

Using medicines responsibly

As little as possible, but as much as necessary



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Introduction

There is increasing concern over the threat of antimicrobial resistance to human and animal health. We all have a part to play in ensuring all medicines are used responsibly.

Medicines are used to treat disease in people and in animals. It is important to use medicines appropriately when animals are sick to protect their welfare and restore them to health. The aim is to use as little as possible, but it is also important to use as much as is necessary to prevent unnecessary suffering and maintain animal welfare.

We all need to work together to tackle antimicrobial resistance in humans and livestock. All livestock keepers have a part to play in reducing the risk of resistance. Promoting responsible use and best practice for on-farm medicine usage is one of our main priorities and part of the Government's antimicrobial resistance (AMR) strategy.

Antimicrobial and anthelmintic (wormer) resistance are both causes for concern in agricultural industries globally. Everyone using antimicrobials has a role in protecting the effectiveness of antimicrobials for future generations. This involves working alongside the Responsible Use of Medicines in Agriculture Alliance (RUMA) and the Veterinary Medicines Directorate (VMD) and other organisations to reduce the risk of resistance developing. This can be done by reducing the amount of antibiotics prescribed for people and animals and ensuring that when antibiotics are prescribed, they are used correctly.

Resistance is the ability to survive exposure to a medicine that would normally kill an organism or stop its growth. With antimicrobial resistance (AMR), the organisms that are of particular concern are bacteria. With anthelmintic resistance, the organisms that are of most concern in the UK are liver fluke and parasitic worms, particularly gastrointestinal worms in sheep.

Antibiotics remain generally effective in the treatment of diseases caused by bacteria in animals. However, some bacteria carried by animals are harmless to them but can cause severe disease in people. If these bacteria become resistant due to exposure to antibiotics in animals, this may result in some diseases being untreatable in humans. For example, infection with *Campylobacter* or *E. coli* O157, both of which can be carried by healthy animals, can cause severe disease in people.

The number of reports of both antimicrobial and anthelmintic resistance has increased. This manual advises on best practice to ensure the products available are effective to treat livestock when needed and to help slow the development of resistance. However, it is only a guide and you should always discuss medicine use on your farm with your vet.

Responsible use of medicines

Farmers and stock-keepers play a major role in ensuring their animals are healthy and that medicines are used responsibly.

Staff working directly with animals should be trained to identify health problems early and in the use of veterinary medicines. Farms under assurance schemes will have a health plan to safeguard the health and welfare of animals on that farm. Treatment with a medicine that requires veterinary prescription should only be administered with formal veterinary approval. Information on all medicines in use should be readily available to stock-keepers and kept on file, e.g. product data sheets, package inserts and safety data sheets. If in any doubt, seek advice from your veterinary surgeon or the product supplier.

All involved with a treatment must make themselves aware of the medicine information relating to withdrawal periods, both for animals destined for slaughter and for those involved in producing milk for human consumption.

Legislation requires that medicine records should be kept for at least five years.

Farms using antibiotics and other medicines must meet the requirements of the Control of Substances Hazardous to Health Regulations 2002 (as amended) (COSHH). Practical advice on how to apply COSHH on farm can be found in the **Health and Safety Executive's Veterinary Medicines guide**.

When using medicines, always follow the guidance on the label and package insert and check you are not allergic to the product ingredients.

Training

Everyone who administers medicines to animals should be trained on the appropriate technique to administer the medicine. This could either be by attending a training course or asking the vet to demonstrate the right techniques.

NOAH, Lantra and City & Guilds provide training courses in best-practice veterinary medicine. For more information, visit:

- noah.co.uk/services/farmer-training
- lantra.co.uk/training/agriculture/livestock
- nptc.org.uk/qualificationschemes.as (see Livestock)

Your own vet practice may also provide training that meets assurance requirements.

To buy or use sheep dip products, you will need to hold a Certificate of Competence (NPTC Level 2 Award in the Safe Use of Sheep Dip). For more information, see Mobile Sheep Dipping Code of Practice 2023 for farmers, mobile dipping contractors and prescribers on the SCOPS website (scops.org.uk/external-parasites/code-of-practice-for-mobile-dippers).

Working with your vet

Vets are the only people allowed to prescribe prescription-only veterinary medicines (POM-Vs). All antibiotics for animals are POM-Vs.

Prescribing is considered to be deciding, instructing and recording which treatment should be given to an animal or group of animals. A vet should only prescribe after they have examined the animals or if they have personal knowledge of the condition of the animals to make a diagnosis.



In practice, this means a vet may only prescribe antibiotics or other POM-V medicines if they have been on the farm recently enough to be familiar with the management and disease situation on the farm.

It is a legal requirement for the vet to label all medicines with the name of the farm, the date, the animal for which the medicine is intended, the dosage and route of administration and the meat or milk withdrawal times (see page 20).

The vet should also advise of any extra precautions to be taken when using the medicine.

The vet should only prescribe sufficient quantity of medicines to treat the affected animal or animals.

Training for dairy farmers

MilkSure is a training and veterinary certification programme for farmers, led by Dairy UK, developed in conjunction with the BCVA (British Cattle Veterinary Association). The training improves the professionalism around medicine use on dairy farms and drives higher standards. This provides a thorough risk assessment of all veterinary medicines, not just antibiotics, to identify areas of improvement to avoid medicine residues in milk.

For more information, see bcva.org.uk/content/milksure

Working with registered animal medicine advisers (RAMAs)

A RAMA, previously known in the industry as specifically qualified persons (SQPs), can prescribe and supply certain veterinary medicines for the qualification that they have obtained and hold a registration for. These fall into three classes:

- POM-VPS (Prescription-only medicine – veterinarian, pharmacist, SQP)
- NFA-VPS (Non-food animal – veterinarian, pharmacist, SQP)
- AVM-GSL (Authorised veterinary medicine – general sales list)

POM-VPS medicines include those for internal and external parasites and some vaccines. RAMAs must follow the Veterinary Medicines Regulations, a code of practice, and commit to continued professional development to ensure they prescribe responsibly.

Antibiotics

Antibiotics are categorised into different groups according to their chemical structure and the way they kill or halt the growth of bacteria. Antibiotics vary in the way they are distributed within the body, how long they remain active after dosing, how long they persist in the animal and the range of bacteria against which they are effective. They are not effective against viruses, although they can be used to control secondary bacterial infections if prescribed by the vet.

Antibiotic use in animals can be divided into three categories:

1. Curative or therapeutic – treatment of a sick animal or group of animals after the diagnosis of disease or infection has been made.
2. Control or metaphylactic – treatment of a group of animals after the diagnosis of disease has been made in part of the group. The aim is to treat clinically sick animals and control the spread of disease to others in close contact, which may already be subclinically infected.
3. Preventative or prophylactic – treatment of an animal or group of animals before clinical signs of disease. The aim is to prevent the occurrence of disease or infection.

Responsible use of antibiotics

Key priorities for those using antibiotics in animals are:

- To avoid the use of highest-priority critically important antibiotics (HP-CIAs), only using when no other antibiotic would be clinically effective
- To avoid the routine use of preventative or prophylactic antibiotics

Antibiotics should not compensate for poor hygiene or inadequate husbandry

conditions. For example, the routine use of antibiotics to control watery mouth in newborn lambs is not necessary when ewes are adequately fed in late pregnancy and lambs are born into a clean and dry environment and get sufficient quantity of quality colostrum quickly enough (the 3 Qs of colostrum).



Some classes of antibiotic, such as fluoroquinolones, third- and fourth-generation cephalosporins and colistin, have been classified as critically important antibiotics for use in humans. Vets are advised only to use these antibiotics as a last resort, when no other product would be clinically effective for the condition being treated.

Red Tractor standards specify that your vet must review medicine records and antibiotic use data annually, including the use of HP-CIAs and any prophylactic treatments, to make recommendations to reduce antibiotic usage where appropriate without negatively affecting welfare.

There is a drive for the livestock industry to voluntarily demonstrate responsible antibiotic usage through the use of national data recording tools.

Medicine Hub is a safe, secure and independent database to collate, report and compare antibiotic data for UK cattle and sheep farms. It has been developed by industry to enable the UK cattle and sheep sectors to prove our commitment to responsible use of medicines to the public, the supply chain and to competitors and customers around the world. For more information, see page 25.

Useful tools and further reading

AHDB has developed dairy and sheep antimicrobial usage calculators, designed to provide an estimation of usage on farms. These calculators are useful to use in combination with your health plan. To download a calculator, visit ahdb.org.uk/tools

RUMA has developed responsible-use guidelines for all livestock sectors in collaboration with industry (ruma.org.uk).

Farm Vet Champions, provided through RCVS Knowledge, provides vets with over 20 hours of continuing professional development (CPD) on good antimicrobial stewardship practices. See knowledge.rcvs.org.uk/amr/farm-vet-champions

Further tips and guidance on how colostrum can play a vital role in animal performance, health and reduced antibiotic use can be found at colostrumisgold.org

More information on risk categories of antibiotics is available on the RUMA website: ruma.org.uk/risk-categorisation-for-antibiotics

The use of antibiotics in livestock is regularly reviewed – please be aware that risk categorisation may change at any time.

Antibiotic sensitivity testing

Whenever possible, and especially in cases where a number of animals are affected, samples should be taken from sick animals and submitted to a laboratory for bacterial culture. The bacteria causing disease can be tested against different antibiotics to identify which ones are likely to be the most effective. This is called antibiotic sensitivity testing.

If an animal is very sick, it may have to be treated before the results are known, but treatment of any further cases can be based on the result of the sensitivity testing. It is important that this testing is done to select the best possible treatment for sick animals and also to monitor antibiotic resistance patterns.

Reducing the need to use antibiotics

Antibiotics are not always necessary for some of the common ailments in livestock. Sometimes, a painkiller and/or anti-inflammatory will have better results. Check with the vet if you are unsure which medicine to use.

No antibiotic should be used for routine or blanket treatment to prevent infection. There may be situations where preventative antibiotic use is necessary, but this must always be under veterinary advice. For example when deciding which cows need antibiotic dry cow therapy this should be based on a risk assessment agreed with your vet. This is a subtle change in decision making. Previously farmers and vets made selective dry cow therapy decisions based on which cows did not require antibiotics; now decisions should be made as to which cows may require antibiotics to prevent future infections.

Many health issues can be prevented through good husbandry, vaccination and management practices, including:

- Making sure all newborns get enough good-quality colostrum quickly enough to give them antibodies to protect them from disease
- Maintaining good hygiene and general conditions on the farm to prevent disease, e.g. keeping lambing and calving pens clean to reduce infection at a vulnerable age
- Cleaning and disinfection of houses and equipment between groups of animals; all-in all-out systems
- Applying rigorous disease-control measures, e.g. vaccination of cattle to prevent pneumonia, vaccinating sheep to prevent abortion
- Good ventilation – enough airspace and clean air without draughts
- Closed herds where all replacement animals are bred on farm
- Purchase of animals from disease-free herds
- Quarantining all animals brought on farm until tested and shown to be free of new diseases
- Isolating and quarantining sick and infected animals
- Preventing contact with other animals at farm boundaries, e.g. 3 m double fencing
- Keeping age groups separately to avoid disease transfer; not holding poor-doers back
- Using skilled stockpersons and good husbandry practices while handling animals on farms and during transport to reduce stress (stressed animals have a lower immunity to disease)
- Making sure water and feed is free from contamination
- Breeding for disease resistance (resistant animals will require a lower number of treatments with antimicrobials)
- Taking sensible precautions to ensure people, products, vehicles and equipment brought on farm are not contaminated with manure and other animal material, such as those produced at calving or lambing, which could contain bacteria or viruses leading to disease
- Eliminating disease on your farm, e.g. BVD, sheep scab
- Applying good practices for waste management, e.g. slurry storage before land spreading



Resistance

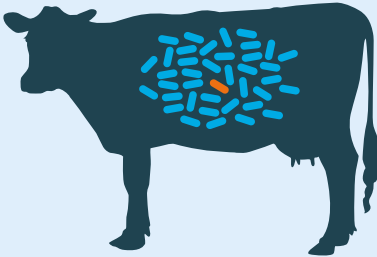
Antimicrobial resistance is a major global threat of increasing concern. Livestock producers have an important responsibility to protect human and animal health by using antibiotics and anthelmintics responsibly in order to minimise the risk of antibiotic resistance (AMR) and anthelmintic resistance. While the sensible use of antimicrobials is important to treat animal diseases, its overuse and misuse can contribute to antimicrobial resistance. A unified One Health approach to address AMR requires everyone working with or using antimicrobials to commit to an approach that aims to sustainably balance and optimise the health of people, animals and ecosystems. On the livestock side,

this requires everyone working with livestock to minimise the need for and use of antimicrobials, while maintaining animal health, welfare and productivity.

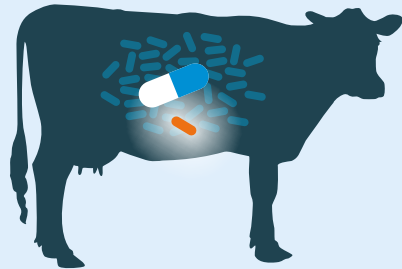
Antibiotic use and resistance

When an antibiotic is used, bacteria that can resist that antibiotic have a greater chance of survival than those that are 'susceptible', and those that are not killed quickly multiply. Some resistance occurs naturally as a random mutation in some individual bacteria can produce and use antibiotics against other bacteria, leading to a low level of natural selection for resistance to antibiotics.

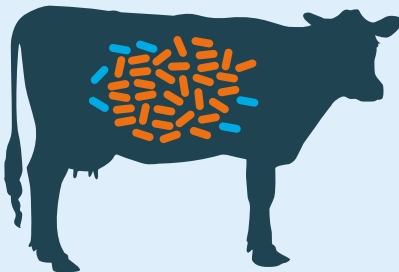
1 Antibiotic resistance occurs when an antibiotic is no longer able to effectively control or kill bacteria.



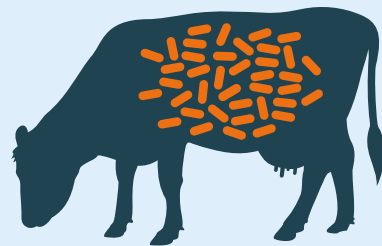
2 When an antibiotic is used, bacteria that can resist that antibiotic have a greater chance of survival than those that are 'susceptible'.




3 These resistant bacteria can multiply and can outnumber the susceptible bacteria.

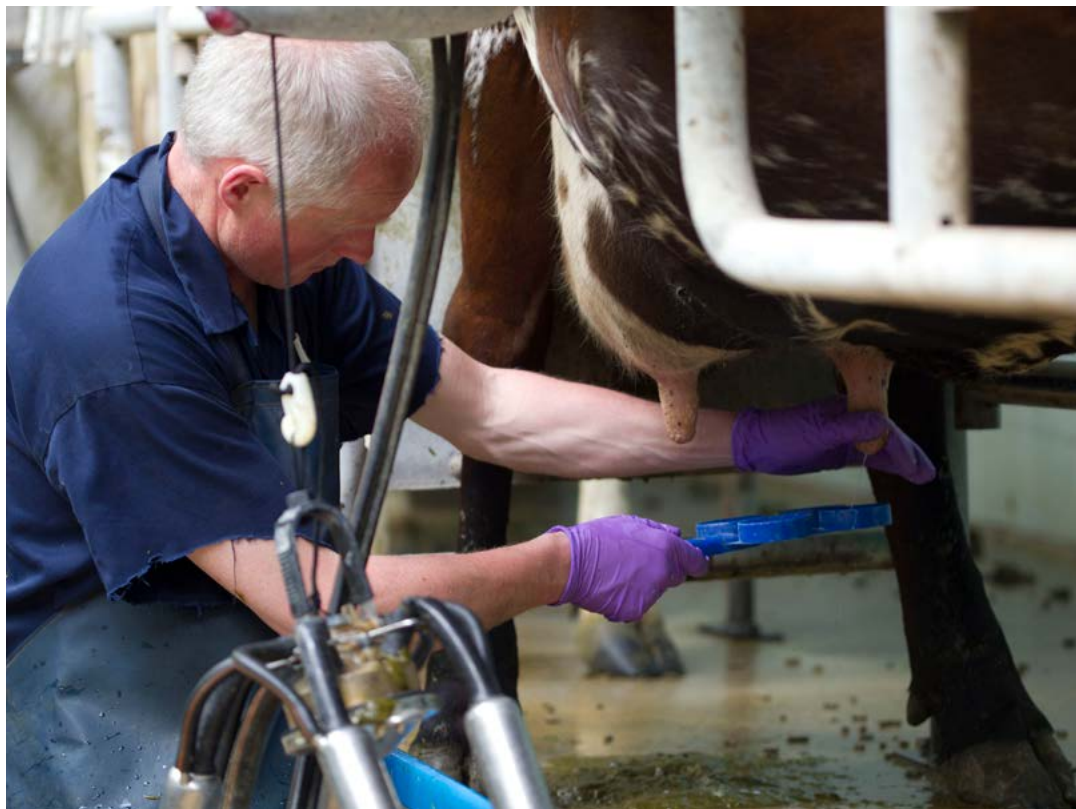


4 Antibiotic resistance means that the bacterial infection can become life-threatening or life-limiting.



 Susceptible bacteria

 Resistant bacteria



However, the current higher levels of antibiotic-resistant bacteria are attributed to the overuse and incorrect use of antibiotics, both in human healthcare and in the agriculture sector.

Some bacteria are naturally resistant to certain types of antibiotics. Some mutate to produce enzymes that ‘deactivate’ antibiotics, while other mutations change the target area on the bacteria that the antibiotic would normally attack. Some even create mechanisms to push the antibiotic back out of the cell when it attacks. Bacteria can acquire antibiotic resistance genes from other bacteria in several ways. They can transfer genetic material through a simple ‘mating’ process or through plasmids that ‘reprogramme’ other bacteria to be resistant to antibiotics.

Antibiotic resistance spreads as bacteria themselves move from place to place through direct animal contact or by contaminated materials and housing and in water, food and air. People can transfer resistant bacteria, for example, on unwashed hands or by coughing.

Golden rule

The golden rule for using antibiotics and anthelmintics in all livestock is: As little as possible, but as much as necessary.

Improving the nutrition and environment of animals will often improve their health and welfare, reducing the need to use these medicines.

Anthelmintics

Anthelmintics are categorised into groups according to the parasites they are effective against, e.g. wormers and flukicides. They are in groups according to the way in which the chemical acts on the parasites.

Understanding these groups is important so that the treatment is targeted to the correct parasite at the relevant stage of its life cycle. More information on anthelmintic groups is available from SCOPS and COWS.

Resistance

It is important to monitor how effective different anthelmintic groups are on the farm. Presently, the easiest way to check for anthelmintic resistance is to look for the presence of the parasite after treatment, usually by looking for parasite eggs in faeces.



Anthelmintic resistance in worms and liver fluke does not pose a risk to human health but is a threat to profitable farming. In many areas of England, resistance has been identified (mainly in sheep) to the three main wormer groups (white: 1-BZ, yellow: 2-LV and clear: 3-ML) and to the

flukicide triclabendazole, due to overuse and incorrect use. In 2018, the first UK case of resistance to the orange (4-AD) wormer group was also reported. Untreatable worm or liver fluke burdens can cause major health, welfare and production losses.

Many farms already have some form of anthelmintic resistance present in their livestock. However, care should be taken to avoid introducing resistance not already present on the farm when buying in animals. With some forward planning and advice from your vet, quarantine testing and treatments for new and returning livestock (e.g. returning from grazing away) not only protect your existing livestock against resistant worms and fluke but can be widened out to other disease risks too.

Anthelmintic resistance is only one of the reasons why treatment may appear not to have been effective. Other reasons include under-dosing; failure to follow the manufacturer's instructions; rapid reinfection after treatment from highly infective pastures; or use of the incorrect product for the target species, or stage of life cycle. If there is doubt about how well a product is working, talk to your vet or registered animal medicines adviser about doing a wormer or drench test to check for resistance.

For more information on internal and external parasites and anthelmintic resistance in livestock, visit scops.org.uk for sheep or cattleparasites.org.uk for cattle.

Reducing the need to use anthelmintics

Overuse or poorly targeted use does not just increase the risk of parasites developing resistance, it can also be a waste of your time and your money.

Carrying out a faecal egg count (FEC) before worming can help determine if anthelmintics are necessary. FECs can be done in four ways: through the vets, merchants, a commercial laboratory or DIY. They can also be used to check that the anthelmintic being used is effective, ensuring that you chose the appropriate drug and helping you to maintain drug effectiveness on the farm for longer.

Monitoring growth rates can provide a useful indication of the need for targeted treatment of individual animals. If youngstock are failing to meet growth targets during the grazing season in spite of good nutrition, a worm burden is a likely cause.

However, remember that the clinical signs of one disease may be the same as for other conditions.

A common example of this would be early-season lambs with coccidiosis being treated for worms, and vice versa. Speak to your vet or health adviser about testing before treating to ensure you don't waste time and money on the wrong treatment.

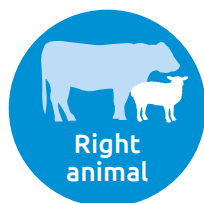
Similarly, it is important to test before treating for liver fluke. Diagnostic tests and treatment options vary according to the life stage of the liver fluke. The threat of liver fluke varies between fields, farms and years – keeping a record of areas on the farm most likely to present a fluke risk can provide a useful tool.

More information on worming can be found in **Worm control in sheep**, **Liver fluke control in grazing livestock** and the **Parasite control guide**, available at ahdb.org.uk



Best-practice medicine use

The **five Rs** of using medicines are: **right** animal, **right** medicine, **right** route, **right** dose, **right** time. Only animals with bacterial infections will benefit from antibiotic treatment. To this we can also add two further Rs – record all medicine use and report any treatment failures to your vet or the VMD.



Follow these guidelines

- Record date, dosage, animal and withdrawal period
- Complete the full course prescribed by the vet or RAMA
- Only use medicines that have been stored at the correct temperature and are not contaminated by dirt or other medicines
- Adhere to withdrawal periods
- Do not use medicines that are past their expiry date or beyond the specified shelf life after the bottle has been opened
- Dispose of unused or expired medicines (and sharps) safely
- Report any adverse reactions or treatment failures to your vet or the VMD

Right medicine, right animal

Medicines must only be used on prescription and under instruction of a veterinary surgeon who has the animal(s) to be treated under their care and should follow a veterinary visit or consultation. The welfare and likely recovery of the animal(s) to be treated must be considered before starting treatment and regularly reassessed during its course.

Best practice

- If animals are not responding to treatment, veterinary advice should be sought as soon as possible
- Medicines should only be used in line with the guidance provided in your veterinary health plan for specific clinical signs and disease conditions. If any other disease signs are observed, a veterinary surgeon should be consulted before antibiotics are administered
- Medicines prescribed for one condition should never be used for a different condition or species without authorisation from your vet
- Antibiotics should only be used for disease control under veterinary guidance and until alternative methods are fully implemented or where there are no effective alternative ways to control disease. For example, changing the vaccination schedule or making management changes may allow disease to be controlled without the need for antibiotics
- The number of animals receiving antibiotics should be kept to the minimum required. The smallest possible number of animals should be treated, but the health and welfare of at-risk animals should not be compromised
- Early isolation of animals showing signs of disease can reduce its spread, minimising the number requiring antibiotic treatment

Right time

Prompt treatment reduces animal suffering, improves the chances of recovery and reduces the risk of disease spreading to other animals in the group.

Sick animals should be isolated from healthy animals to reduce disease spread. Isolation has the added advantage of making it easier to administer repeat doses where a course of treatment is required.

Right dose

Getting the dosage right is very important, regardless of the medicine being used.

Every medicine licensed in the UK has undergone rigorous testing to calculate the optimum dosage and route of administration for each species for which it is licensed. This information is provided on the data sheet, box or bottle supplied with the medicine.

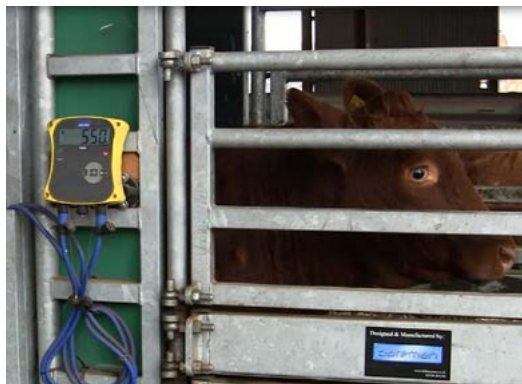
It is vital to give the correct dosage when treating an animal. This is to avoid the

drug not working and resistance developing because of overdosing or under-dosing. Animal welfare can also be compromised by overdosing, as many medicines are toxic if too much is given. The stated milk and meat withdrawal times only apply if the medicine has been given at the correct dosage by the right route of administration.

There may be times when the vet will prescribe medicines to be used at a dosage rate that differs from that stated on the data sheet or for a species that is not listed. In these cases, the vet will advise on the withdrawal periods that apply.

Dosages are usually given in millilitres per kilogram (ml/kg). Always weigh animals before treatment – judging weight by eye nearly always underestimates an animal's weight.





When a group of animals are to be treated, weigh the heaviest and the lightest animal in the group. If there is a wide variation between the heaviest and lightest animal, split the group into subgroups of more even weight. Within each subgroup, calculate the dosage according to the heaviest animal in the group. The data sheet will give additional important information, such as the maximum volume that can be injected in one site and any special precautions.

Remember

Check the accuracy of the weigh scales before starting.

Example dose rate

Dose weight	2 ml/20 kg
Animal weight	65 kg
$65 \div 20$	3.25
3.25×2	6.5 ml

Complete the full course

When the vet prescribes a course of treatment, it is important this is completed, even if the animal appears better after only one or two doses.

If the course has not been completed, some bacteria may have survived and there is a danger the animal may relapse. More importantly, the surviving bacteria are the ones that are the least susceptible to the antibiotic, which leads to selection of a resistant strain of bacteria.

Right route

There are seven main routes to administer animal medicine:

1. Subcutaneous injection (S/C or sub-cut) – under the skin.
2. Intramuscular injection (I/M) – into the muscle.
3. Intravenously (I/V) – into the vein (this is a vet-only procedure).
4. Oral drench.
5. Pour-on – onto the skin.
6. Intramammary – into the teat canal (for mastitis or dry cow treatments).
7. Topical (spray, eye ointment).

Each medicine used on farm will have its own recommended route of administration. Check the label on the bottle and read the data sheet, even if the medicine has been used before.



Administration

It is important to follow the administration guidelines – how quickly a medicine starts to work and how long it persists in the animal can be affected if medicines are administered incorrectly.

Do not handle a product if you know you are allergic to any of the ingredients. There is a risk of allergic reactions through contact with antibiotics. Wear gloves and/or wash your hands after contact.

When giving an injection, consider cleanliness

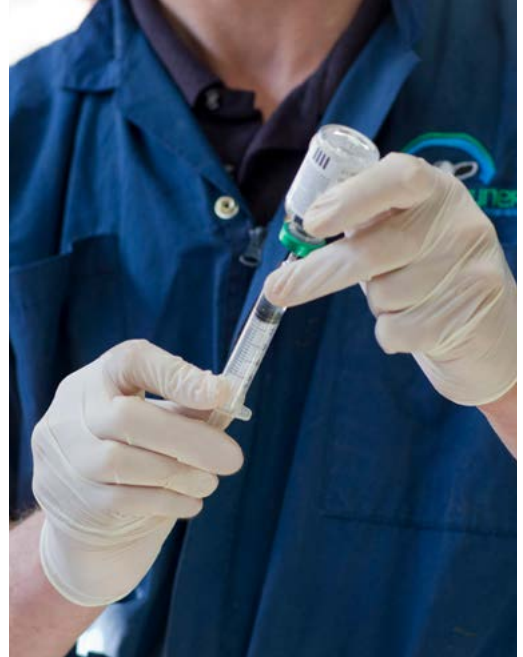
- Use a new sterile needle and syringe. Modern syringes and needles are designed to be used only once
- When injecting a large number of animals in a short space of time, the same needle may be used for several animals, but the needle should still be changed frequently, e.g. after every 10 animals
- Only inject into a clean area on the animal

Good animal restraint prevents injury to humans and animals. It prevents the needle breaking off at the hub when the animal moves suddenly, prevents accidental self-injection and allows the injection site to be clearly seen.

As part of Red Tractor's standards, you must have a broken needle policy in your health plan; an example of a broken needle policy can be found on the Red Tractor website. Good needle practice is a crucial tool to maximise value after slaughter and to minimise risk to consumers.

The volume of product to inject

The data sheet will state the maximum volume that can be injected at one site. Split large volumes into smaller amounts and inject in different locations.



Oral administration/drenching

It is important to ensure that the equipment you are using will deliver the right amount, particularly if treating a large number of animals. Keeping the equipment clean helps with accurate dosing

Load your equipment with the correct dosage and check that the right amount is delivered by emptying into a measuring device (such as a syringe) or by weighing what is delivered. Remember to shake the container of medicine to mix its contents before use.

Regularly check the settings on your equipment if doing large numbers or different groups of animals.

Best practice

1. Restrain the animal's head in a horizontal position – a slight tilt may improve access, but do not pull the head too far back or too far to one side.
2. Insert the nozzle of the drench gun into the corner of the mouth in the gap in between the incisor teeth in front and the molar teeth.
3. Once the nozzle is inside the mouth, position it so that it rests just above the back of the tongue – do not jam it in as you can easily damage the back of the throat and cause pain, injury and even death.
4. Make sure that the nozzle doesn't point directly down the back of the throat. If it's too deep into the throat, it may prevent the animal from swallowing.

For more information, see the video ***Correct drenching technique – sheep worming*** and for cattle, see ***How to administer anthelmintics*** available on the AHDB Beef & Lamb YouTube channel.

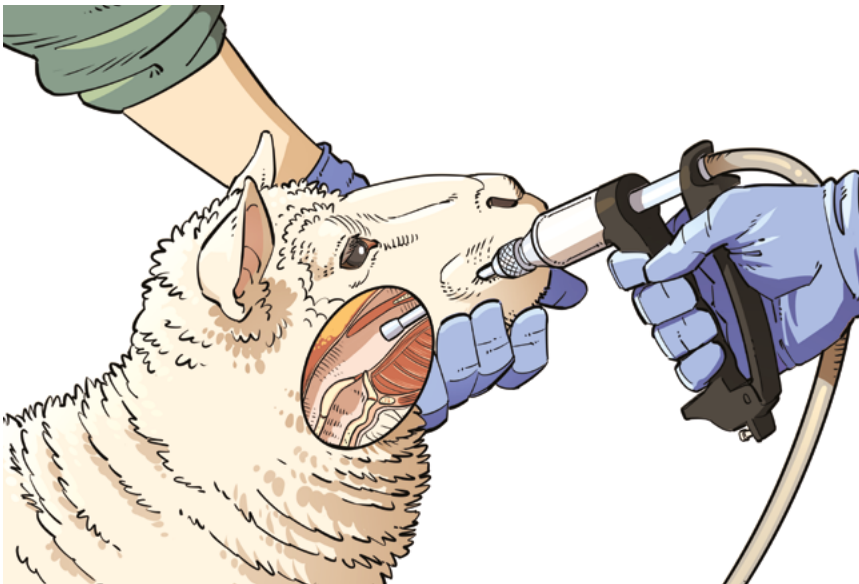
Injection techniques

The size of the needle

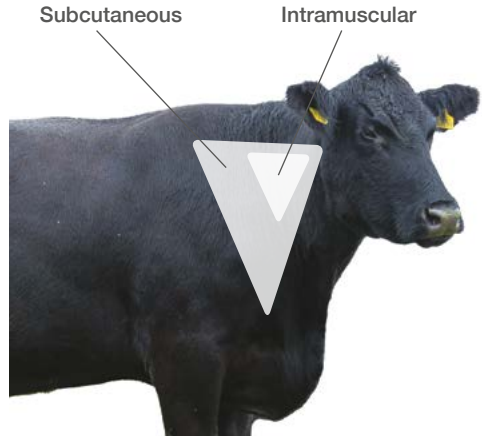
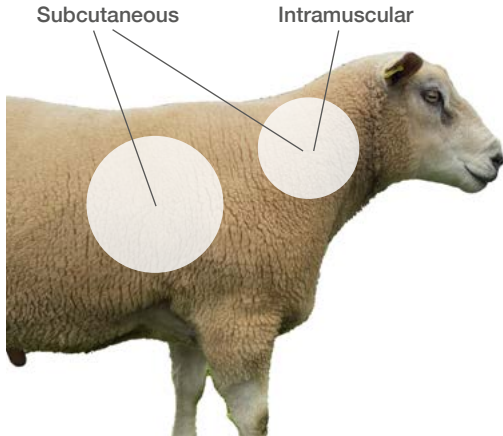
As a general rule, use a short needle for subcutaneous injections and a longer one for intramuscular injections. For example, for large cattle, a 0.5 to 1-inch needle for subcutaneous injections, and a 1.5-inch needle for intramuscular injections. Smaller animals, such as calves and sheep, have a smaller muscle mass, so a shorter needle may be better to prevent injury to nerves and other tissues.

Best practice

- Always use the smallest gauge needle for the product and volume to be injected. This will minimise damage to the tissues and reduce leakage of the product from the injection site
- Change needles frequently and use for no more than 10 injections
- Never attempt to straighten a bent or burred needle because it is much more likely to break or to break off in the process of injection



Correct drenching position



How to inject farm animals for the best results and to minimise carcass damage

Subcutaneous injections

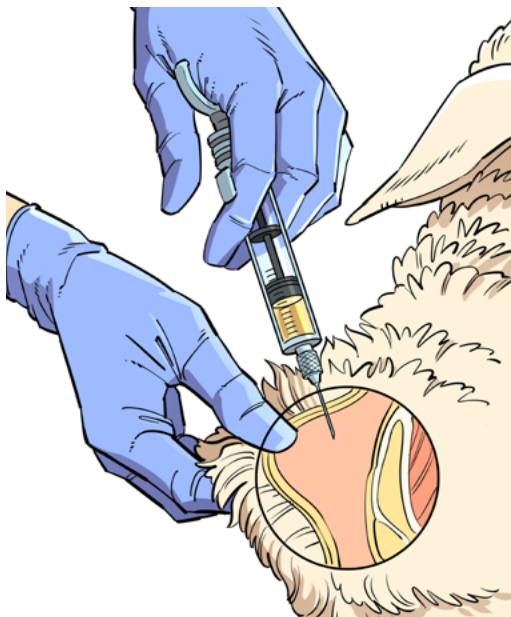
Subcutaneous injections are administered in areas where the skin is loose, mainly in the neck or behind the shoulder.

Best practice

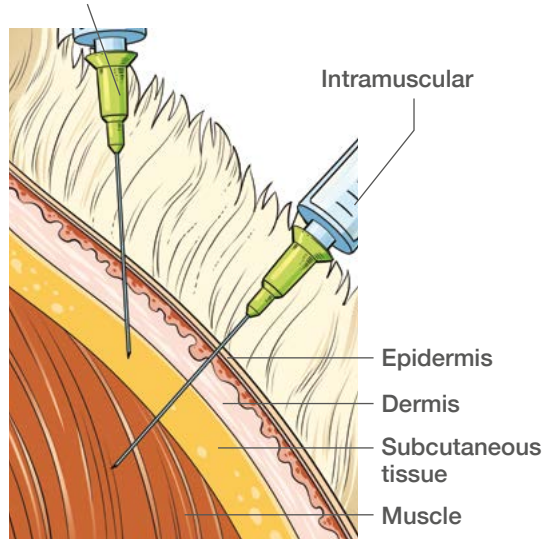
1. Grasp a fold of skin and slide the needle through the skin, parallel to the animal's neck or trunk. This will avoid penetration of underlying muscle.

2. Insert the needle away from your hand to avoid accidental self-injection. The plunger of the syringe should always be pulled back after entry to ensure the needle is not located within a blood vessel. If blood is drawn into the syringe when the plunger is pulled back, reposition the needle and check again.

3. After the injection, briefly massage the site to improve the dispersal of the injected material.



Subcutaneous



Intramuscular injections

The main site for intramuscular injection is the muscle mass of the neck, for which the animal must be adequately restrained. This ensures no valuable cut of meat is damaged, particularly the hindquarter cuts. The constant movement of the neck ensures good dispersion of the product.

1. Make sure the injection site is clean and dry.
2. Draw up the solution for injection into the syringe.
3. Disconnect the needle and hold the hub firmly between thumb and middle finger. With your fist, 'thump' the muscle where the injection will be made – this may help desensitise the area.
4. Insert the needle into the muscle to the hub with a sharp slap action.
5. Connect the syringe to the needle, taking care not to introduce any dirt. If blood is drawn into the syringe when the plunger is pulled back, reposition the needle and check again. Then slowly inject the contents of the syringe over 10 seconds. Do not inject too quickly as this may cause the animal pain.
6. After the injection, gently massage the injection site.

Inserting the needle when connected to the syringe can make it more difficult to insert to the correct depth with a single movement. The syringe hub is the weakest point and will often snap if the animal moves, rendering the contents of the syringe useless and creating potential animal-welfare and meat-safety issues.

Preventable deaths and carcass quality

Knowing how to administer medicine may seem simple, but data from the AHDB Beef & Lamb Fallen Stock project (2015) found 3.5% of ewe deaths were caused

by dosing gun and bolus injuries. These were completely preventable.



Dosing gun injury (circled)

In England in 2021, over 1.8% of sheep carcasses (219,340) and almost 0.5% of cattle carcasses (8,577) contained abscesses. The causes of these abscesses include incorrectly administering subcutaneous and intramuscular injections or using dirty or blunt needles.

Abscesses have to be cut out of the carcass, taking time and reducing meat yield, as well as potentially devaluing the primal cuts or whole carcass.



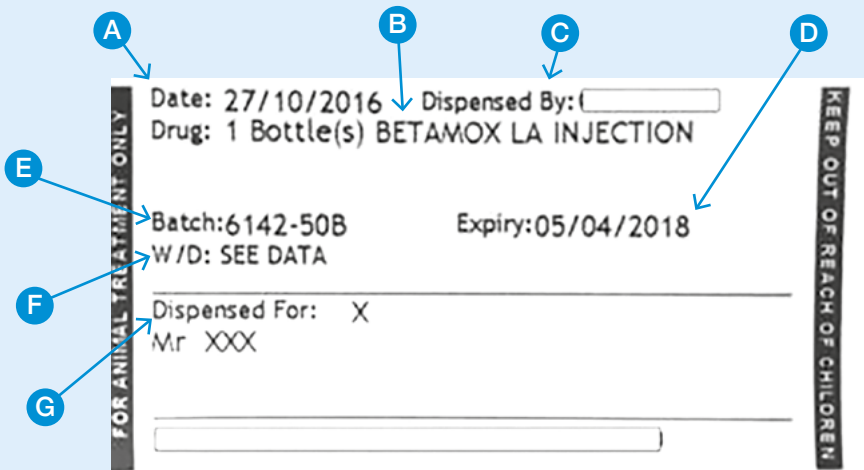
Abscess (circled)

Medicine labelling

All medicines prescribed by the vet will have a label attached to them. Be sure to follow label instructions carefully as they are the official recommendations on how to use a medicine and are the most cost-effective way to administer a drug.

Ignoring or altering dosages, administration routes, expiry dates or storage recommendations may result in the drug being ineffective and can be detrimental to animal health and farm finances.

Information found on a medicine label



- A** This is the date the bottle was dispensed for your purchasing/medicine records.
- B** Name and amount of the drug being dispensed. This will also be on the main label on the bottle.
- C** This is the person who dispensed the drug so it can be traced back if there are any problems.
- D** This is the expiry date of the drug. Once past this date, the drug may not work.
- E** Batch number of the drug for the farm records.
- F** Withdrawal information. If not specifically printed here, the information will be clearly visible on the back of the bottle or the data sheet.
- G** Farmer's name, farm name and address will be printed here. There will also be details of dosage and administration. If the label states 'use as directed', the dosage and administration information will be clearly visible on the back of the bottle or data sheet (or packaging insert).

Information found on the medicine datasheet or bottle

STATEMENT OF ACTIVE AND OTHER SUBSTANCES
 A white to off-white aqueous suspension for parenteral administration. Each ml contains:

Procaine Penicillin	200 mg
Dihydrostreptomycin Sulphate	250 mg

and 1.5 mg Hydroxybenzoate Esters (as Nipasept sodium) as antimicrobial preservative and 1.25mg sodium formaldehyde sulphoxylate dihydrate as antioxidants.

TARGET SPECIES
 Cattle, Horses, Sheep, Pigs

INDICATIONS
 [] is indicated for use in cattle, horses, pigs and sheep for the treatment of infections caused by, or associated with, organisms sensitive to Penicillin and/or Streptomycin including: *Arcanobacterium pyogenes*, *Erysipelothrix rhusiopathiae*, *Klebsiella pneumoniae*, *Listeria spp.*, *Mannheimia haemolytica*, *Pasteurella multocida*, *Staphylococcus spp.*, *Streptococcus spp.* and *Salmonella spp.* [] will therefore be effective in the treatment of infections caused by susceptible organisms including: erysipelas; navels/joint ill; respiratory tract infections including pneumonia and atrophic rhinitis; listeriosis; meningitis; septicaemia; toxæmia associated with mastitis; urogenital tract infections; enteritis associated with *Salmonella spp.*, salmonellosis; and the control of secondary bacterial invaders in diseases of primary viral origin. The combination of penicillin and dihydrostreptomycin is especially useful in the treatment of mixed infections involving both Gram-positive and Gram-negative organisms.

METHOD AND ROUTES OF ADMINISTRATION
 Shake the container before use. The recommended daily dose for cattle, horses, pigs and sheep is 8 mg procaine penicillin and 10 mg dihydrostreptomycin sulphate per kg bodyweight achieved by administering 1 ml [] per 25 kg bodyweight. The dose should be given once daily by deep intramuscular injection for up to three consecutive days. The maximum dose volume administered at sheep and 15 ml for pigs.

WITHDRAWAL PERIOD
 Animals must not be slaughtered for human consumption during treatment.
Sheep: Milk- Not to be used in sheep producing milk for human consumption. Meat- 31 days.
Cattle: Milk- 60 hours. Milk for human consumption must not be taken during treatment. Meat- 23 days.
Pigs: Meat- 18 days.
Horses: Not to be used in horses intended for human consumption. Treated horses may never be slaughtered for human consumption. The horse must have been declared as not intended for human consumption under national horse passport legislation.

- A** These are the species that the medicine has been licensed for.
- B** These are the infections that the medicine can be used to treat. Veterinary advice should always be sought to ensure an accurate diagnosis has been reached.
- C** This is where information on dosage rates and how to administer the medicine can be found. This information should be followed carefully.
- D** Medicine usage should be written down in order to keep track of withdrawal periods. It is an offence to send animals to slaughter while still in the withdrawal period of a medicine.

SPECIAL WARNINGS, IF NECESSARY
 Contraindicated in known cases of hypersensitivity to penicillins. Occasionally in sucking and fattening pigs administration of this product may cause a transient pyrexia, vomiting, shivering, listlessness and inco-ordination. Additionally in pregnant sows and gilts, a vulval discharge which could be associated with abortion, has been reported. Care should be taken not to exceed the recommended dosage.

Operator Warning - Penicillin/Cephalosporin Sensitivity
 Care should be taken to avoid accidental self-injection. In the case of accidental self-injection, seek medical advice immediately. Penicillins and cephalosporins may cause sensitisation following injection, inhalation, ingestion or skin contact. Sensitivity to penicillins may lead to cross sensitivity to cephalosporins and vice versa. Allergic reactions to these substances are occasionally serious.

1. Do not handle this product if you know you are sensitised, or if you have been advised not to work with such preparations.
2. Handle this product with great care to avoid exposure taking all recommended precautions.
3. If you develop symptoms following exposure, such as a skin rash, you should seek medical advice and show the doctor this warning. Swelling of the face, lips or eyes or difficulty breathing are more serious symptoms and require urgent medical attention.
4. Wash hands after use.

SPECIAL STORAGE CONDITIONS
 Do not store above 25°C. Protect from light. Following withdrawal of the first dose, use the product within 28 days. Discard unused material. Keep container in outer carton.

SPECIAL PRECAUTIONS FOR THE DISPOSAL OF UNUSED PRODUCTS OR WASTE MATERIALS.
 Dispose of any unused product and empty containers in accordance with guidance from your local waste regulation authority.

POM-V To be supplied only on veterinary prescription

Keep out of the reach and sight of children.

NAME AND ADDRESS OF THE MARKETING AUTHORISATION HOLDER
 Manufactured by: []
 Distributed by: []

MARKETING AUTHORISATION NUMBERS
 ManA: 2000
 VM: 02000/4100

- E** This section includes any adverse reactions to the medicine that have been reported. Any adverse reactions should be reported to the vet.
- F** These are warnings for the person administering the medicine. Read carefully, as some medicines are dangerous to pregnant women.
- G** These are instructions on how the medicine should be stored. These are different for every medicine, so always check the bottle or data sheet.
- H** This is the class of the drug, which indicates who is allowed to prescribe and sell it.

Medicine storage

Every medicine has its own specific storage instructions, which can be found on the label or in the packaging insert. These should be followed closely as many medicines are sensitive to light and temperature. The active ingredient in the medicine will be compromised if it is not stored correctly, causing it to be less effective, if not completely ineffective.

Make sure medicines are stored in an appropriate locked store – either a medicine cabinet or fridge, rather than leaving them in farm vehicles, sheds or near livestock pens or handling equipment.

The fridge temperature should be maintained between 2°C and 8°C. This should be checked regularly using a thermometer as a recent survey found that many farm fridges were either too warm or too cold.



For fragile medicines, such as live vaccines, being stored at the incorrect temperature can destroy the vaccine and render it totally ineffective. Using min-max thermometers to monitor the temperature

of medicine storage areas will help ensure you know if a product has been exposed to temperatures that render them ineffective.

The middle of a fridge generally has the most constant temperature, so this is the best place to store medicines that require refrigeration. Keep bottles in their boxes as this helps protect medicines from light.

Take care when transporting medicines. If the medicine is supposed to be kept refrigerated, it should not be allowed to warm up at any time. Use a cold box or bag to transport medicines and avoid leaving them in a vehicle for any length of time.

Medicines shelf life

Every medicine has a specific shelf life after the bottle or container has been opened for the first time. This will be stated on the product label and on the data sheet. It is important to check this and to record both the date of first opening and the date after which the medicine should not be used. Continuing to use medicines after this time may be ineffective or harmful to the animals treated.

When drawing multiple doses out of the same bottle of injectable medicine, either use a multi-dose syringe or leave a clean needle in the bottle to reduce the number of times the bottle is pierced. Always change to a new needle when drawing from a different bottle of medication because using the old needle may introduce contamination.

Never re-enter a bottle of injectable medicine with a needle that has already been used for an animal injection as this will risk contamination. Remove all needles from bottles before storing.

Disposal

All out-of-date or unwanted animal medicines, containers, syringes and needles must be disposed of safely.

Always follow any specific advice on the label with regards to disposal. Do not hoard partly used medicines in case they may be useful later and never pass them on to anyone else; it is illegal to do so.

Speak to the vet regarding disposal as they should be able to provide a DOOP (disposal of old pharmaceuticals) bin, which you can use for old bottles and used syringes.

Most vets offer a service whereby the filled bin is returned to the vet practice for collection and disposal by a registered waste disposal contractor. Sharps must be disposed of in a purpose-made container and removed through an approved route. They should never be put in domestic waste. Most vets will also provide a sharps container for used needles.

A record should be made of any medicines that have been disposed of and not used to treat animals.

If a medicine changes colour or becomes thick or lumpy, check with the vet that it is still safe to use. The medicine will probably be wasted and have to be discarded appropriately and a new bottle used. It is important to inform the vet if there are any adverse reactions in treated animals.



Recording medicine use



Keeping up-to-date records of medicine purchase and use is a legal requirement. It is also the only way to keep track of withdrawal periods. Records are important on the rare occasions when a medicine causes an adverse reaction or is ineffective.

At a minimum, recording requirements must comply with the Veterinary Medicines Regulations 2013.

This legislation will be updated in 2024 by the Veterinary Medicines (Amendment etc.) Regulations 2024. The VMD has provided draft guidance on the upcoming changes, which can be found on the VMD Information Hub: gov.uk/guidance/vmd-information-hub

The owner or keeper of food-producing animals must keep the documentation relating to the purchase of all veterinary medicinal products acquired for those animals for five years. The following must be recorded:

- Name of the product and the batch number
- Date of acquisition
- Quantity acquired
- Name and address of the supplier

At the time of administration, the keeper must record:

- Name of the product
- Date of administration
- Quantity administered
- Withdrawal period
- Identity of the animal(s) treated

If a veterinary surgeon administers a veterinary medicinal product, they must record the outlined information relating to administration, the batch number and their name in the keeper's records, or provide this information to the keeper in writing and the keeper must then enter it in their records.

If the keeper disposes of a veterinary medicine other than by treating an animal, they must record:

- Date of disposal
- Quantity of product disposed
- How and where they disposed of it

Medicine records are also useful for monitoring the incidence of disease or identifying trends in disease outbreaks.

Records can be used to see if any management changes, such as introducing a vaccination programme, have reduced the number of animals requiring antibiotic treatment.

Medicine Hub

EU legislation requires nations to operate centralised recording of antibiotic use in cattle (2023 calendar year data reported in 2025) and sheep (2026 data reported in 2027). While the UK is outside the EU, aligning with this is desirable to protect our reputation domestically and to retain a competitive trading position.

Medicine Hub is the industry-driven initiative supported by industry organisations, milk and meat buyers, food processors, retailers and the veterinary profession. It was developed by AHDB and will provide evidence of the ruminant sector's responsible approach to the use of antibiotics.

Antibiotics have a role in managing the health of animals and must be used appropriately to safeguard their future use, for both animal and human health. Without a national database to measure use, it's impossible to provide evidence of what is happening at a national or individual farm level. Sharing antibiotic usage data with Medicine Hub will help protect the reputation of the UK ruminant sector, as well as ensuring access to these important medicines in years to come.

How to enter your data into Medicine Hub

- Farmers can enter their data directly onto the Hub
- Farmers can ask their vets or other agents to do it on their behalf
- Where data is already being collected by the supply chain, for example milk processors, this existing information can be uploaded by these bulk data holders with the permission of the farmer

There are guides on registering an enterprise and uploading medicine data at ahdb.org.uk/medicine-hub

Help is also available via email medicinehub@ahdb.org.uk or telephone: 024 7771 9414.

Protecting your data

The farmer always owns the data and controls who can and cannot have access to it. Medicine Hub will only report aggregate and/or anonymised data, unless the farmer specifically gives permissions to other third parties, typically their vets, to view their individual enterprise data.

Farm assurance

Recording antibiotic use has been part of Farm Assured Welsh Livestock (FAWL), which is operated by Welsh Lamb and Beef Producers (WLBP), for some time. Red Tractor is introducing a recommendation in 2024 for members to upload data to Medicine Hub, or an equivalent, sharing data with the Hub. Other assurance schemes are likely to follow.

The health plan

Herd or flock performance should be reviewed with the medicine records with the vet regularly and at least annually. This will enable the vet to make informed decisions on the best use of medicines on the farm.

Use of antibiotics must not become habitual, as this can increase the risk of resistance developing. This could limit treatment options in future disease outbreaks and have a negative effect on the health and welfare of your livestock. Where antibiotics are being used repeatedly or for longer periods of time, usage should be reviewed and refined every quarter. All changes should be documented every quarter in the veterinary health plan.

The following can be useful when reviewing with your vet whether to continue or discontinue antibiotic treatments:

- Careful observation of your animals, including any changes in feeding habits, water consumption, behaviour or other signs of disease. This should be supported by clinical examination and observation by your vet
- Records of productivity, such as mortality rates and growth rates
- Medicine book and antibiotic usage records
- Abattoir monitoring results
- Results of diagnostic investigations
- Where applicable, laboratory testing for antibiotic susceptibility should be repeated, as advised by your veterinary surgeon

Generating a health plan and using it to manage the timing, product choices and application protocols of animal treatments will simplify and improve the effectiveness of disease control in each enterprise.

The health plan should include monitoring activities, such as worm egg counts or screening for liver fluke. Disease due to parasites is often weather-dependent, so every year is likely to be different and treatment protocols will vary accordingly. For information on parasite forecasts, see the NADIS website: nadis.org.uk/parasite-forecast.aspx

More information on common beef and sheep diseases can be found in the **Beef diseases directory** and the **Sheep diseases directory**, available at ahdb.org.uk

Biosecurity

There are many ways that diseases can be introduced onto a farm, but buying in animals is one of the biggest risks.

The farm's health plan should have a protocol for purchased stock so that risks are minimised.

This may involve only buying from herds or flocks of known health status or testing animals before purchase. Once animals arrive on the farm, they should be isolated and quarantine treated as directed by the vet.

For more information, see the **Biosecurity advice and cattle purchasing checklist**, **Buyers' checklist for breeding cattle** and **Buyers' checklist for calves and store cattle** at ahdb.org.uk



Vaccines



Vaccines work very differently from antibiotics and anthelmintics. Vaccines stimulate an animal's immune system without actually infecting them with the disease.

If the vaccinated animal then comes into contact with the disease itself, its immune system will recognise it and immediately produce the antibodies it needs to fight it. Vaccines help to prevent disease. They work best when whole groups or populations of animals are vaccinated.

Vaccines have very specific storage requirements. All vaccines must be kept refrigerated at all times until they are used. Live vaccines are especially fragile. If they become too hot or are frozen for any length of time, the organisms in the vaccine will be destroyed and the vaccine will not work.

Leaving a live vaccine in a hot vehicle for just 30 minutes is enough to render the vaccine ineffective. Vaccines have to be used quickly after the bottle is opened for the first time.

Dosage requirements of vaccines are quite different to other medicines, with a set dose for each class of animal, regardless of weight. Initial vaccination courses often need two doses, with a booster later on to maintain immunity.

Some vaccines are specifically licensed for use in pregnant cows or ewes to increase the level of antibodies in colostrum and so to protect the offspring that drink it. It is important to give the vaccine at the recommended time and to ensure newborn calves and lambs get a sufficient quantity of good-quality colostrum.

Other vaccines may not be safe to use in pregnant animals. Some vaccines are affected by levels of maternal antibodies from colostrum and therefore these vaccines should not be given too early in life. Always check and follow instructions on the data sheet for each vaccine or ask the vet.

There is a wide range of vaccines licensed for use on farm animals in the UK. Increased use of vaccines could help reduce the level of disease and so reduce the need for antibiotics.

For further information on vaccines see:

- AHDB's vaccine uptake report for cattle and sheep (ahdb.org.uk/knowledge-library/vaccine-uptake-report-for-cattle-and-sheep)
- The RUMA website (ruma.org.vaccines)
- NOAH's livestock vaccination guidance for dairy, beef and sheep sectors (noah.co.uk)

Vaccinations are a wise investment, as outbreaks of disease are often unpredictable and can have major financial implications for a farm business. Losses can occur as deaths, abortions and sick animals. It is often the production losses from subclinical disease that have the greatest financial impact.

Vaccines are available for the following diseases in the UK

Cattle

- Clostridial diseases, e.g. blackleg and tetanus
- Respiratory diseases, e.g. infectious bovine rhinotracheitis (IBR), parainfluenza-3, respiratory syncytial virus (RSV), 'husk' (lungworm disease)
- Enteritis, e.g. rotavirus, coronavirus, *E. coli*
- Pasteurellosis
- Leptospirosis
- Lungworm
- Mastitis
- Ringworm
- Bovine viral diarrhoea (BVD)
- Salmonella

Sheep

- Clostridial diseases, e.g. lamb dysentery, pulpy kidney, tetanus, braxy, blackleg
- Pasteurellosis
- Ovine abortion, e.g. toxoplasmosis and enzootic abortion
- Louping ill
- Contagious pustular dermatitis (Orf)
- Footrot

Summary

Antibiotics and anthelmintics should only be used for disease control until alternative methods are fully implemented or where there are no effective alternative ways to control disease. For example, changing the vaccination schedule or making management changes may allow disease to be controlled without the need for antibiotics.

Farmers should ensure fundamentals such as ventilation, nutrition, water supply, housing, hygiene and biosecurity are well managed as these are crucial in controlling disease and reducing the need for medicines.

Where medicines are necessary, the advice in this guide recommends how to use them responsibly to safeguard animal health and welfare.

When used in conjunction with optimum management on farm, these measures aim to preserve the effectiveness of medicines for future use in people and in animals.

While this guide describes general on-farm use of medicines, it is recognised that in specific farm situations the prescribing veterinary surgeon may advise alternative good-practice solutions based on their knowledge of the disease profile, the animals and the infrastructure of the farm. Specific advice from your veterinary surgeon must take precedence over this guide and you should always follow their advice.

Glossary

Anthelmintic – Used to control parasitic worms.

Antibiotic – Used to kill or inhibit the growth of bacteria, e.g. amoxicillin, penicillin, cefquinome, marbofloxacin, florfenicol, ceftiofur, enrofloxacin, sulphadimidine, streptomycin, oxytetracycline.

Anti-inflammatory – Used to reduce inflammation. There are two types: steroidal anti-inflammatories and non-steroidal anti-inflammatories (NSAIDs). NSAIDs are used more commonly.

Antimicrobial – An agent that kills or inhibits the growth of microbes, including bacteria, viruses, protozoa and fungi, e.g. oxytetracycline spray.

Antiseptic – An antimicrobial substance normally applied to the skin to reduce the possibility of infection, e.g. iodophor disinfectants, chlorhexidine wash.

Metaphylactic – Treatment given to a group of animals when disease has been diagnosed in some of the animals in the group and the risk of other animals contracting the disease is very high.

Mg/PCU – Milligrams per population correction unit. A measurement used to standardise the amount of medicines sold per animal when comparing multiple countries.

Milligrams per kg (mg/kg) – The amount of active ingredient in a drug needed per kilogram of animal being treated.

Non-steroidal anti-inflammatory drug (NSAIDs) – Used to provide pain relief, reduce fevers and inflammation, e.g. meloxicam, carprofen, ketoprofen and flunixin. None currently licensed for use in sheep, but vets may prescribe products authorised for use in cattle with appropriate withdrawal periods.

Prophylactic (prophylaxis) – A medicine given to prevent disease, e.g. antibiotics following surgery.

Therapeutic – Use of a medicine to treat disease or infection.



Further information

Other publications from AHDB

- Beef diseases directory
- Biosecurity advice and cattle purchasing checklist
- Calf management guide
- Liver fluke control in grazing livestock
- Parasite control guide
- Sheep diseases directory
- Worm control in sheep

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