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SPRING 2017

Livestock MATTERS

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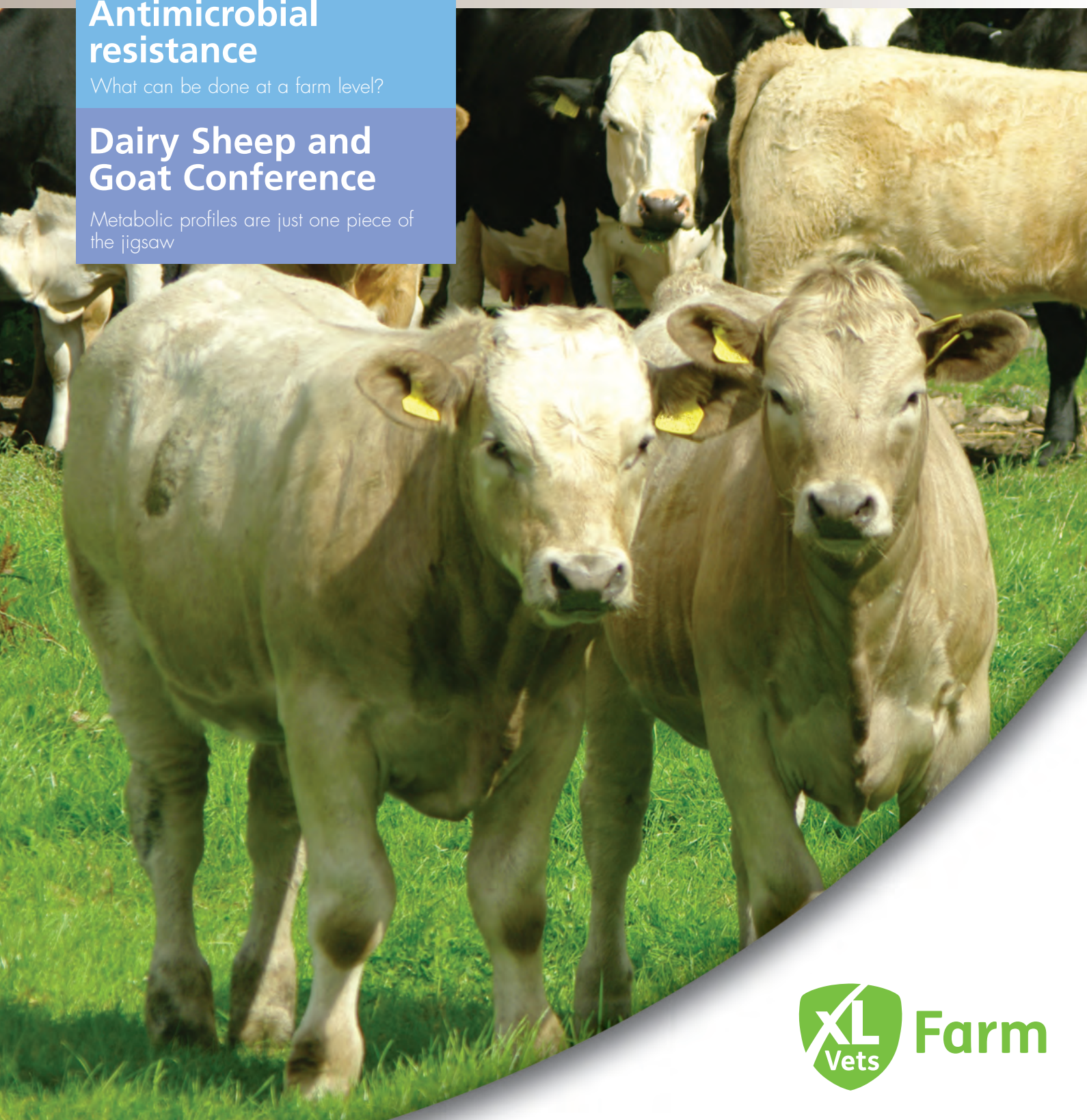
Inside this issue:

Antimicrobial resistance
What can be done at a farm level?

Dairy Sheep and Goat Conference
Metabolic profiles are just one piece of the jigsaw



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THE EDITOR

Welcome to the 'Spring' issue of Livestock Matters

Welcome to the Spring issue of Livestock Matters. In this edition we look at how we can stack the odds against TB using a 5 point plan. There are a range of different measures that can be taken, and they all add up cumulatively to increase a herd's chance of staying TB free.

Antimicrobial use on farm is a hot topic in the press at the moment and an important issue - globally, nationally and on every single farm. This year, a series of articles will be included in Livestock Matters addressing issues surrounding Antimicrobial Resistance (AMR) and this first issue sets the AMR scene and looks at how antibiotics work (and don't work) on farm.

Rhona Norquay gives some insight into the causes of perinatal calf mortalities and advises on strategies to ensure heifers and cows deliver a healthy live calf. Some losses are unavoidable but the majority could have been prevented either through better cow management pre-calving and/or a different approach at calving.

I hope you enjoy our Spring issue of Livestock Matters.

Gemma Ayre
Editor

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XLVets to support Future Beef Farmer Challenge at Beef Expo

For the third year, the National Beef Association will be hosting the Future Beef Farmer Challenge Competition in conjunction with AHDB at the NBA Beef Expo in Stoneleigh on the 18th May 2017. The competition is aimed at getting the younger generation more involved with important aspects of beef production, with questionnaires surrounding genetics, selection, health and nutrition. This year's hosts and sponsors for the relevant sections of the competition are Farmskills and XLVets (health), Berrystock Feeds (Nutrition) and AHDB Beef & Lamb (genetics and selection).

Prizes include 1 year's free membership for the NBA, FarmSkills training vouchers, Great Yorkshire show tickets and AHDB Beef & Lamb and FarmSkills goody bags. The winning team will be awarded the NBA's Duke of Northumberland Trophy while the winner of the open class will receive the NBA Frank Momber Memorial Trophy. Competitors will be judged on carcass selection and their knowledge of nutrition, genetics and health, visiting trade stands of industry experts to demonstrate their skills in each sector.

Amy Fawcett, Knowledge Transfer Officer Beef and Lamb, AHDB commented on the Future Beef Farmer Challenge 'AHDB are very pleased to be running the competition again at this year's NBA Beef Expo, like the NBA we put a large focus in supporting the next generation of beef farmers coming through into the industry. We feel the competition is a great way of showcasing the talent of our young farmers as well as acting as a knowledge sharing exercise. With some great prizes on offer I would encourage all 16-36 year olds to sign up and get involved.'

NBA director Chris Mallon said: 'There really is no competition like the Future Beef Challenge anywhere else in the UK and we're delighted to host this competition at NBA BeefExpo 2017. We were pleased with the success of Future Beef Farmer Challenge last year and also in 2015, which attracted a high level of interest from both individuals and teams. To move forward within the industry it is very important to have an in-depth knowledge of the beef sector at both a practical and a scientific level. This competition is designed to challenge both, and we are thrilled that it is to become such an integral part of our annual NBA Beef Expo. Encouraging the next generation of progressive beef farmers is hugely important for the future sustainability of the industry, and it's something we at the NBA are very keen to support.'

To sign up to the competition please visit our website: **https://www.nationalbeefassociation.com/beef-expo/competitions/future-beef-farmer-challenge/** to download the online booking form or entries can be made on the morning of the NBA Expo at the AHDB Beef & Lamb stand.

Dairy Sheep and Goat Conference 2017

February saw the delivery of the second annual, Dairy Sheep and Goat Conference in Bristol - Feeding and Breeding. The meeting attracted over 120 small ruminant dairy farmers, vets, advisors and suppliers from across the UK and beyond, all willing to share ideas and information about aspects of small ruminant dairying. XLVets member, Friars Moor, are behind the initiative which aims to develop a partnership between dairy sheep and goat farmers and their vets, advisors and nutritionists.

The diverse agenda, delivered by speakers from around the world provided great insights into topic areas such as 'Johnes testing schemes', 'udder health and milk quality' and 'development and applications of genomics in dairy goats'. Yoav Alony-Gilboa, Dairy Sheep and Goat Consultancy and Kate Hovers, a consultant sheep vet outlined how breeding out of season, and advancing or compacting the breeding period, could have many advantages for dairy sheep and goat operations.

Look out for details of the Lucy Hepworth and Lesley Stubbings presentation on metabolic profiling later in this issue.

Yoav Alony-Gilboa (L), Friars Moor with David Alvis (R), Yorkshire Dairy Goats, who explained how genomic selection is a key part of the breeding programme at Yorkshire Dairy Goats

BVDFree England approaches its first anniversary

As BVDFree England approaches its first anniversary, 940 herds are signed up, and over 140,000 cattle are covered by the scheme. With momentum continuing to grow, a coordinated approach between vets and farmers needs to be maintained to eliminate BVD from the cattle population.

Why do we need to eradicate BVD from England?

Bovine Viral Diarrhoea or BVD is a highly contagious viral disease of cattle, and one of the biggest disease issues facing the UK cattle industry. BVD has been estimated to cost between £13 and £301 per affected cow and it is believed the national cost could be as high as £61million per year. The BVDFree England scheme is based on achieving the elimination of the disease through identification and removal of animals persistently infected (PI) with BVD. A national database supports this by storing individual and herd test results for scheme members.

To be part of the journey towards BVD elimination, head to bvdfree.org.uk to sign up to the scheme or to find out more information.

Sheep farmer focus groups help explore farmer and vet engagement

During 2015 and 2016, XLVet UK Ltd and Norbrook Laboratories ran two focus groups aimed at gaining a deeper understanding of the engagement between sheep farmers and vets.

Chris Geddes, Marketing Manager at Norbrook, says the wide-ranging results provide an accurate picture of how and when sheep farmers access veterinary expertise, as well as recommendations for how to improve professional relationships for the benefit of the industry.

The results also demonstrated that flock health planning is seen as beneficial by most sheep farmers. This was identified as a good way for vets to be more involved with flock management and providing advice to sheep farmers, which could assist in building trust and closer relationships between vet and farmer.

Lee-Anne Oliver, veterinary surgeon at Scott Mitchell Associates, explained that the results from this study are particularly useful to help veterinary practices to better understand, and ensure they meet the needs of their sheep farmers. 'By listening to what our sheep farmers want from us and then working with them to develop our services, we can ensure we add value to their businesses.

'The research has provided a number of insights into how we, as veterinary surgeons, can further develop our own skills and assist our sheep farmers in more positive and proactive ways. Within the XLVets community, we have now developed a sheep networking group to facilitate this - The 'Woolpack', which consists of individuals with a passion for sheep from throughout the UK. By advancing our knowledge and skills - and by sharing this learning and experience across the XLVets community, we are certain that many more sheep farmers can benefit from the results of this study.'

Veterinary surgeon: Kate Bowen

Company XL Farmcare

Kate Bowen VetMB BA MRCVS,
XL Farmcare

Stacking the odds against getting TB

Farms can reduce their risk of suffering a TB breakdown by adopting a series of biosecurity measures and adjusting some of their farming practices. These were the messages running through a series of free TB Biosecurity workshops held earlier this year by XL Farmcare UK in combination with XLVets' FarmSkills and ADAS.

XL Farmcare's Kate Bowen has been leading the workshops, with support from ADAS' Peter Hancocks. 'Some farmers are very fatalistic about getting TB in their herd,' says Kate. 'But not every farm in a TB hotspot goes down with it. So why is that? Well, it's not all down to luck! Farming practices have a role to play, as does the level of biosecurity on a farm.

'There are a range of different measures that can be taken, and they all add up cumulatively to increase a herd's chance of staying TB-free.'

Changing farming practices

The workshops used Defra's 5 point plan as a basis for discussion. Two of the points seemed relatively simple and straightforward to observe:

1. Reduce risk from neighbouring herds, e.g. double-fence with a 3m gap all the boundaries between neighbouring cattle;

2. Minimise infection from cattle manure, e.g. don't spread manure from other farms.

However the other three points received more discussion at the workshops as they each depend on managing a situation which will be unique to each farm.

3. Restrict contact between badgers and cattle

ADAS' Peter Hancocks explains: 'The evidence is that badgers and cattle rarely get close enough to touch each other. So therefore TB transmission is indirect, mostly a consequence of a "shared environment".

'Infected wildlife can spread TB via their saliva, urine, and faeces, and also in pus from lesions. Bovine TB commonly affects the kidneys of badgers - hence urine is potentially a very potent source of infection.

'Ideally farmers need to keep cattle out of fields with badger setts. A licence can be obtained from Natural England to push a sett back into woodland or a hedgerow or to close it, if it is causing loss of agricultural amenity – for example reducing crop area, or presenting a direct risk of damage to machinery and/or injury to livestock.

'If grazing cattle in a field with a sett can't be avoided, ideally fence off the badger latrine

The badger's part

On a national scale, 16% of TB infection can be attributed to badgers; therefore 84% of TB spread can be attributed to cattle-to-cattle transmission, or other sources.

'Infected wildlife can spread TB via their saliva, urine, and faeces, and also in pus from lesions. Bovine TB can affect the kidneys of badgers - hence urine is a very potent source of infection.

4. Manage cattle feed and water to avoid attracting wildlife

Deer and badgers may visit cattle paddocks in search of food and water.

A recent study showed that feeding sites at pasture were most likely site for indirect badger to cattle contact. 'So don't make it easy for them,' says Peter. 'Avoid feeding out concentrates straight onto grass. Use badger-proof troughs, and feed in the mornings so there are no leftovers by nightfall when badgers become active.

plastic barrel or have them raised off the ground. Raising water troughs to a height above 1.5m will help prevent badgers sharing water, but will also stop calves from drinking so this won't be suitable everywhere.

'Badgers have been known to squeeze through a 7.5cm gap. Sheer proofing applied to gates needs to be at least 1.5m high. At the farm, where possible use gates and doors to prevent badgers entering feed stores. Badgers will keep revisiting areas and keep exploring for opportunities. So it's important that farmers keep revisiting the checking of gates and barriers!

'Always clear up any spilt grain or concentrates that may fall out of the silo or in transport - else they will find it and come back again for more.

'Electric fencing can be put around maize silage clamp faces or even whole farmsteads. The recognised badger-proof settings are 4 strands of wire at heights above the ground of 10, 15, 20 and 30cm.'

5. Stop infected cattle entering the herd

Observing biosecurity procedures when buying in cattle is fundamental to keeping diseases out. Kate advises: 'Farmers need to think about where they buy their cattle from. They should check the herd's TB history, and ensure the animals have been pre-movement tested if applicable. If purchasing cattle from a low risk area, then the last test could have been up to 3 years ago. Farmers need to ask when the date of the last whole herd test was, and discuss with their own vet whether to proceed.

'When cattle arrive at the farm, isolate them. They need to have 4 weeks of a separate airspace. Post-movement testing during this period will detect animals that may be infected but were not picked up by the pre-movement test. Think carefully about where you will dispose of manure from the isolation area as M.bovis can survive for up to 6 months in slurry.'

Stacking the odds

'As was evident from discussions at the workshops, every farm is different and applying DEFRA's 5 point plan will depend on each situation,' says Kate.

'There is a cumulative effect of implementing each point regarding extra biosecurity and altering the way animals are managed and fed. Farmers should do what they can. It all counts.

Peter Hancocks of ADAS discusses badger-proof fencing at a February workshop near Cirencester

Facts about TB Testing

At a workshop, held at the Royal Agricultural University of Cirencester, vet Chris Price from nearby Drove Farm Vets gave some insight into the issues surrounding the tests for TB.

'Farmers frequently complain to me that the TB skin test is not very accurate,' said Chris. 'This is a perception but not a reality. In fact, it rarely gives false positives. However there is a 3-6 week period after infection where the test doesn't pick up the disease, yet that animal can infect others. So the issue is not that the test condemns a healthy animal, but that it may not identify a diseased one. This is why the frequency of testing has been stepped up to ensure that infected animals are not being left behind on a farm after reactors have been found and culled.

'Similarly, when a slaughterhouse report states that a TB-condemned animal had no visible lesions. This does not mean it wasn't infected, It just hadn't yet developed visible signs, or these signs went undetected at post-mortem.

'There is a more sensitive test - Gamma interferon - which involves blood sampling. However this has a greater risk of giving false positives. It is useful in situations to avoid having to wait 3-6 weeks for infection to be detectable using the skin test, however it is more expensive and not ideal as a single test for surveillance testing.

'Farmers can request a private test using Gamma interferon but must get APHA approval. It can be useful where farmers are purchasing cattle and wish to have extra reassurance on TB status. It can also be useful in herds suffering repeated breakdowns, to help detect infected animals.'

He explained that progress in reducing the incidence of TB requires: 1) better wildlife control 2) better farm biosecurity 3) and more blood testing so that any infected animal is identified and culled.

Jim Willshire BVSc DCHP MRCVS,
Endell Veterinary Group

How and why to prevent Antimicrobial Resistance (AMR)

There have been many news reports and articles on the subject of Antimicrobial Resistance (AMR) over the past 12 months. It is a massive topic, and an important issue - globally, nationally, and on every single livestock farm.

Veterinary surgeon Jim Willshire
XLVets practice Endell Veterinary Group

This year, a series of articles in Livestock Matters will be addressing the issues surrounding AMR, aiming to provide an understanding of how resistance arises, together with strategies that can be taken at farm level to help protect the efficacy of veterinary medicines whilst assuring animal health. Ultimately, this will be beneficial for the efficacy of human medicines, too.

In this first article, vet Jim Willshire from Endell Farm Vets in Salisbury sets the AMR scene, outlines how antibiotics work (and don't work), and explains what is meant by 'responsible use' of medicines on-farm.

Government policies and farm practices

'Repeated misuse of antimicrobials, globally, has facilitated the development of AMR in some bacteria,' explains Jim. 'The classic example is the MRSA infection found in some hospitals. And in 2015, resistance was found to the antibiotic colistin, which for some human infections had been the last-resort choice of antibiotic.

'In 2013, the UK Government published a 5-year strategy to tackle the rise in AMR. Then in 2016, Lord Jim O'Neill chaired a global review on tackling drug-resistance infections and published a report with a number of recommendations (now often referred to as the 'O'Neill Report'). Amongst these is the much publicised target of reducing antibiotic use in agriculture down to 50mg/kg of livestock unit. Whilst, as a vet in practice, I would never set a farmer an individual target based on limiting the quantity of antibiotic used - the reasons for which are outlined later in this article - the simple aim was to get an overall reduction in farm use of antimicrobials.

'Already, different sectors of the industry are working towards that goal'.

'Last year saw the stipulation, by several milk buyers, that their producers adopt the practice of Selective Dry Cow Therapy – and change from blanket antibiotic treatment of dry cows to selectively treating only those deemed at-risk of developing mastitis during the dry period.

'The veterinary profession has always been aware of the possibility of developing resistance to antimicrobials and the need to safeguard the efficacy of what is a limited range of antibiotics for both animals and humans. For instance, this is why, vets are careful about prescribing fluoroquinolones, as these are also used to treat infections in humans. Hence, they fall into the World Health Organisation (WHO) defined category of Critically Important Antimicrobials (CIA).

'This year, more than one milk buyer has banned the use of CIA on farms. Others will no doubt follow.' *(There will be more information on this topic later in the series.)*

'The use of antimicrobials in agriculture is changing,' says Jim 'Already in some European countries they can only be administered by vets. Here in the UK, there are both the moral arguments for protecting the efficacy of our limited antibiotics and the real threat of legislation from which processors are already trying to secure and protect their supply chains.

'Antimicrobials are needed. On livestock farms they ensure good animal health and welfare can be maintained. However, they do need to be used responsibly 'as little as possible, but as much as necessary'. And there are a number of farm-level strategies that farmers can adopt, working together with their vet, to achieve this,' adds Jim.

'However, the most effective strategy for reducing our usage is by improving farm management to reduce the need.'

Bacteria and Antibiotics

The word 'antimicrobial' refers to any compound that can be used to treat or prevent an infection: this includes products which may be anti-fungal, anti-viral, anti-protozoal or anti-bacterial, i.e. antibiotics. So all antibiotics are antimicrobials, but not all antimicrobials are antibiotics!

In this first article, the focus has been narrowed to consider bacteria and antibiotics.

How antibiotics work

Bacteria are single-celled organisms, that reproduce asexually (by simply dividing into two) to create populations of millions of individual organisms.

Antibiotics can be used to kill these bacteria (bacteriocidal action), or to stop them multiplying (bacteriostatic action).

Viruses are not living organisms. So antibiotics cannot kill, nor have any effect on them.

One of the first considerations a vet takes into account in deciding which antibiotic is going to be appropriate to treat an infection, is whether it is due to Gram-positive, or Gram-negative, bacteria.

This classification takes its name from a dark stain that is used in laboratory tests (developed by Hans Christian Gram) which is taken up by the cell walls of bacteria. Some bacteria do not have a cell wall, just a membrane. The hen's egg is a good analogy: there is a shell, but if it is removed, the yolk and white still hold together because they are enclosed within a membrane. Simplistically, this is the difference between a bacterium that has a cell wall and is Gram-positive (egg shell), and one that does not and is Gram-negative (white and yolk holding together). An example would be a *Strep. uberis* which is Gram positive, whereas *E. coli* is Gram negative.

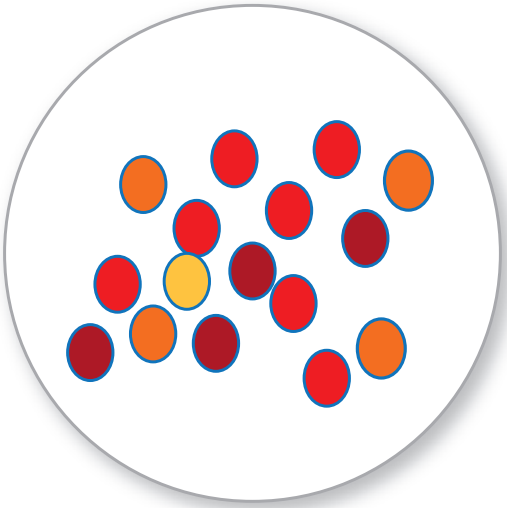
The nature of bacterial populations

In a bacterial infection there is a fast-multiplying population of bacterial organisms. Sometimes the infection is mainly of one specific bacterium, for example *E.coli*. Or it could be a mixed infection and contain several bacteria, and require a broad spectrum antibiotic to control all the bacteria in the infection. For example, 'summer mastitis' is a classic example of where several different pathogenic bacteria are typically present.

But consider a population of just one type of bacteria, say a *Strep. uberis* mastitis: evolution dictates that there will always be a random component to their genetics. Diagram 1

Diagram 1

A simple illustration of a typical population of a single bacteria with genetic differences shown as different shades of red circles, and a 'freak' organism shown as a yellow circle.



The mechanisms by which a certain antibiotic will kill a bacterium are also very specific. It might be one that targets and breaks down cell walls. Or its mode of action might be to prevent the asexual reproduction process.

If a bacterium is Gram-negative and has no cell wall, then an antibiotic which acts on cell walls, will have no effect. However, it may affect some of the Gram-positive bacteria it encounters, but which were not the target. These can be described as 'innocent bystanders'. These bacteria may be detrimental to the animal, or they may be 'good bacteria' whose presence is of benefit. Either way, they have been exposed to the antibiotic.

Residues of the antibiotic that have not been spent in killing the bacteria, will eventually be excreted from the body and into the environment via, e.g. urine, faeces. They may then affect free-living bacteria, or potentially transfer genes (see 'link with human medicines' box later).

illustrates a bacterial population of one type, with genetic variation represented by different shades of red.

This is the same genetic variation that may give an advantage or disadvantage to a ewe in a flock. A different genetic make-up can give an animal/organism an advantage (or disadvantage) in a given environment, or when the environment changes.

In a bacterial population, this genetic randomness might result in the presence of 'freak' organisms (one is represented in Diagram 1 by a yellow circle) whose genetics make them significantly different from the rest in some way. At farm level, this could be a sheep with a black head in an otherwise white-headed flock.

Often these 'freak' organisms will be naturally out-competed by the population and die, but sometimes they will continue to multiply and may even reproduce more quickly.

Using the 'wrong' antibiotic: the consequences

The efficacy of an antibiotic's effect is dependent on its mode of action and the type of bacteria it is used against.

Diagram 2 illustrates what happens when an inappropriate antibiotic is used on a bacterial infection. During the course of treatment, time has passed and the bacterial population has increased, as has the degree of infection. The return to better health/welfare of the animal has been delayed. Money has been wasted.

In addition, bacteria unrelated to the infection in the animal (the 'innocent bystanders') may be exposed to lower levels of antibiotic than would be found in the infected organ (e.g. whilst treating an infection in the mammary gland, bacteria in the gut will also be exposed). This low-level exposure increases the risk of resistance gene selection in these bacteria. This may be detrimental to the efficacy of human medicine (see 'The link with human medicines').

Also, residues from the antibiotic will pass into the environment. So there is also the potential for free living bacteria to be affected despite being 'innocent bystanders'.

If an infection is due to a virus, and an antibiotic is used, then the same negative consequences apply again.

Using the 'right' antibiotic at the 'wrong' dose

Using antibiotics responsibly is not just about choosing an appropriate antibiotic for the job. They also need to be used at an appropriate dose. Diagram 3

Misuse can occur when, for example, the weight of the animal is underestimated and too low a dose is given, or if a series of doses are required, but the course is not finished.

Sometimes in these cases a clinical cure is achieved - in which the infection appears to have disappeared. However a bacteriological cure may not have been achieved and low levels of bacteria might still be present.

If infection is still present, then what happens next depends on a variety of factors. If the animal's immune system is strong/healthy enough, it can fight the infection and a clinical cure may follow, naturally. Factors such as good hygiene, low stress, good energy status, all add up cumulatively to improve the chance of success. But conversely, if management of the animal - its health and environment - are poor, then the bacteria can multiply up again and cause another clinical infection.

By now, the first course will have removed a proportion of those organisms with the genetics most susceptible to the mode of action of the particular antibiotic. But those with genetics that are more resistant to its specific attack method, will still be present. So the infection may now require a change of antibiotic, one which works in a different way.

Again, as a course of antibiotics has been delivered, there is the risk of 'innocent bystander' exposure and the subsequent risk of resistance genes disseminating into the environment.

Diagram 2

Treating a bacterial infection with the 'wrong' antibiotic allows the infection to worsen, costs time and money, negatively impacts on animal health, plus it unnecessarily exposes 'innocent' bacteria to the antibiotic.

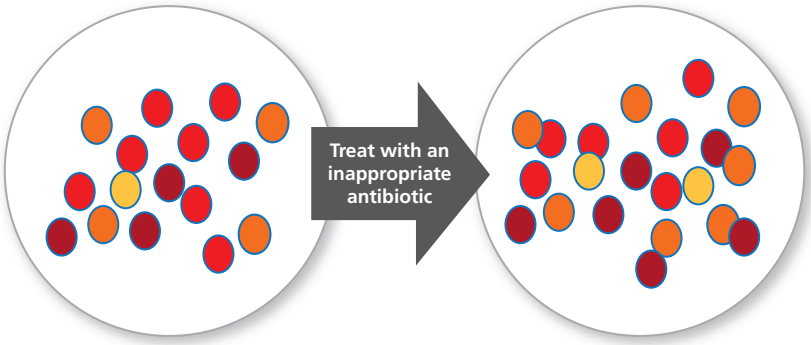
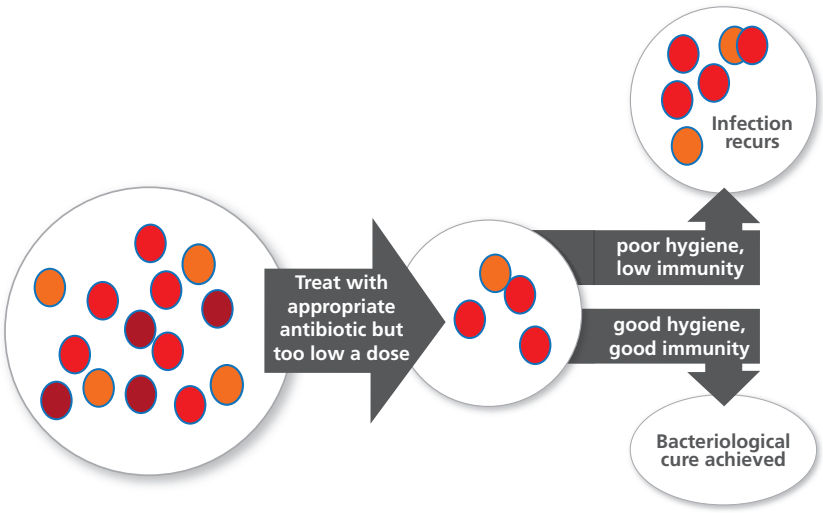


Diagram 3

The under-dosing of an antibiotic treatment may achieve a clinical cure but not a bacteriological cure. The animal's immune system and the environmental conditions will influence the final outcome.



The link with human medicines

The bacteria carrying resistance genes, selected by inappropriate antibiotic selection or poor dosage, will pass out of the animal and into the environment e.g. in faeces.

There is some evidence to suggest that these genes can then be transferred to free living bacteria. Once in these environmental bacteria, there is a theoretical risk of them being transferred to the bacteria that cause infections in humans, which could then reduce the efficacy of antibiotics when they are used to treat these infections.

However, temporal studies examining outbreaks of genetically related *Salmonella* in humans and animals have failed to demonstrate a correlation.

Resistance through natural mutation

Bacterial resistance to the effects of an antibiotic can occur through misuse of the medicine by humans, but also as a natural phenomenon.

The organisms in a population of bacteria will have slightly different genetic make-up, which may enable some of them to survive the effects of an 'appropriate' antibiotic. In Diagram 4, a 'freak' yellow organism has survived antibiotic treatment. This leads to the creation of a resistant population. Moreover, there is no longer any competition for nutrients/light/moisture from the non-freak bacteria as they have been killed by the antibiotic. So this may allow the 'freak' organisms to multiply more rapidly.

At farm level, a chronic infection is seen to develop: one that will not respond to the initial antibiotic and so needs a change of attack.

A different antibiotic with a different mode of action can be selected, preferably after culture of the bacteria to identify it and any resistance genes it might be carrying.

However, sometimes a healthy animal can mount its own immune response and eliminate the bacteria before the development of any clinical infection. In which case, no antibiotic is required.

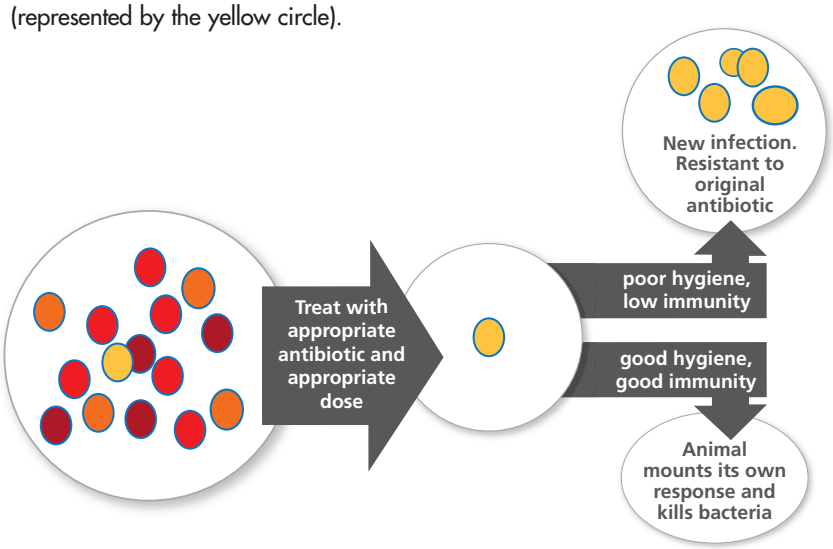
Farm strategies

The fewer antibiotic courses used, the lower the risk of bacterial resistance developing.

So 'responsible use' includes reducing the need to use antibiotics in the first place by farming in a way that ensures the health and environment of the animal will prevent it from becoming infected and enable it, if it does become infected, to combat the infection itself.

Diagram 4

The development of bacterial resistance to an antibiotic is not always man-made. Sometimes it happens naturally simply due to a mutation during reproduction which produces a 'freak' organism that has a different genetic make-up (represented by the yellow circle).



Responsible use of antibiotics also concerns using an appropriate antibiotic to treat a bacterial infection when needed, and using it at an appropriate dosage, for an appropriate time period - it is not necessarily about using less.

Note: not using an antibiotic to fight infection when it is needed, is not responsible care of livestock!

To maximise the cure rate, it's important to identify which bacteria are causing the infection. So responsible practice includes the use of diagnostic tools e.g. bacterial culture, which may be on-farm or laboratory based. This then allows a narrow spectrum antibiotic to be selected which will have specific activity against the culprit bacteria but have a smaller effect on the 'innocent bystanders'. (A sniper rifle approach, rather than a shotgun.)

This is the first in a series of articles which aim to give an understanding on the key issues surrounding Antimicrobial Resistance (AMR) as well as guidance on what can be done at farm level to prevent it.

It's an important subject and XLVets is inviting farmers to send in any concerns or questions on the AMR issue so that they can be explained in these articles. ***Simply email: admin@xlvets.co.uk or talk to your vet.***

FriarsMoor Livestock Health

Veterinary surgeon	Lucy Hepworth
XLVets practice	Friars Moor Veterinary Clinic

Lucy Hepworth BVSc MRCVS,
Friars Moor Veterinary Clinic

Metabolic profiling: a useful tool to guide the feeding of sheep and goats

How can you measure whether a diet is appropriate for milking sheep and goats? Use metabolic profiling. That was the advice of Lucy Hepworth of Friars Moor Livestock Health, speaking at the practice's recent Dairy Sheep and Goat Conference (see News page).

Metabolic profiles are a useful in-practice tool to make sure that animals are receiving sufficient nutritional inputs at key times of their production cycle,' explains Lucy.

'By taking blood samples for analysis, the levels of nutritional components such as energy, protein and minerals can be objectively measured, and any over or under supply identified. When repeated over time, they allow the flock or herd to be accurately monitored.

'Energy and protein levels need to be matched for efficient rumen function. So sometimes a diet may need some fine-tuning. Protein level per se is important in pregnant animals as it impacts on colostrum quality, and in turn on youngstock health.

'It's a good time to work with the farm nutritionist as part of the farm team.'

Using metabolic profiles

Energy supply needs to be carefully matched to demand in late gestation and early lactation for dairy sheep and goats.

'A heavily pregnant small ruminant animal has a high energy requirement,' explains Lucy. 'Yet feed intakes are physically restricted by the presence of, commonly, multiple foetuses. It's a high risk time for things to go wrong. As is the period when they transition into milk and approach peak yield.

Figure one. Taking bloods for analysis of metabolic profiles – a useful tool to check feeding regime.

'So in pregnant sheep and goats, blood samples for metabolic profiling should be taken 3 weeks before the due date, which is just in advance of the huge increase in energy requirement **(See Figure Two)**. Sampling can be repeated, 3 weeks after parturition.

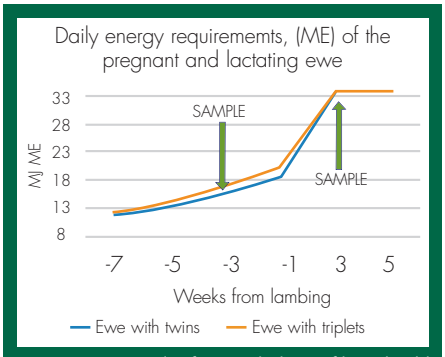


Figure two. Samples for metabolic profiling should be taken 3 weeks pre- and post parturition

'Blood samples need to be taken from a random selection of representative animals in a management group. If animals are scanned for litter size and fed accordingly, groups should be sampled separately.'

There are a variety of metabolic analyses that can be carried out. An animal's energy supply can be measured by BHB, NEFA and glucose. The current protein status is assessed by Urea-N, and longer term protein 'history' indicated using albumin levels. Blood analyses can also highlight deficiencies in levels of macro minerals (magnesium and phosphorous) or trace elements (copper and selenium). To assess levels of underlying disease in the group, analysis of globulins can also be made.

Lucy warns: 'In assessing nutritional management of a group, then metabolic profiles are just one piece of the jigsaw.

'While the animals are being handled for blood sampling, assess body condition score and if weighing equipment is available on farm, record body weight too. Goats are difficult to body score accurately because their body fat is carried internally.

'It's also important to look at the feed presentation, storage, palatability and availability of feed space.'

Case studies

'Metabolic profiles can serve as an early warning system before a problem impacts on performance or production,' says Lucy.
In the following three case studies, metabolic profiling helped identify and resolve some nutritional issues.

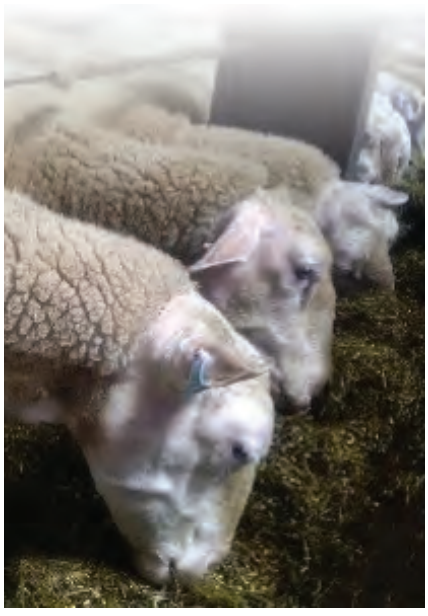
1. Ration sorting

On a goat farm, scours and death were occurring in does at all stages of the lactation.

Lucy explains: 'Metabolic profiles revealed a wide range of Urea-N values, with some very low figures. This measurement reflects protein intake over the previous few hours.

'We were suspicious that goats were sorting the TMR ration. So although they were all fed the same diet, they didn't all eat the same diet. The more dominant goats ate more of the concentrates resulting in ruminal acidosis and scours. Ruminal acidosis made them susceptible to clostridial perfringens overgrowth and toxaemia.'

The solutions were to: reduce the chop length of the straw, increase feed access, reduce the crude protein content of the diet, and instigate a more stringent protocol of quarterly vaccinations for clostridial diseases.



2. Pregnancy toxaemia

On another goat farm, does were succumbing to pregnancy toxaemia. This occurs when energy intakes are too low. Early signs are: inappetence and lethargy. Prognosis in goats is poor, and these early signs are usually followed by blindness, organ failure and death. The death of kids in utero, also contributes to the toxaemia.

'Metabolic profiling showed that approximately 40% of goats were not meeting their energy demand through the diet,' says Lucy. 'The farm now feeds the late dry goats more akin to pregnant ewes carrying multiples, than to transition cows as had previously been followed. The energy density of the late dry period TMR diet has been increased from 9.7 to 11.6 MJ/kg DM.

'To further boost energy intakes in the 3 weeks prior to kidding: glycerine powder is added to the mixer wagon at 70g/head/day, and molasses at 100g/head, also enhancing palatability. Feed space has been increased from 15 to 20cm per head.'

'Ration sorting was also a problem here, with the less dominant animals ending up with a high straw diet and subsequent low energy intakes. A straw chopper was purchased to resolve the sorting. Straw is chopped 2-3 times per week, down to a length of about 1 inch, before adding in to the mixer wagon.'

3. Anaemia from worm infection

Last August, a routine metabolic profiling for a milking sheep flock revealed surprisingly low blood albumin levels in 90% of the ewes.

Lucy explains: 'Albumin gives the animal's protein status over the past few months. But these low levels were not due to poor nutrition, they were due to excessive protein loss from the gut. Post-mortem examination revealed heavy infestations of Haemonchus, or more commonly - Barber's Pole worm. On close examination, some ewes were pale in the eye from anaemia.

'Metabolic profiling had alerted us to a problem, and then further examinations enabled us to define the cause. The ewes were all treated with moxidectin drench. Haemonchus can be a problem in subsequent years, so when the dairy ewes are grazing this year, they will be monitored using regular worm egg counting.'

Figure three. A heavy infestation of Barber's Pole worm was causing excessive protein loss.

Measure and monitor

Lucy recommends the use of metabolic profiling for most dairy sheep and goat herds: 'The frequency of use, and complexity of profiles, should be tailored to the needs of the individual farm.

'Whilst metabolic profiles are a measure of nutrition, they need to be used in combination with other measures to assess how small ruminants transition through parturition into milk.

'Mortality and disease data should be collected and can then be very useful to analyse together with the farm's vet and nutritionist. The measuring and recording of performance makes it possible to see where a farm is doing well and where improvements are needed. Using EID is a fantastic way of recording data. If the EID can communicate with parlour software, then looking at individual yield data can be a very useful insight into performance.

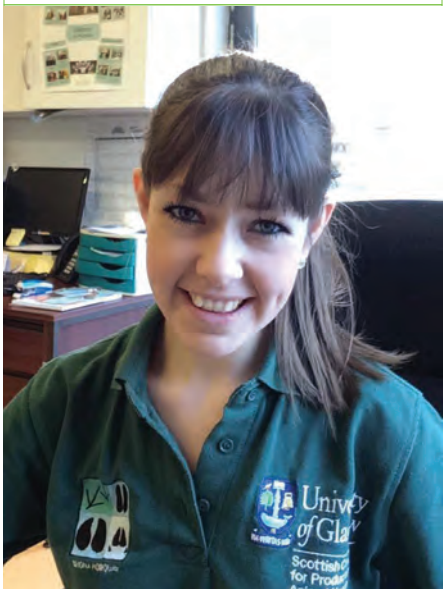
She adds: 'The cost of a vet visit, blood sampling and lab fee, is around £250-£300, which is less than the cost of a replacement ewe or doe. So if it saves one animal, then it's paid for itself. Or put another way, comparing milk revenue, the cost of testing is equivalent to 420 litres of goats' milk or 230 litres of sheep's milk in dairy flocks.'

Rhona Norquay BVMS CertAVP MRCVS,
Northvet Veterinary Group

Strategies for trouble-free calvings and maximising the numbers of live calves

In a study of Orkney beef herds, 5.1% of calves born were born dead or died within the first 48 hours of birth. A small proportion of these calf deaths were unavoidable, but the majority could have been prevented either through better cow management pre-calving and/or a different approach at calving.

Veterinary surgeon	Rhona Norquay
XLVets practice	Northvet Veterinary Group



Here, Rhona Norquay of Northvet Veterinary Group on Orkney, gives some insight into the causes of perinatal calf mortalities and advises on strategies to ensure heifers and cows deliver a healthy live calf.

Causes of bovine perinatal losses

Last year, as part of her Masters degree, Rhona conducted a study on the causes of perinatal losses in Orkney beef herds. Data from the pregnancies/calvings of 1,100 cows and heifers in eleven herds was collected between 1st February and 10th June.

Farmers recorded data about the circumstances of the calvings, and whether calves were born alive, were dead at birth, or died within the first 48 hours. For all perinatal losses, a post-mortem examination was performed by Rhona.

Rhona explains: 'For beef herds, the aim is to have less than 2% perinatal losses, but in this study, the incidence was 5.1%. This is worryingly high and so changes are needed on farms to reduce these losses.'

The most common cause of death in the study was due to anoxia (low oxygen). 'This can occur for a variety of reasons, the most common being a slow calving. In turn, a slow calving can be due to foetal oversize or poor calving management - for instance if a calf is wrongly presented, but action is not taken soon enough.'

Other causes of death found in this study included infections, traumatic calvings and congenital malformations.

Calving Management

Cows are very sensitive to their environment close up to, and during, calving.

Rhona explains: 'The siting of calving pens is important. Ideally, they should be located where it is calm and quiet, away from the traffic of noisy machinery and people passing by.

'It's important that these calving pens are clean. About two days before calving, the cervix and vulva start to relax and there is a risk of bacteria from the environment passing into the uterus, causing infection. So pens should always have clean bedding and be mucked out regularly.

'Where cows are taken to individual pens to calve, the timing of movement to these pens can have a significant effect on the duration of calving. A cow should be moved 1-2 days before she is due to calve, to give her time to become familiar with her new environment. If this is not possible, movement should be delayed until stage 2 parturition (when the water bag appears). This is preferable to movement during stage 1 parturition (restless behaviour, mucus string at vulva): if moved at this point, the onset of calving can be delayed as cows take time to adjust to their surroundings.

'Intervention and assistance at calving can significantly reduce perinatal losses, providing it is timely and appropriate. The 'two feet - two hours' rule should be observed to ensure that a cow's pelvis has had plenty of time to 'open up' properly. If assistance is given too quickly, it will put the calf under unnecessary pressure and stress when it is forced through the pelvis.

Figure one. If two feet are showing, then give cows 2 hours to calve, before intervening.

'If assistance is delayed beyond two hours then this will also put the calf under stress, potentially leading to death.

'For the 'two feet - two hours' rule to apply, there must be two front feet present. If this is not the case, assistance should be given earlier.

'The level of assistance at calving should also be appropriate. If too much force is applied to the calf, it may reduce its vigour when born and may even lead to death - through broken ribs or fractured legs.'

Figure two. Bruising on the legs from calving ropes

Nutrition factors

Cow nutrition is another factor which impacts on perinatal losses.

Rhona explains: 'Cows and heifers should have a body condition score of 2.5-3.0 at calving. It's good practice to monitor body condition throughout pregnancy, and alter nutrition accordingly.

'Cows that are fat at calving will lay down fat in the pelvis, resulting in less space for the calf to come through. Overfat cows are also more at risk of uterine inertias in which they are physically unable to push the calf out quickly enough.

'Similarly, thin cows may not have the body reserves of energy to deliver the calf.

'It is important that all feed given to cows is of high quality. Spoiled feed may contain bacteria and fungi, which can potentially lead to infections in the calf.

'Nutrition of the calf itself is also important in preventing perinatal losses. Calves should receive high quality colostrum, equating to 10% of their body weight in the first 24 hours.'

Preventing over-sized calves

Foetal oversize can lead to a slow calving as the cow is physically unable to deliver the calf through the pelvis.

'Foetal oversize can be a consequence of poor nutrition management: if pregnant cows are given too much feed, they put the surplus energy into growing the size of the calf. Analyses of energy and protein levels in forage and rations will show if changes are needed.'

Poor dam and sire selection can also result in an over-large calf. Rhona explains: 'Sires need to be selected with care. Bulls should have positive figures for calving ease, especially when breeding with heifers. Also, the longer the gestation length, the greater the likelihood of a larger calf being born. So bulls should be chosen which have negative EBVs for gestation length.

'Heifers should not be run with the bull until they have reached a suitable size and age. They need to be at least 60-65% of their mature bodyweight, and should not be calving before two years of age.

'To assess whether a heifer is suitable for breeding, it is best practice to measure the size of their pelvis. 'Pelvimetry' is the measuring of its height and width and cross-referencing against the breed's bodyweight chart. This gives a very good indication as to whether the heifer can have a trouble-free calving. It is an objective measurement, and having an actual figure helps prevent the temptation of putting small heifers to the bull and 'hoping for the best'. Heifers with too small a pelvis should be culled.'

Figure three. A vet starts a Caesarean: one of the potential consequences of an oversized calf

Natural mutations

'A small percentage of calves will die due to congenital malformations,' says Rhona. 'In the majority of these cases, there is nothing that can be done. For example, in the Orkney study there were a few cases of "Schistosome" calves, which is when the calf is born inside out.

Figure four. Non-viable calf born with severe congenital malformations

'Intestinal atresia was another malformation recorded. These calves have a blind ending gut, so are unable to pass faeces, despite the presence of an anus.

Figure five. Dilated intestines connected to normal looking intestines by blind ending pocket.

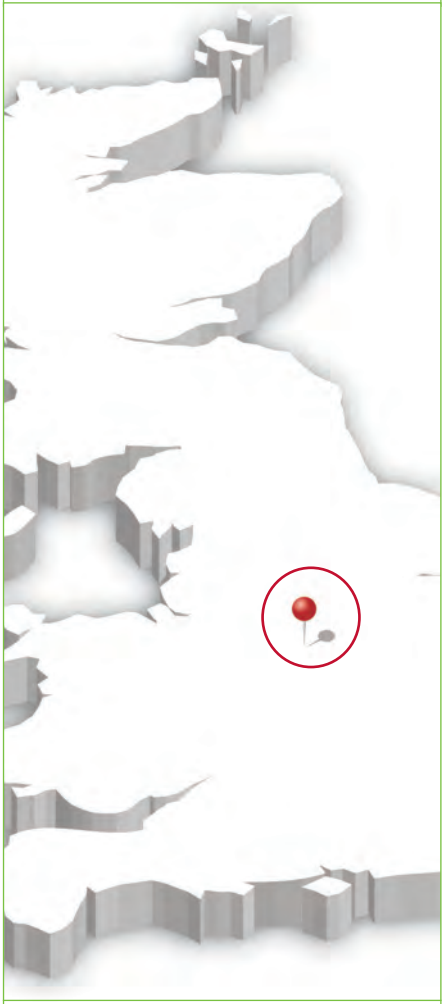
'In most cases, these are freak mutations, however, if the cow produces a similar calf the following year, she should be culled.'

New strategies

All the farmers who took part in the Orkney study received a follow-up visit to discuss their results. 'In some cases, there was nothing that could have been done to prevent a calf's death, and it can be reassuring to know that,' says Rhona.

'But in other cases, perinatal losses could have been reduced or totally prevented with better management of the cow at calving, and attention to monitoring BCS and sire selection.'

ScarsdaleVets



Veterinary surgeon	Emily Sycamore
XLVets practice	Scarsdale Veterinary Group

Emily Sycamore, BVetMed MRCVS
Scarsdale Vets LLP

How to store medicines correctly

As farmers, most of you will use veterinary medicines on a regular basis. In order for these medicines to work effectively it is essential that they are not only used in the correct manner, but that they are stored correctly too.

In general, all medicines should be stored in a lockable medicine cabinet to ensure that access to medicines is limited to those members of staff who have been trained in using them. This medicine cabinet should be in a position which is easily accessible but that is out of direct sunlight to try and maintain a constant temperature. Inside this medicine cabinet should also be a medicines record book which should be filled in at the time of medicine administration. The information which should be recorded includes: The date of administration, the official ID of animal being treated, the medicine used, the dose administered, the date when the animals will come out of milk/meat withdrawal periods, the name of the person administering the medicine and of course the batch number and expiry date of the medicine used.

Figure one. Medicine cabinet

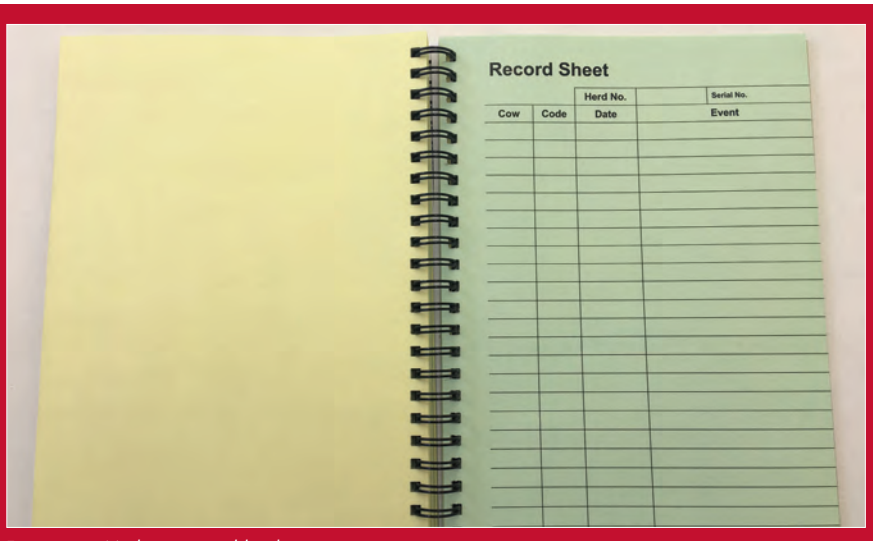


Figure two. Medicine record book

Preventing medicines being exposed to large changes in temperature is essential to ensure that the medicines work effectively. Changes in temperature can lead to the structure of the medicine changing and subsequently not working within the body in the same way. Most medicines will have an indication of the maximum temperature that they could be stored at on the side of the bottle, this is particularly important to adhere to with products such as vaccines which should be stored in a refrigerator. These types of products are particularly sensitive to changes in temperature which can result in ineffective vaccines and animals left exposed to disease.

When coming to collect temperature sensitive product such as vaccines from the veterinary practice, it is always advisable to bring something appropriate with you to store the product in until you get home. Cool bags with ice packs in are ideal for this purpose, and as soon as you are back at the farm these sorts of products should immediately be transferred back into a working fridge set at the correct temperature. As vets, we commonly see fridges on farm which are broken, not holding the correct temperature or not even switched on!

Too low a temperature can also be an issue with keeping medicines working optimally. When freezing outside temperatures hit it is worth checking that your medicines have not frozen - just like too high temperatures, medicines freezing can alter the structure of the medicine rendering it ineffective. If medicines have frozen, let them defrost naturally in a warm room, do not immerse them in hot water to defrost them as this sudden change in temperature again may leave you with an ineffective product. The ideal is to keep your medicines cabinet in a place where it is not subjected to the extremes of temperature change - thus preventing this problem in the first place!

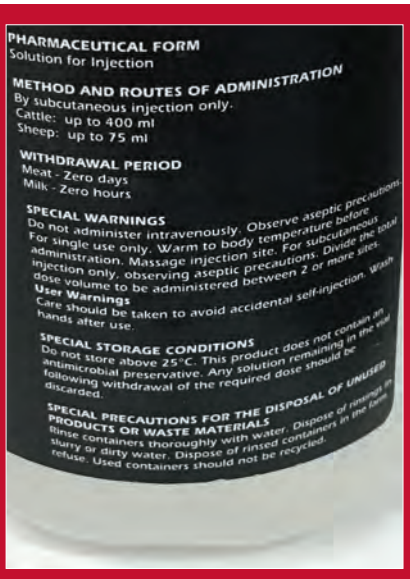


Figure three. Ensure that medicines are not stored in a position that might reach 25°C on a summer day

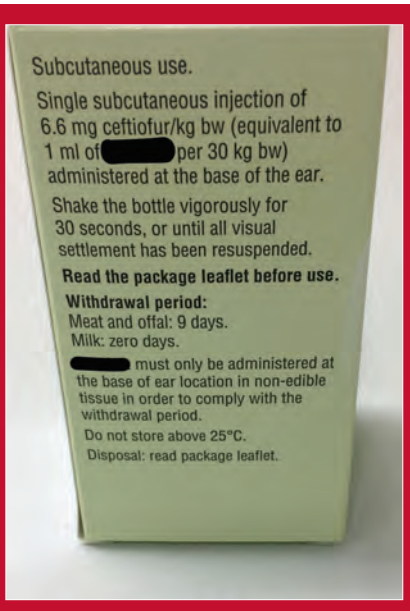


Figure four. Attention must be paid to the route of administration

Some medicines which are commonly used on farm are not necessarily temperature sensitive but are light sensitive and should be kept in the dark to prevent damage occurring to the product, one such product is oxytetracycline which goes black if left exposed to sunlight. Any product which does not look like it should do, either an abnormal colour or consistency should not be used in your animal - even if it is still within the use by date! There is no guarantee that 'abnormal' medicines such as these will effectively work in your animals and by injecting them it could also lead to other problems such as abscessation at the injection site.

Medicines which are past their use by date, or which have been opened for longer than the maximum time stated on the bottle should not be used. Once opened, injectable medicines become exposed to the air which can lead to contamination of the bottle with airborne bacteria, over time the structure of the medicine may also change - again resulting in an ineffective product. Most medicines have a fairly long breach period (usually 28 days), however some, such as vaccines need to be used within 8-24 hours of opening; choosing an appropriate dose size of the product for the number of animals that you would like to treat on that day can prevent wasting of doses, a lot of cattle vaccines come in 5, 10 or 25 dose vials.

Once a bottle of medication is opened, it is important to ensure that new, clean, needles and syringes are used to draw up injections from the bottle. This will not only help to prevent the medicines themselves becoming contaminated with bacteria from the needle, but may also help to reduce the likelihood of animals developing injection site abscesses. The cost of an injection site abscess is much greater than that of a new needle and syringe!

Figure six. New clean needles are key

Figure five. Recording the broach date and the discard date is an easy way of ensuring the medicine used is effective

Kitty Jenkins BVSc MRCVS,
Kernow Veterinary Group Ltd

About me

When I was much younger, I thought I'd like to be a vet for a horse stud, as my family were involved in breeding thoroughbred racehorses. However, after moving to Cornwall at the age of 15, I did some work on a large dairy farm. Here I developed a strong interest in cattle medicine, and this has continued through my years studying to be a vet at the University of Liverpool.

After graduating in July 2016, I was lucky enough to get a job back in Cornwall working for Kernow Farm & Equine, a 13-vet large animal practice which covers 500 square miles across mid-Cornwall. Our work is very mixed with a wide variety of cattle, sheep and equine work. No two days are the same!

I am loving being able to enjoy all Cornwall has to offer, including walking the coastal paths with my slightly mental Australian Shepherd, who has gained a reputation on farms for being an aggressive guardian of the car!

Learning from each other...

At our Kernow practice, we have quite a mix of different ages of vets now: three graduates having joined in the past two years. There are definitely some differences in thinking between the 'old school' and the new. But I think it's interesting for all of us! I like to think that whilst I'm learning from them, they may be learning from us younger ones too!

I've been assigned a mentor - Phil Dawber - and he's been a great support for me. The first few months when starting out are a bit 'scary'. I think every new graduate feels that. But for the most part, it's fine, it's very satisfying when it all goes well. Plus there's a good network of support available from all the vets, and the office-based staff here, so I can always get help if needed.

Testing times

The most stressful part of being a vet is, for me, the TB testing. The procedure for testing has been put under the microscope recently to ensure that now all vets test up to the same standard, with a series of audits and revalidation exams for more experienced vets.

When I set out to a farm to read the results of the test, I mentally say a prayer and hope the herd goes clear (which is a less common occurrence in Cornwall). As a new vet you want to make a good first impression, but when you are the one who finds 10 reactors, it's not a good start!

I know it is very hard for some of the older vets here who have built long term working relationships with their clients, who then might lose a lot of cows in the testing.

I suppose that's a slight advantage I have for the moment, I don't know people too well. Not yet, anyway. But whether this is the first time you've stepped on their farm or the 100th, you still empathise with the loss of an animal or restrictions being put in place on their business. I don't think finding reactors will ever get any easier, however long I work in this job.

This practice sees a lot of clients get shut down with TB. With youngstock being unable to leave the farm by conventional means, they start 'piling up' around the farm. And of course, then issues develop from over-stocking. The situation just isn't a very good one for the client or the cattle. As a vet, all you can do is give advice on how best to manage the situation. But you can't actually change it.

Veterinary surgeon	Kitty Jenkins
XLVets practice	Northvet Veterinary Group

Being in the frontline TB testing is definitely the hard side of the job, and something University just can't prepare you for.

But fortunately, we've got a great team back at the practice. A vet might come back feeling low after finding a lot of reactors in a client's herd. Someone will make them a cup of tea and maybe find some cake, and we'll sit and talk it through or just talk about other things instead.

There is such a lot of TB down here in Cornwall that we can be testing 4 days a week. This means Wednesdays can get pretty manic with routine clinical work. After all the days and intensity of TB testing, I sometimes have to think really hard to switch mindsets when called out to a horse with colic!

Opportunities to learn more

As vets, whether we are new hands or old, we all want to keep brushing up on our knowledge and skills.

For me, this started literally a few days after joining the practice: I attended the first of several modules of the XLVets New Graduate scheme. A range of different topics get covered over a period of 3 months. For instance, we had a very useful practical session on post-mortems. I'm finding some farmers prefer to have these done on the farm, rather than send carcases away, as it's quicker and cheaper. So it was good to refresh my knowledge. It's also interesting to spend time with new graduates working at other XLVets practices. We shared our experiences of the first months in practice as well as comparing techniques and exchanging knowledge.

There are also a variety of veterinary CPD events laid on through the year by different organisations which keep us up-to-date. My colleague Katie Hawksworth is one of the organisers of the Cornwall Veterinary Association and helps co-ordinate evening talks. Six of us from the practice attended an evening of donkey CPD. We had talks from a vet from local charity The Donkey Sanctuary, as well as the Chief Donkey Welfare Officer for Cornwall. It was really useful - did you know donkeys can get depressed? We also learnt what schemes were available to help hard-pressed owners look after their donkeys' health, and what could be done if we encountered a case of neglect. We also learnt that Cornwall's Donkey Sanctuary is the county's 5th most popular charity for donations!

Back at the practice, we've got our own mini-clinical club. It's nothing too formal. We have a noticeboard and we can put up a note with a topic we'd like to discuss, and then we get together and chat it through with the more experienced vets. Recently we've had some good sessions on calf scouring and a refresher on sheep Caesareans. This proved invaluable especially when I had to carry out my first one alone because the practice was having one of its busy days and I was the only free vet!

It's lambing time, and I've not had as much working experience with sheep as I have with cattle. But I know that I have great support from my colleagues who are either in the office or on the other end of the phone if I need advice! And getting out and seeing new and interesting cases on farm makes a nice change from TB testing!

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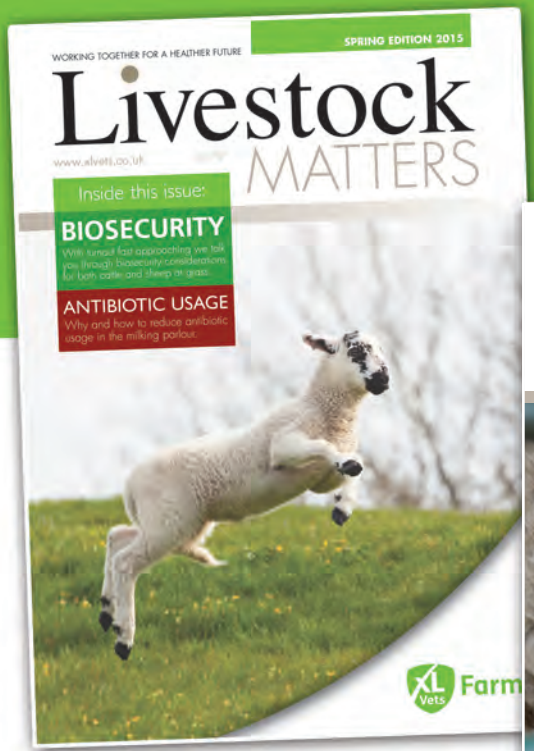

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