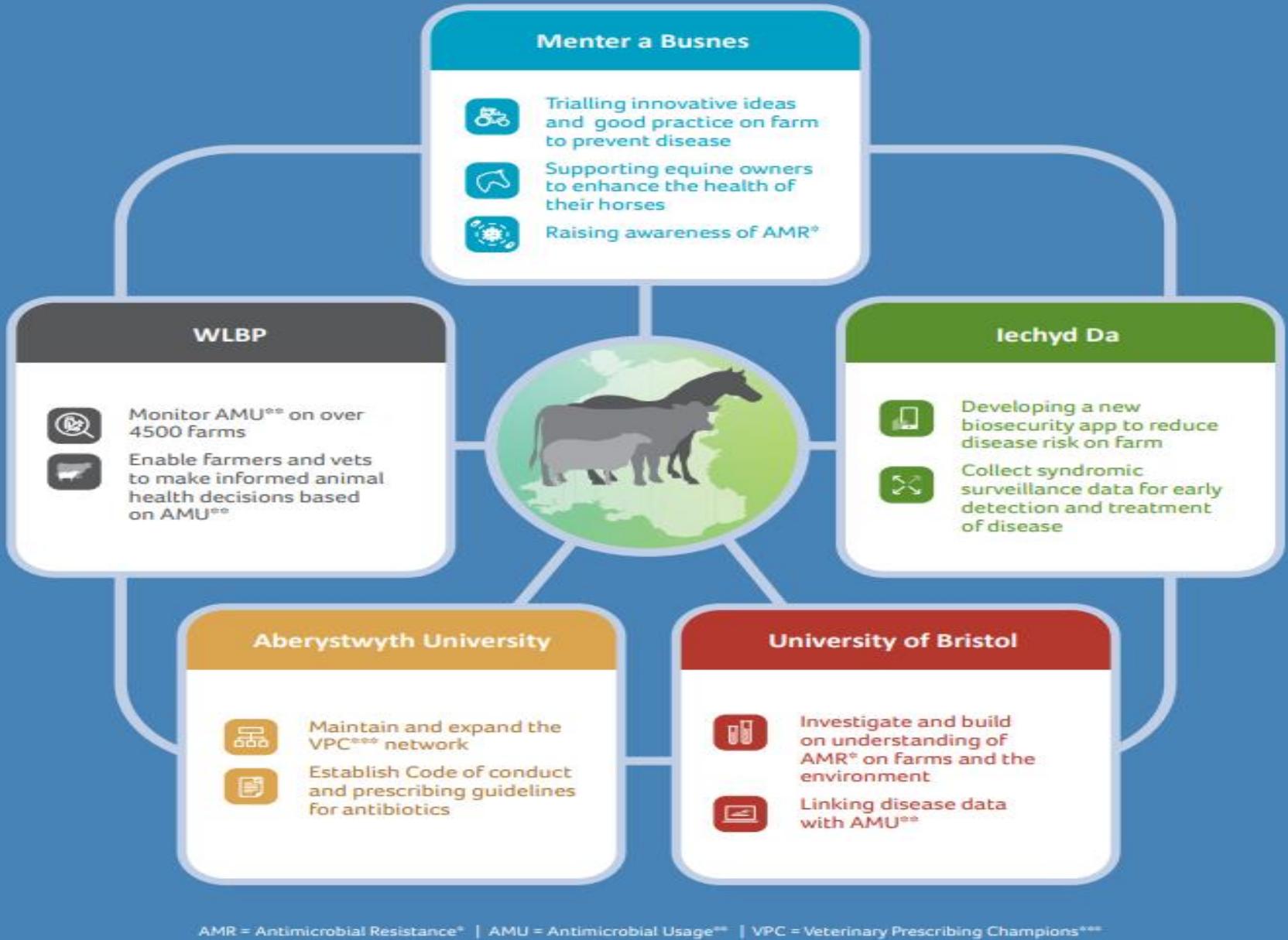
### 2019 Arwain Vet Cymru

Establish the Veterinary Prescribing Champions Network

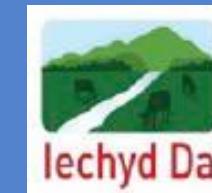
2016

Vets in practice agree policy on responsible medicine use





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Connecting industry experts, researchers, farmers and vets  
to lead the way in responsible antimicrobial use in Wales



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## Aberystwyth University



Expanding the successful Veterinary  
Prescribing Champions network



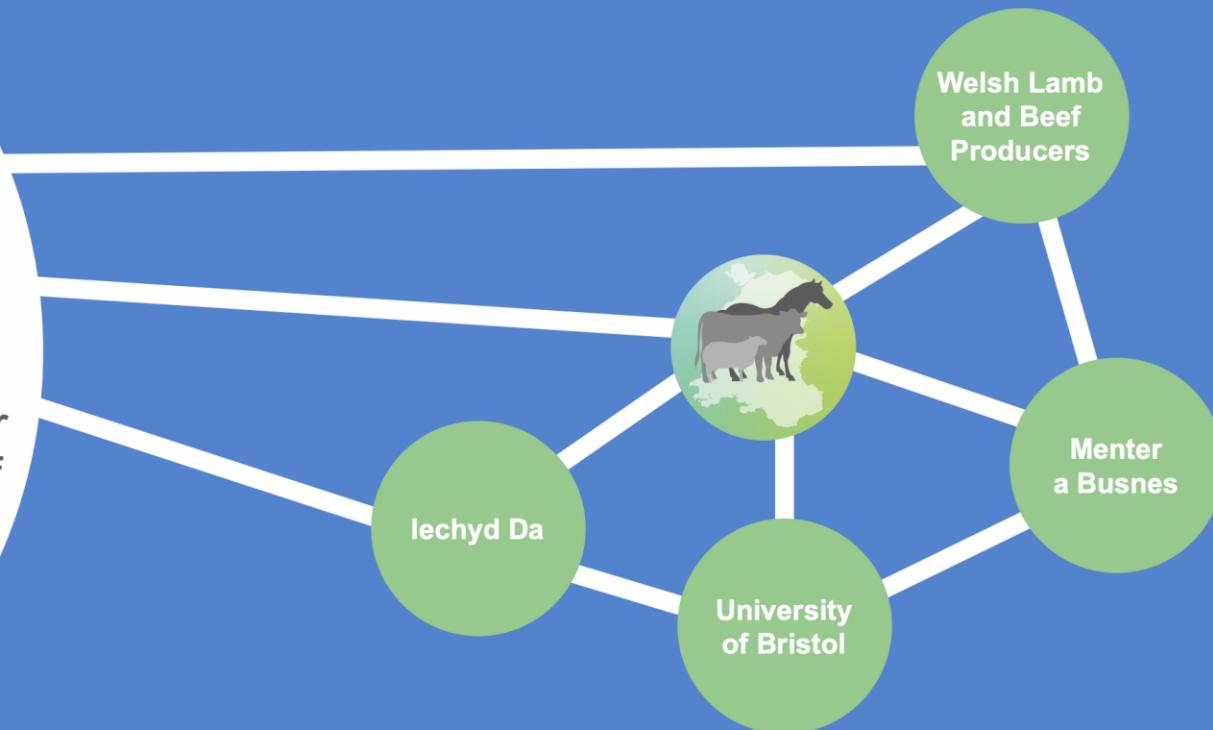
Developing collaborative clinical guidelines for  
cattle and sheep vets and a voluntary code of  
conduct for veterinary prescribing



Researching the use of  
antibiotics in the Welsh  
equine industry



AM = Antimicrobial  
Amanir gan  
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AMU = Antimicrobial Usage  
AMR = Antimicrobial Resistance  
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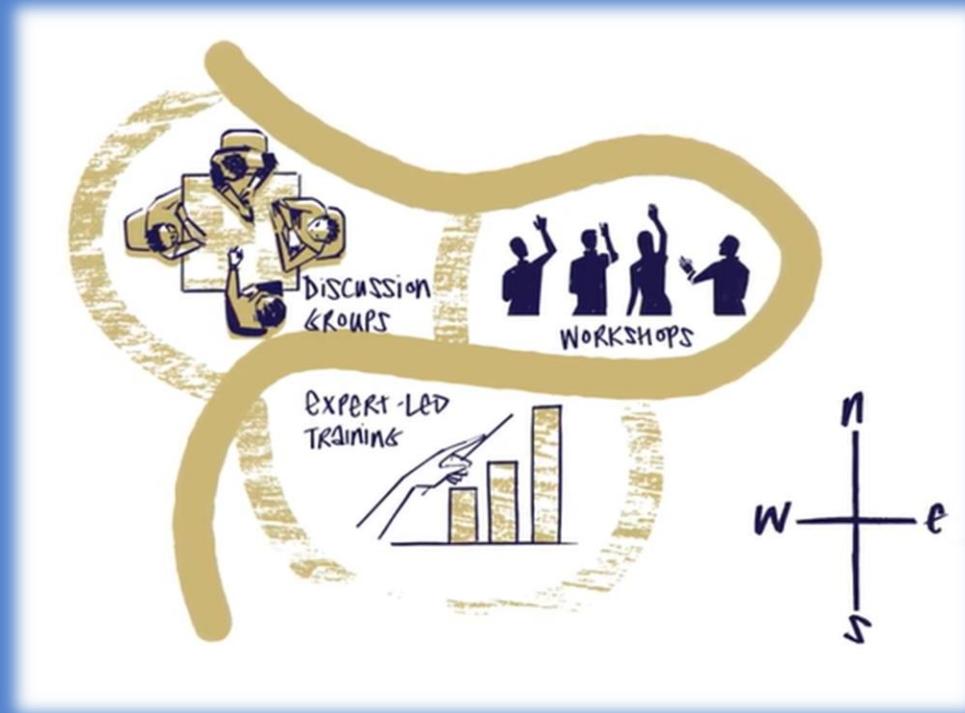


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# Veterinary Prescribing Champions Network



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Develop a national collaborative network of highly motivated and trained vets

One vet from each farm or mixed practice in Wales invited: '*Veterinary Prescribing Champion*'

Role to be a responsible prescribing champion and practice prescribing lead



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## VPC Network

49 Practices  
44 sub-branches  
34 Wales  
10 England

62 VPCs  
2 Working Groups



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Cefnogi Defnydd Gwrthfiotig Cyfrifol  
Supporting Responsible Antibiotic Use

## Lleoliad Pencampwyr Presgripsiynu Milfeddygol Veterinary Prescribing Champions Locations

### Allwedd | Key

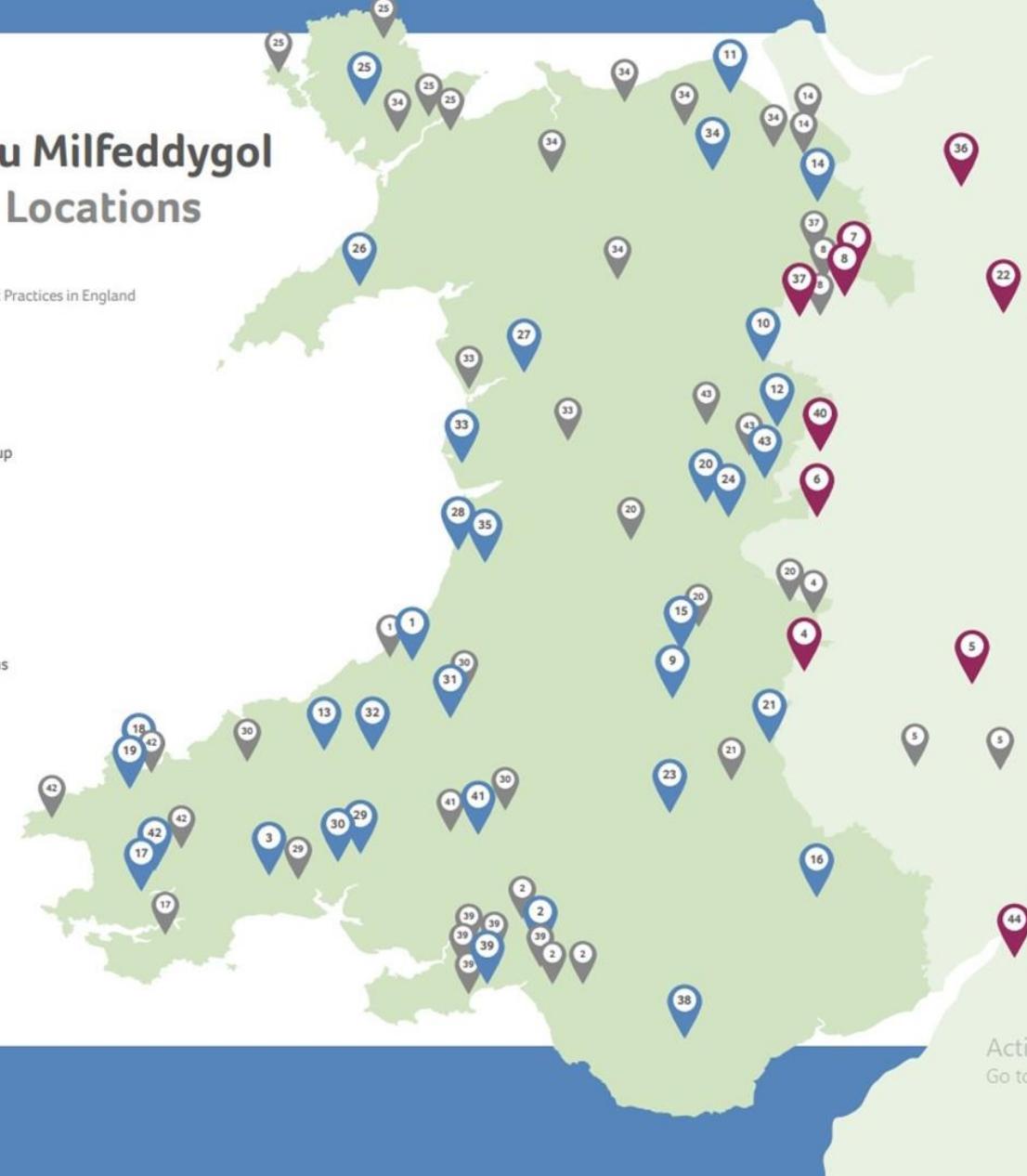
Prif Milfeddygfa | Main vet practice   Is-ganghennau | Sub-branches   Milfeddygfa yn Lloegr | Vet Practices in England

### Milfeddygfeydd | Vet Practices

1. Aeron Vets
2. Afon Veterinary Centre
3. Allen & Partners Veterinary Services Ltd
4. Arrowfield Veterinary Practice Ltd
5. Belmont Farm & Equine Vets
6. Bishops Castle Vets
7. Blakemere Veterinary Centre
8. Brownlow Veterinary Group
9. Builth Wells Veterinary Practice
10. Cain Farm Vets
11. Calcoed Vets
12. Camlas Farm Vets LLP
13. Castle House Veterinary Practice
14. Daleside Veterinary Group
15. Ddole Road Veterinary Clinic
16. Farm First Vets
17. Fenton Vets
18. Fishguard Veterinary Services Ltd
19. Gwaun Veterinary Group
20. Hafren Veterinary Group
21. Hay Veterinary Group
22. Haywood Farm Vets
23. Honddu Veterinary Practice Ltd
24. Kerry Vale Vets
25. Milfeddygon Bodrwnsiwn Veterinary Group
26. Milfeddygon Deufor
27. Milfeddygon Dolgellau Cyf
28. Milfeddygon Downes Veterinary Services
29. Milfeddygon Ffwrn Dyfed Farm Vets
30. Milfeddygon ProStock Vets
31. Milfeddygon Steffan Vets
32. Milfeddygon Tysul Vets
33. Milfeddygon Williams Veterinary Surgeons
34. Milfeddygon y Wern Veterinary Surgeons
35. Milfeddygon Ystwyth Vets
36. Nantwich Farm Vets LLP
37. Park Issa Veterinary Hospital
38. South Wales Farm Vets
39. St James Veterinary Group
40. Stapeley Veterinary Practice Ltd
41. Teilo Vets Ltd
42. The Oak Veterinary Group
43. Trefaldwyn Vets
44. Tyndale Farm Veterinary Practice

Correct as at April 2023.

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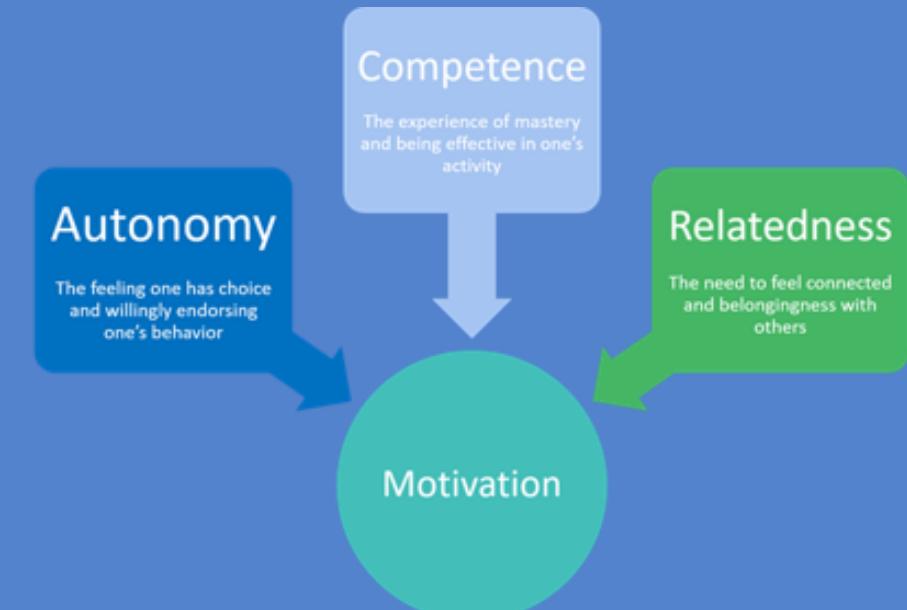
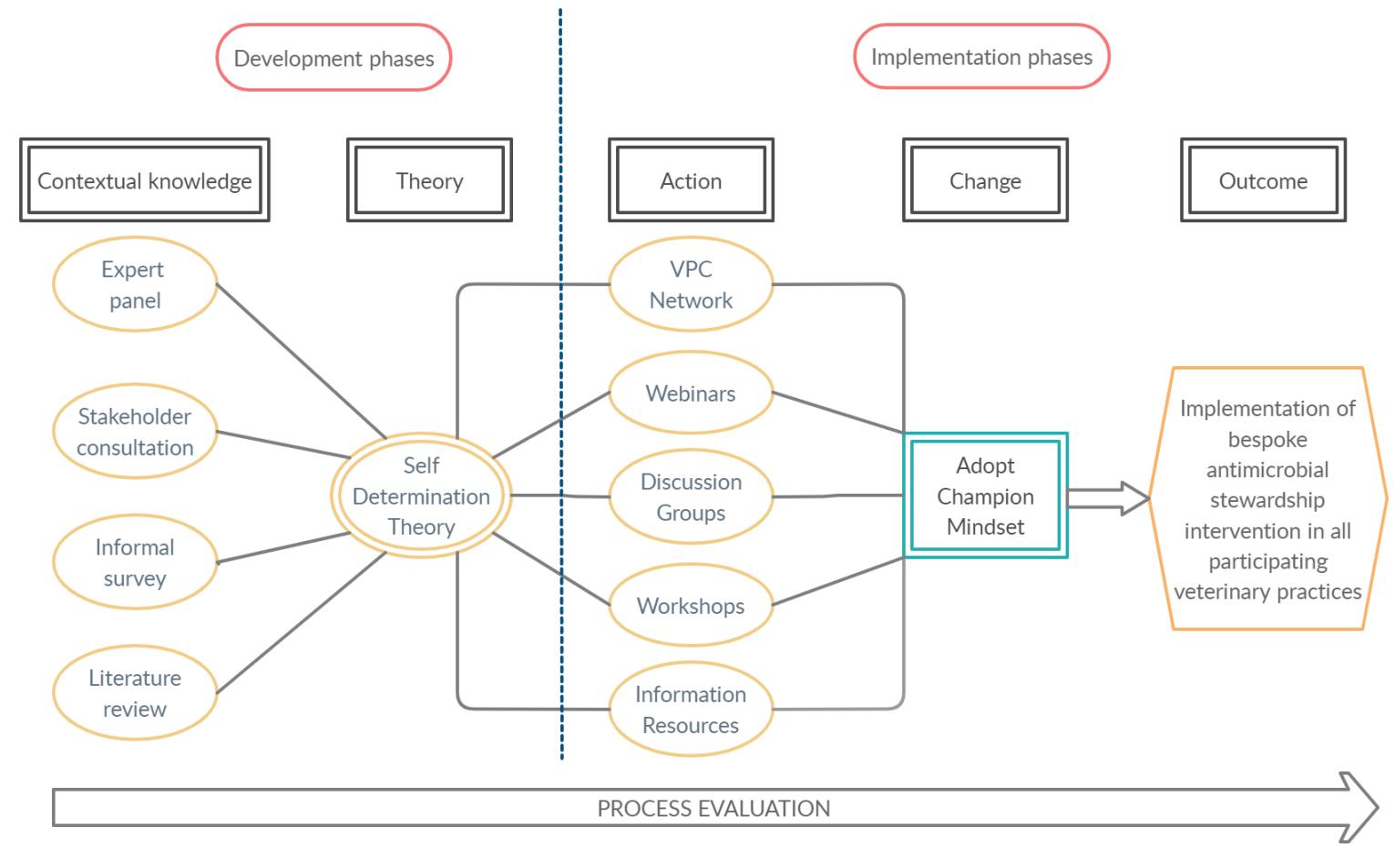


Activia  
Go to Se

# Theory and implementation



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# Training and CPD



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Home > VPC Training Webinars

### VPC Training Webinars

Here you can watch recordings of the VPC Webinars:

WLBP AMU Calculator Webinar (WLBP)

WLBP's solution:

(1) Develop a web-based database & calculator that:  
• Standardises veterinary prescription and sales data  
• Uses BOMS cattle data including age, time on farm, breed  
• Develop an algorithm to recommend use based on industry and government guidelines  
• Present standardised data on antibiotic use of mg/kg  
(2) The calculation can be done with the vet during the FAWL scheme Annual Health and Welfare Review

Arwain DGC  
February 3, 2017  
Hyfforddiant AMR  
AMR Training

Digwyddiad gwyth yn Aberystwyth yr wythnos hon gyda Brian Faulkner yn hyfforddi rhai o'r derbyniadion/staff blaen y o bractisau ein Pencampwyr Presgripsiynu Mifleddygol (VPC).... See more

AMR Trainer  
AMR Training

A great event in Aberystwyth this week with Brian Faulkner training some of the receptionists/front of house staff on practices for our International Prescription Champions (VPC).... See more

Hide Translation - Rate this translation

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## Discussion Groups Webinars Workshops

- **Specific disease / sub-sector information**
  - *BVD, mastitis*
  - *Clinical forum (routine surgery)*
  - *Sheep lameness and common ailments*
- **Health management systems**
  - *AMU calculator and FAWL*
  - *WVSC and surveillance*
  - *Alternative medicine*
- **Client management**
  - *Front of house and client liaison*
  - *Facilitating / motivating change*
  - *Vet peer : peer workshops*

# Antibiotic Action Plans



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**Arwain DGC Initiative**

**Creating your prescribing champion strategy**

**Meeting goal:** To enable you to explore and discuss practical antimicrobial stewardship options with fellow prescribing champions.

**Meeting task:** To consolidate what you have learnt so far in Arwain DGC by creating and recording your own choice of practical strategy – an Action Plan - you and your practice can implement from September 2022.

**What will you do to reduce, rationalise and replace antimicrobial use (prescribed and administered) in your daily work as a vet? How will you achieve this?**

**Specific** – what exactly are you going to change and how, be as precise as you can

**Measurable** – How will you and your colleagues know it has worked, had an impact or has been achieved? Can you quantify or qualify this?

**Achievable** – Make sure it is realistic and within you/your practices remit in the timescale

**Relevant** – Keep focused on the task of antibiotic stewardship

**Time-bound** – Give you and your colleagues a date by which you will have partially or fully implemented your strategy

**Assignable** – Give you and your colleagues tasks to be responsible for so you can achieve your plan

Please complete this worksheet and return it by 7<sup>th</sup> September 2022 to [alb142@aber.ac.uk](mailto:alb142@aber.ac.uk)

VPC co-created recommendations for responsible prescribing

**Ca. 100** antimicrobial stewardship interventions underway

## “Education – Data – Dispensing”

- Reorganisation of practice dispensaries
- Training practice staff to ensure consistent messaging
- Increased use of rapid, point of care diagnostics
- Benchmarking antimicrobial use on practice farms
- Introducing on-farm medicine cupboard “health checks”



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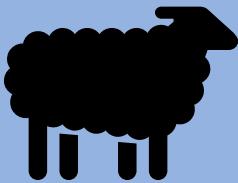
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# Clinical Guidelines

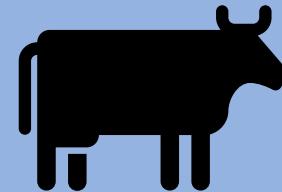
Co-develop series of guidelines to help decision-making

Profession led: 6 VPC working group members  
2 literature reviews + clinical experience

## Clinical prescribing guidelines 6 key sheep and cattle diseases



Watery Mouth  
Joint III  
Lameness



Bovine Respiratory Disease  
Neonatal scours  
Mastitis / SDCT



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“To inform, rather than teach”

“Clinical freedom is important”



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# Clinical Guidelines – For Practices



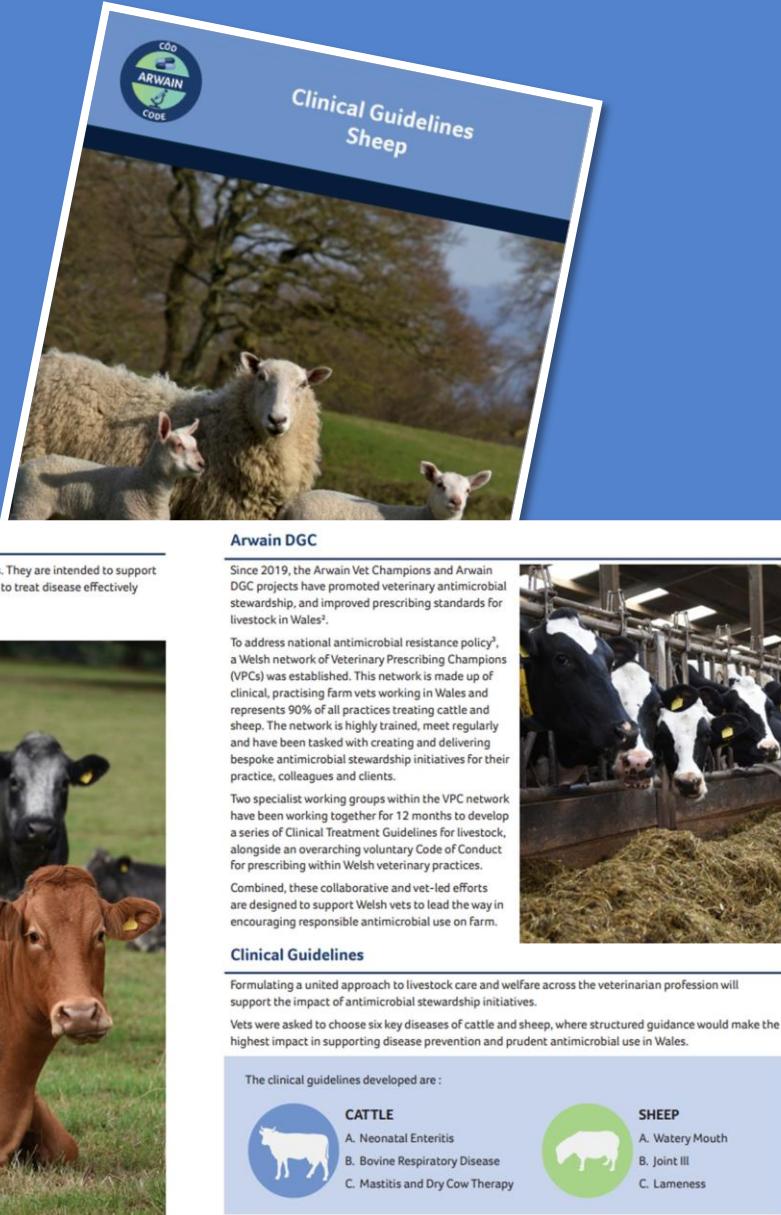
**Clinical Guidelines  
Cattle**

**Introduction**

These guidelines were produced by vets working with farm animals in Wales. They are intended to support vets working in Wales with clinical decision-making, helping the profession to treat disease effectively and use antimicrobials responsibly.

**Antimicrobials and Threat of Resistance**

Antimicrobials, and particularly antibiotics, have been an essential tool for treating bacterial infections in animals and humans for nearly 80 years<sup>1</sup>. This has radically improved treatment outcomes, alongside patient health and welfare. It's now very difficult to imagine daily life in a pre-antibiotic world. However, bacteria can rapidly reproduce billions of cells at an infection site. A spontaneous mutation in any one of these cells could make it resistant to an antibiotic. This bacterial cell could survive and produce more offspring with the same characteristics. Indiscriminate antibiotic use encourages drug resistance, since bacteria are exposed more frequently to the medicines used to treat them. It is therefore unsurprising that antimicrobial growth promoters are banned, whilst restrictions on veterinary prophylactic and metaphylactic use are being considered. However, the "golden age" of antibiotic discovery ended some 30 years ago. Very few novel antimicrobials are under development for commercial use. As a vet, how would you support animal health without antimicrobials? How would the health and welfare of your family be impacted without access to effective antibiotics? Vets have the authority to prescribe antibiotics, and a responsibility to prescribe them prudently. Together, we need to conserve the antibiotics we have remaining for future use.



**Clinical Guidelines  
Sheep**

**Arwain DGC**

Since 2019, the Arwain Vet Champions and Arwain DGC projects have promoted veterinary antimicrobial stewardship, and improved prescribing standards for livestock in Wales<sup>2</sup>. To address national antimicrobial resistance policy<sup>3</sup>, a Welsh network of Veterinary Prescribing Champions (VPCs) was established. This network is made up of clinical, practising farm vets working in Wales and represents 90% of all practices treating cattle and sheep. The network is highly trained, meet regularly and have been tasked with creating and delivering bespoke antimicrobial stewardship initiatives for their practice, colleagues and clients.

Two specialist working groups within the VPC network have been working together for 12 months to develop a series of Clinical Treatment Guidelines for livestock, alongside an overarching voluntary Code of Conduct for prescribing within Welsh veterinary practices. Combined, these collaborative and vet-led efforts are designed to support Welsh vets to lead the way in encouraging responsible antimicrobial use on farm.

**Clinical Guidelines**

Formulating a united approach to livestock care and welfare across the veterinarian profession will support the impact of antimicrobial stewardship initiatives. Vets were asked to choose six key diseases of cattle and sheep, where structured guidance would make the highest impact in supporting disease prevention and prudent antimicrobial use in Wales.

The clinical guidelines developed are:

<b>CATTLE</b> A. Neonatal Enteritis B. Bovine Respiratory Disease C. Mastitis and Dry Cow Therapy	<b>SHEEP</b> A. Watery Mouth B. Joint Ill C. Lameness
------------------------------------------------------------------------------------------------------------	----------------------------------------------------------------



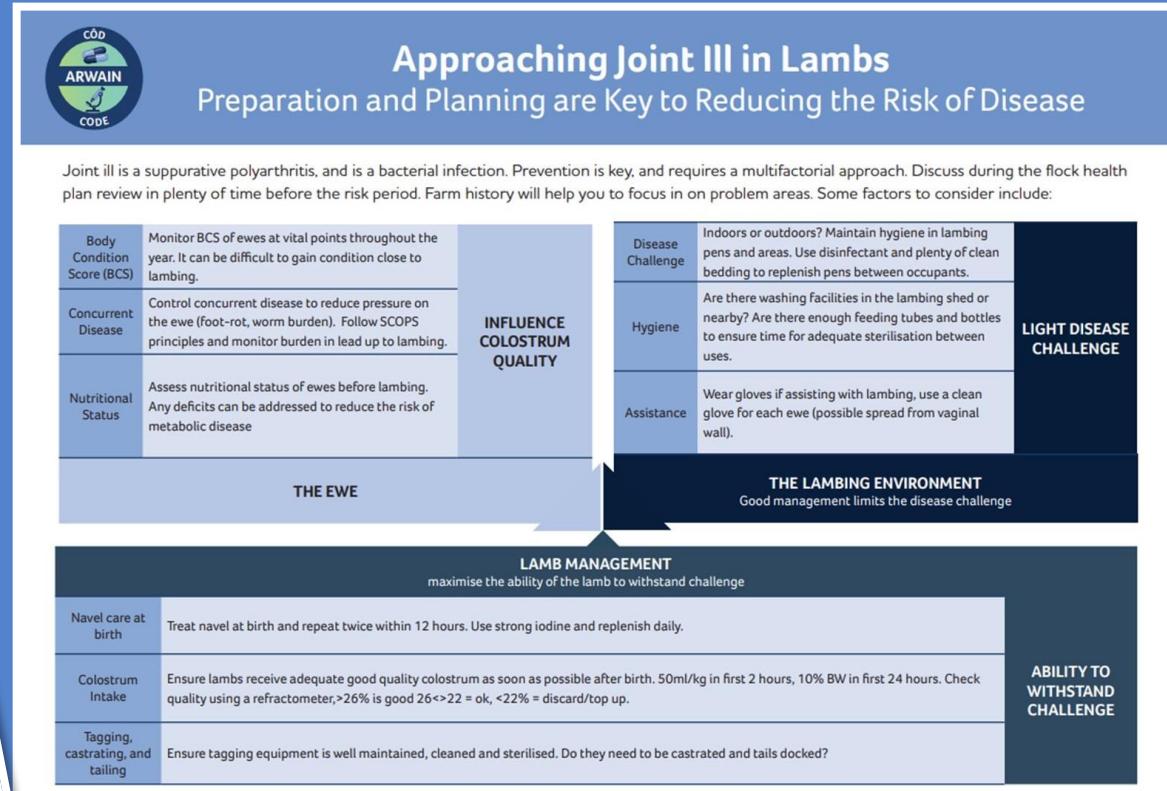
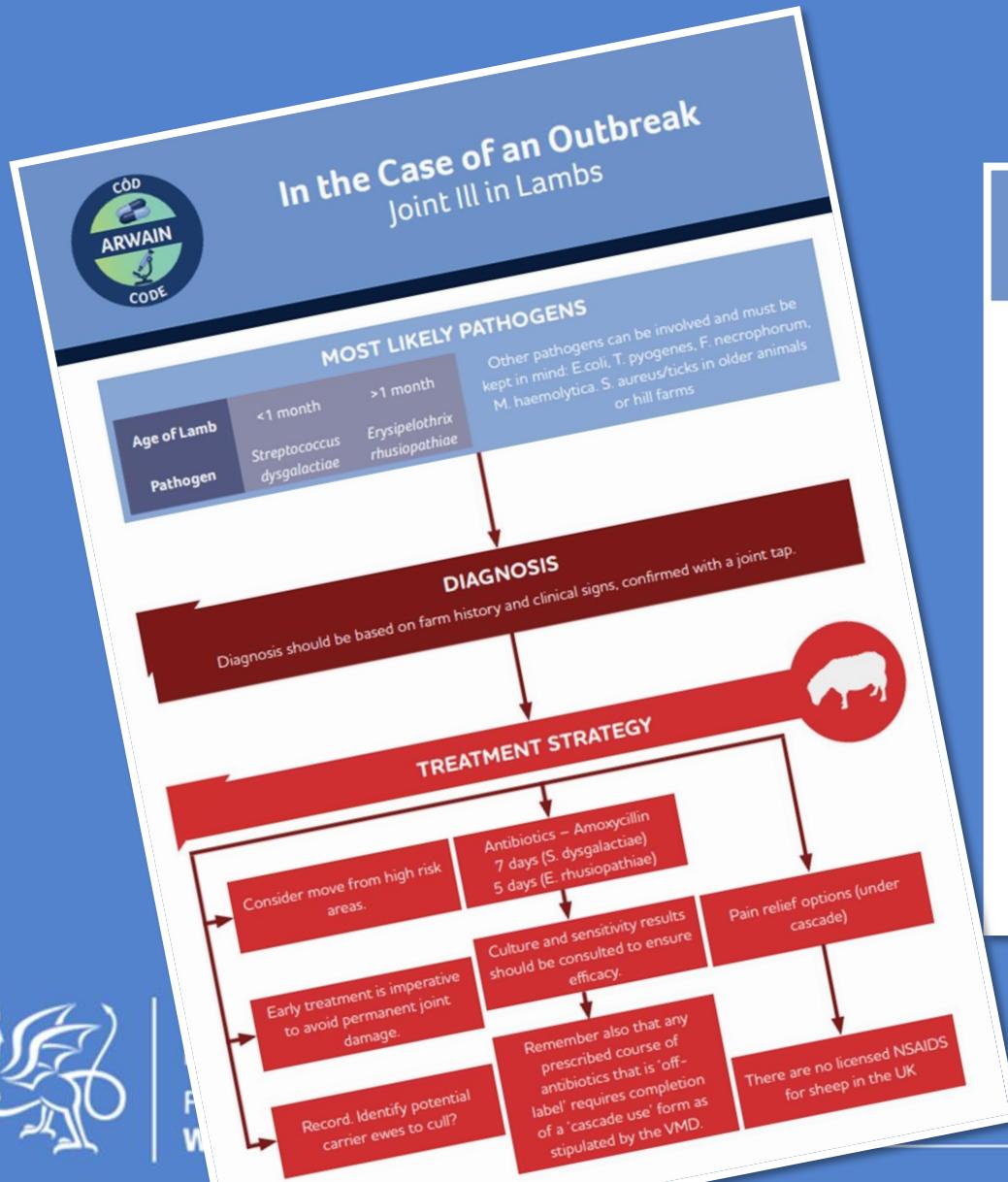
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- Aetiology
- Risk factors
- Prevention
- Diagnosis
- Treatment

# Clinical Guidelines – For Vets



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# Clinical Guidelines – For Farms



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**Calf Scour Treatment Plan**

**ARWAIN CODE**

Farm Name: \_\_\_\_\_  
Vet Name: \_\_\_\_\_  
Vet Contact: \_\_\_\_\_

**Mild Cases**

Definition: \_\_\_\_\_

Give supportive treatment and monitor regularly

Oral Rehydration

On this Farm Use \_\_\_\_\_

Dose \_\_\_\_\_ Frequency \_\_\_\_\_ Withdrawal \_\_\_\_\_

**Pain Relief / NSAID**

On this Farm Use \_\_\_\_\_

Dose \_\_\_\_\_ Frequency \_\_\_\_\_ Withdrawal \_\_\_\_\_

**Other**

On this Farm Use \_\_\_\_\_

Dose \_\_\_\_\_ Frequency \_\_\_\_\_ Withdrawal \_\_\_\_\_

**Severe Cases**

Definition: \_\_\_\_\_

Consult with vet where possible – likely to require IV fluids

Otherwise treat as for mild cases plus:

**Antibiotic**

First choice antibiotic \_\_\_\_\_

Dose \_\_\_\_\_ Frequency \_\_\_\_\_ Withdrawal \_\_\_\_\_

Second choice antibiotic \_\_\_\_\_

Dose \_\_\_\_\_ Frequency \_\_\_\_\_ Withdrawal \_\_\_\_\_



# Code of Conduct



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- Core Prescribing Practice**
  - All farms should have a named CCP who can prescribe*
  - Regular in depth animal health reviews*



- Under Care definition**
  - Agreement between CPP and non-CPP*
  - No POM-V outside this agreement*



- Defining responsible use**
- Engaging with client**
- Holistic approach to treatment and prevention**
- Audit and Review**



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# CODE OF CONDUCT

## This code of conduct has been developed by Welsh farm vets, for Welsh farm vets.

This Code of Conduct is a voluntary agreement by leading veterinary practices in Wales, aimed at supporting responsible medicines use in cattle and sheep.

Veterinary practices who sign up to the Code of Conduct demonstrate their commitment to responsible medicine use, to tackling the global challenge of antibiotic resistance, and to ensuring that the Welsh veterinary profession leads the way on prescribing.

This code should be read alongside the supporting document, which outlines in more detail what is expected by practices under this code.

For further information on the development of this Code of Conduct, please visit:  
<https://menterabusnes.cymru/arwaindgc/resource-hub/>

### The Code – Overarching Values:

- This practice will only prescribe medicines to farms where the practice is identified as the Core Prescribing Practice (CPP) for that farm or species, or where the CPP has been notified that the prescription is taking place.
  - This practice will use the Arwain Defnydd Gwrthficroaidd Cyfrifol - Responsible Antimicrobial Use Code of Conduct definition of "Under Care" when considering prescribing to animals.
  - This practice will prescribe all veterinary medicines responsibly. Use needs to be justified, targeted, involve engaging the client effectively and reviewing and reporting outcomes as necessary.
  - This practice will always consider the risks of antibiotic resistance when making prescribing decisions and will only prescribe antibiotics when the veterinary surgeon considers that the benefits of using them outweigh the risks.
  - This practice has a Veterinary Prescribing Champion who acts as the clinical prescribing lead for the practice. This Veterinary Prescribing Champion (VPC) is
- PRACTICE PARTNER/CLINICAL DIRECTOR  
SIGNATURE(S)**
- 
- DATE** \_\_\_\_\_
- ARWAIN DGC PRESCRIBING LEAD  
SIGNATURE**
- 
- DATE** \_\_\_\_\_



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## Supporting Guidance



# The next steps



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## Clinical guidelines

- Update and incorporate feedback
  - Suggest further key diseases
- Include treatment selection guidance where possible

## Code of Conduct

- Support adoption and implementation across Wales
- Refine and align with changing UK regulation
  - Longer term: assess impact on AMU

## Stewardship

Examine effectiveness and feasibility of stewardship initiatives

Develop similar model for companion animal practice



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**RESEARCH ARTICLE**

**Validation, visibility, vagueness and variation: A qualitative assessment of existing veterinary guidelines for antimicrobial use in cattle and sheep in the UK**

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**Abstract**

Antimicrobials are essential in veterinary medicine to treat and control bacterial disease in animals. Their prudent use in food-producing animals has been encouraged to reduce the development and spread of antimicrobial resistance. National and international guidelines for responsible antimicrobial use have been developed as tools to guide and rationalise antimicrobial prescribing decisions by veterinarians and usage decisions by farmers. Yet, there is little understanding of whether these existing guidelines are fit for purpose. Accordingly, this study rigorously assessed 128 veterinary guidelines for antimicrobial use in ruminants in the UK, following established qualitative methodologies. Findings revealed four pertinent themes: validation of the veterinarian as the prescriber, visibility of responsible use realities, vagueness in interpretation and variation in directing behaviour. These themes encompassed the roles and responsibilities of the veterinarian and the realities of prescribing scenarios, alongside concerns relating to the specificity within and variation between guidelines. Resultant recommendations to inform and support the future development of guidelines include establishing species-specific and disease-specific guidelines, expanding guidelines to include disease prevention measures, including definitions to resolve vagueness and promoting congruence in interpretation, encouraging the development of practice-level guidelines to endorse collaboration and ownership, and fostering active working between stakeholders to align priorities and messaging.



# Lessons learned



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Responsible Antimicrobial Use

Participatory co-creation requires time and effort

Giving vets control = losing control

Farm animal formulary = the holy grail!

Timing is everything

Working together is greater than the sum of its parts



“All singing from the same hymn sheet”



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# Diolch yn fawr!



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Responsible Antimicrobial Use

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