

Using medicines for Better Returns



Contents

3	Introduction	12	Injection techniques
4	Responsible use	14	Medicine broaching
6	Correct medicine	16	The health plan
8	Avoid overuse of medicines	18	Medicine labelling
10	Administration		

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Glossary

Anthelmintic – Used to control parasitic worms

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

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

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

Metaphylactic – Treatment given to a group of animals when disease has been diagnosed in some of the animals in the group

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

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

Non-steroidal anti-inflammatory (NSAID) – Used to provide pain relief, reduce anti-inflammatory fevers and reduce inflammation, e.g. meloxicam, carprofen, ketoprofen, phenylbutazone, flunixin. Not licensed for use in sheep, but vets may prescribe products authorised for use in cattle

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

Therapeutic – Use of a medicine to treat disease or infection

Introduction

Tackling antimicrobial resistance in humans and livestock is an industry-wide objective, together with governmental and non-governmental organisations. All livestock sectors are expected to play their part in reducing 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. This involves working alongside organisations such as Responsible Use of Medicines in Agriculture Alliance (RUMA) and the Veterinary Medicines Directorate (VMD) to meet industry targets. This can be done by reducing the amount of antibiotics prescribed for people and animals and ensuring when antibiotics are prescribed, they are used correctly.

Antimicrobial and anthelmintic (wormer) resistance are both causes for concern in agricultural industries globally.

Resistance is the ability to survive exposure to a medicine that would normally kill an organism or stop its growth.

With AMR, the organisms that are of particular concern are bacteria.

With anthelmintic resistance, the parasites that are of most concern in the UK are liver fluke and gastrointestinal worms, especially those affecting 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* 0157, both of which can be carried by healthy animals but can cause severe disease in people.

The number of bacteria becoming resistant to antibiotics has increased. This manual advises on best practice to ensure the products available are effective to treat livestock when needed.



Amy Fawcett
KE Manager
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Responsible use

Antibiotic use in animals can be divided into three categories:

- **Curative or therapeutic** – Treatment of a sick animal or group of animals after the diagnosis of disease or infection has been made
- **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
- **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

Key priorities for the beef and sheep sectors are to avoid the use of highest priority critically important antibiotics (HP-CIAs) except as a last resort and 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.

Red Tractor standards specify that your vet must annually review antibiotic prescription data, including the use of HP-CIAs and any prophylactic treatments, to make recommendations to reduce antibiotic usage where appropriate.

There is a drive for the industry to demonstrate a reduction in antibiotic usage. This is being achieved in the pig industry through the use of the electronic medicine book (eMB), which allows farmers to record all antibiotic usage data as a requirement of the Red Tractor standards for pigs.

We are currently running a pilot project for an electronic medicine book (eMB) for the beef industry.



We have developed a sheep antimicrobial usage calculator, which is designed to provide an estimation of usage on sheep farms. To download the calculator, visit beefandlamb.ahdb.org.uk/returns/tools

Resistance to wormers

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 (1-BZ, 2-LV and 3-ML) and to the flukicide triclabendazole, due to over and incorrect use. Untreatable worm or liver fluke burdens can cause major losses in production.

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

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.

Working with the 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 withholding times (see page 18).

The vet should also advise the farmer 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.

Best practice for the use of animal medicines:

- Use the correct medicine for the job
- Use it at the correct time
- Use the correct dosage for the weight of the animal
- Complete the full course prescribed by the vet
- Administer the medicine correctly
- Only use medicines that have been stored correctly and are not contaminated by dirt or other medicines
- Do not use medicines that are past their expiry date
- Record date, dosage, animal, withdrawal period
- Dispose of unused or expired medicines safely
- Adhere to withdrawal periods

Correct medicine

Antibiotics are categorised into different groups according to their chemical structure and the way they kill or halt the growth of bacteria.

Some antibiotics are only effective against particular bacteria and are called narrow-spectrum antibiotics. Others are effective against a range of different bacteria and are known as broad-spectrum antibiotics.

Narrow-spectrum antibiotics are less likely to be selected for resistance, so their use is preferred.

Antibiotics vary in the way they are distributed within the body, how long they remain active after dosing and how long they persist in the animal.

As well as the variation between different antibiotics, there are different ways in which the antibiotic can be formulated and administered:

- Injectable antibiotics
- Intramammary antibiotic tubes
- Antibiotic eye ointment
- Antibiotic topical sprays
- Antibiotic powder for adding to feed or water

The vet will decide on the best type of antibiotic for the specific issue when prescribing.

Some classes of antibiotic, such as fluoroquinolones and third- and fourth-generation cephalosporins, have been classified as critically important antibiotics (CIAs) for use in humans. Vets are advised only to use these antibiotics as a last resort, when other antibiotics have been, or are expected to be, ineffective.

For more information on CIAs, refer to briefing document 'CIAs in veterinary medicine – European Medicines Agency (EMA) recommendations', available at noah.co.uk

Use only when needed

Antibiotics are not effective against viruses, although they can be used to control secondary bacterial infections if prescribed by the vet.

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.



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.

Part of the government's strategy on AMR is to develop quicker ways of identifying bacteria and testing them for antibiotic sensitivity.

Anthelmintics

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

Understanding these groups is important so that the treatment can be targeted to the correct parasite, at the relevant stage of its life cycle.

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 check for the presence of the parasite after treatment, usually by looking for parasite eggs in faeces.



When using anthelmintics, follow the same principles as when using any other medicine, i.e. use the correct dosage, medicine, administration and storage.

Many farms already have some form of anthelmintic resistance present in their livestock. If a wormer does not seem to be working, speak to the vet.

Avoid overuse of medicines

There is a risk of medicines being overused on farm, when they are used as a preventative measure or because it is perceived as best practice to avoid production losses, e.g. a blanket worming treatment.

Many health issues can be prevented through better husbandry or vaccination, e.g. keeping lambing pens clean to reduce infection of lambs at a vulnerable age or vaccinating cattle to reduce pneumonia cases.

It is important to consider preventative options before resorting to medicines.

Submitting a faecal egg count to the vet before worming can help determine if anthelmintics are necessary and which product is best suited for the specific parasite infection.



Doing this as standard practice can help reduce anthelmintic use and save time and money on administering medicines that are not really needed.

If there is doubt about how well a wormer is working, talk to the vet about doing a wormer or drench test to check for resistance.

The symptoms of one disease may be the same as for other conditions, resulting in the wrong product being used and animals not being cured. A common example of this would be early-season lambs with coccidiosis being treated for worms, and vice versa. By routinely treating animals with certain medicines, signs of another disease could be missed.

More information on correct worming can be found in ***Worm control in sheep for Better Returns, Controlling worms and liver fluke in cattle for Better Returns*** and the ***Parasite Control Guide***, available to view and download at beefandlamb.ahdb.org.uk

When animals are sick, they should always be treated as soon as possible

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.

Use the right amount

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 it is licensed for.

This information is provided on the data sheet, box or bottle supplied with the medicine.

It is vital the correct dosage is given when treating an animal. This is to avoid the drug not working and resistance developing by underdosing. Animal welfare can be compromised by overdosing, as many medicines are toxic if too much is given.

Overdosing means withdrawal periods will change from that stated on the label.

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 of the withdrawal periods that apply.

Dosages are usually given in millilitres per kilogram (ml/kg). In order for the correct dosage to be given, animals should be weighed 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, the group should be split into subgroups of more even weight. Within each subgroup, the dosage should be calculated according to the heaviest animal in the group.

Remember – check the accuracy of the weighing scales before starting.

Example:

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.



Administration

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, up the teat (for mastitis or dry cow treatments)
7. Topical (spray, eye ointment)



Correct oral drench technique

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.

The data sheet will give additional important information, such as the maximum volume that can be injected in one site and any special precautions.

It is important to follow the administration guidelines, as some medicines will not work as effectively if given incorrectly. How quickly they start to work and how long they persist in the animal can be affected.

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. Some medicines may be harmful or kill an animal if not given correctly.

Preventable deaths

Knowing how to administer drugs may seem simple, but data from the AHDB Beef & Lamb Fallen Stock project found 3.5% of ewe deaths were caused by dosing gun and bolus injuries. These were completely preventable.



Carcass quality

In England in 2017, over 1.9% of sheep carcasses (176,500) and almost 5.9% of cattle carcasses (88,500) 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.



Source: Andy Grist, University of Bristol

Training

Everyone who administers medicines to animals should be trained in injection and drenching techniques. This could either be by attending a training course or asking the vet to demonstrate the right techniques.

When giving an injection, consider:

Cleanliness

- Use a new sterile needle and syringe. Modern syringes and needles are designed to be used once only
- 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



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
- 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

Correct restraint of animals

- Good animal restraint prevents injury to humans and animals
- Good restraint 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



The volume of product to inject

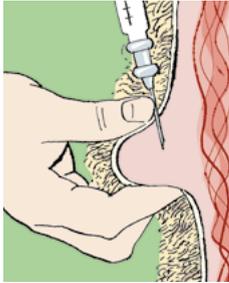
- The data sheet will state the maximum volume that can be injected at one site. Split large volumes into smaller amounts and inject in different locations

Injection techniques

Subcutaneous injections

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

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.



The needle should be inserted several inches from the operator's 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.

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

Intramuscular injections

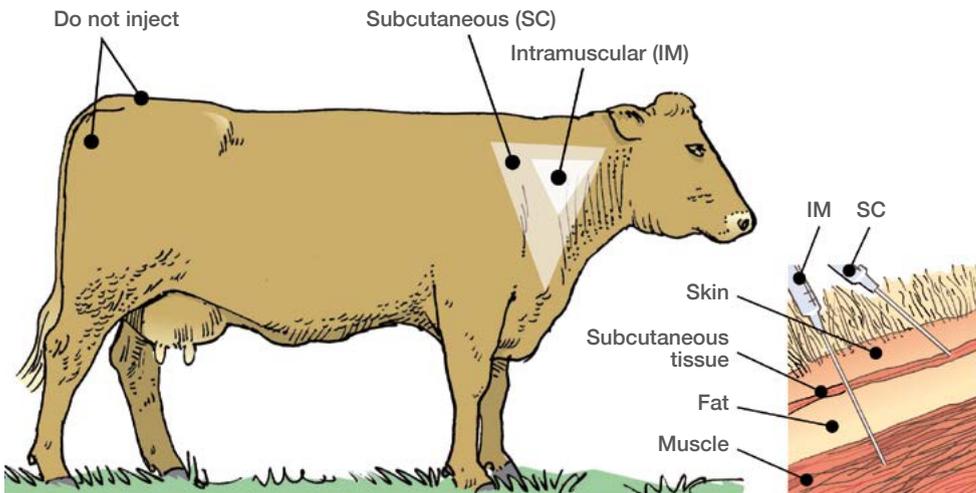
The main site for intramuscular injection is the muscle mass of the neck, for which the animal must be adequately restrained. This ensures no valuable cut of meat is damaged, particularly the hindquarter cuts. The constant movement of the neck ensures good dispersion of the product.

Draw up the solution for injection into the syringe. Disconnect the needle and hold the hub firmly between thumb and middle finger. Insert the needle into the muscle to the hub with a sharp slap action.

Connect the syringe to the needle, draw back to check there is no blood and then slowly inject the contents of the syringe over 10 seconds. Do not inject too quickly as this may cause the animal pain.

Never insert the needle when connected to the syringe as this makes 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.

After the injection, gently massage the injection site.



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

Correct storage

Every medicine has its own specific storage instructions, which can be found on the back of the packaging. 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 the correct location – 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.

The middle of a fridge generally has the most constant temperature, so this is the best place to store medicines. 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.

Only use a product before its expiry date and check the product after first opening

For more information on storage guidelines, including both how to store and how long a product can be used after the bottle is first opened, check the back of the packaging.



Medicine broaching

Broaching is the opening of a container of medicine or the piercing of a medicine bottle for the first time.

Every medicine has a specific shelf life after the bottle or container has been broached. 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 broaching 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.

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 prior to storage.

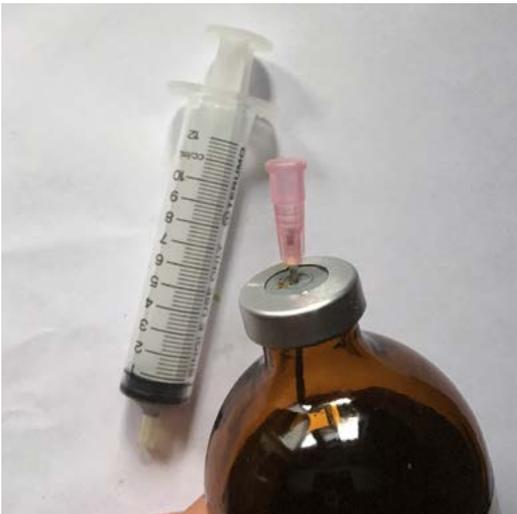
Disposal

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

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. 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 or if treatment may not have been fully effective.

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.

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.

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 prior to purchase. Once animals arrive on the farm, they should be isolated and quarantine treated as directed by the vet.

For more information on biosecurity, see the ***Buyers checklist for breeding cattle*** and the ***Buyers checklist for calves and store cattle*** at beefandlamb.ahdb.org.uk



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.



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.

More information on common beef and sheep diseases can be found in the **Beef diseases directory** and the **Sheep diseases directory** available at beefandlamb.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 broached.

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 colostrum. Other vaccines may not be safe to use in pregnant animals, so always check on the data sheet 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.



Diseases that can be vaccinated against 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
- 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



Vaccinations are a wise investment, as outbreaks of disease are often unpredictable and can have major financial implications for a farm business.

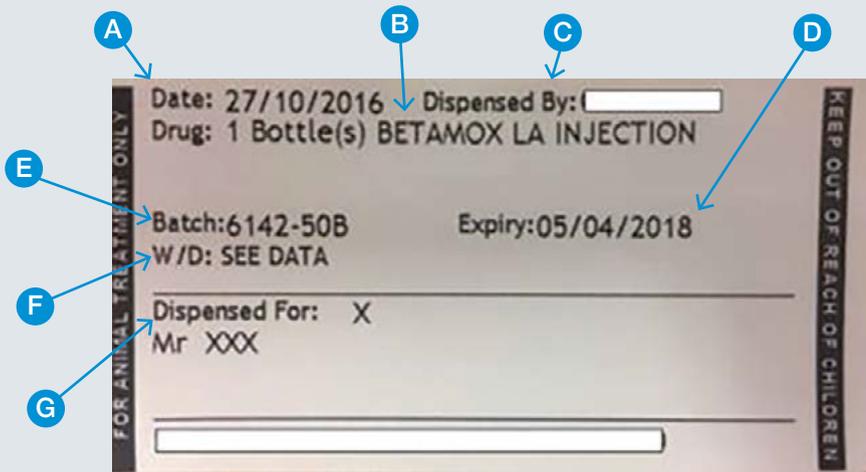
Losses can occur as deaths, abortions and sick animals. It is often the production losses from subclinical disease that have the greatest financial impact.

Medicine labelling

All medicines prescribed by the vet will have a label attached to them. The label must contain certain information.

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 or storage recommendations may result in the drug being ineffective and can be detrimental to animal health.



- 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 as it is intended.
- 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 box.
- 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 box.

Information found on the medicine box 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*, *Pasturella multocida*, *Staphylococcus spp*, *Streptococcus spp* and *Salmonella spp*. [] will therefore be effective in the treatment of infections caused by susceptible organisms including: erysipelas; naveljoint 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 one site should not exceed 15 ml for horses, 6 ml for cattle, 3 ml for sheep and 1.5 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

A This section includes any adverse reactions to the medicine that have been reported. Any adverse reactions should be reported to the vet.

B These are warnings for the person administering the medicine. Read carefully, as some medicines are dangerous to pregnant women.

C These are instructions on how the medicine should be stored. These are different for every medicine, so always check the box or bottle.

D This is the class of the drug, which indicates who is allowed to prescribe and sell it.

Beef and sheep BRP Manuals

Manual 1	Improving pasture for Better Returns
Manual 2	Assessing the business for Better Returns
Manual 3	Improving soils for Better Returns
Manual 4	Managing clover for Better Returns
Manual 5	Making grass silage for Better Returns
Manual 6	Using brassicas for Better Returns
Manual 7	Managing nutrients for Better Returns
Manual 8	Planning grazing strategies for Better Returns
Manual 9	Minimising carcass losses for Better Returns
Manual 10	Growing and feeding maize silage for Better Returns
Manual 11	Using medicines correctly for Better Returns

See the AHDB Beef & Lamb website ahdb.org.uk for the full list of Better Returns Programme publications for beef and lamb farmers.

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