EBLEX BEEF BRP MANUAL 9

Better Returns Programme

Controlling worms and liver fluke in cattle for Better Returns

The information in this booklet has been drawn mainly from 'COWS – Control of Worms Sustainably', a publication written by Prof M A Taylor, BVMS PhD MRCVS DipEVPC DipECSRHM CBiol MSB, for vets and advisors, funded by EBLEX and DairyCo.

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Better Returns Programme

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Contents

Internal parasites (worms and fluke) pose a significant threat to animal health and performance. Sheep farmers in particular rely heavily on chemical treatments for control. Unfortunately this has led to resistance developing in worm populations and some products becoming ineffective.

So far, resistance in cattle worms is relatively uncommon, although there are signs that it could become a problem. Producers should not be lulled into thinking it won't happen, as it probably will.

The sheep industry came together in 2003 to develop the Sustainable Control of Parasites in Sheep (SCOPS) guidelines. These allow farmers to maintain good worm control while preserving the activity of wormers for future use.

Control of Worms Sustainably (COWS) is the cattle industry's response. By following these guidelines, beef farmers will gain good control, but will not encourage resistance. This will keep the current range of worming products working for as long as possible.

Dr Mary Vickers
Livestock Scientist
EBLEX

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The threats

Endoparasites – organisms that attack an animal's internal organs (as opposed to ectoparasites that affect the outer skin), cause the English cattle industry £millions in lost production and treatment costs.

Fortunately through better grazing management and/or the use of effective chemical treatments, these costs can be minimised.

Adult cattle generally acquire immunity to most of these parasites (except liver fluke), so treatment usually focuses on youngstock, particularly during their first grazing season when they are most at risk.

Wormer resistance

Resistance to wormers is now widely reported in the UK sheep industry, where they are used more intensively. This limits the treatment choices available to sheep farmers.

So far, resistance in cattle worms is relatively uncommon in this country. However, there have been reports that some roundworm species are resistant to products in wormer Group 3 (see page 8).

Understanding the basic life cycles of the most important parasites, and following the COWS (Control of Worms Sustainably) guidelines for responsible anthelmintic use, will help ensure treatments remain fully effective now, and in the future.

Worm terms

Worms are also referred to as:

Endoparasites

Nematodes – roundworms eg gut worms, lungworms

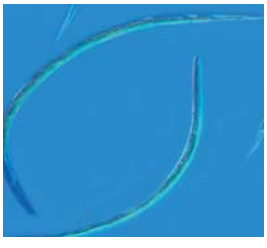
Trematodes – flat worms eg liver fluke, tapeworms

Veterinary treatments can be called:

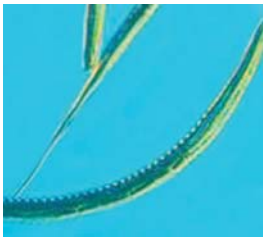
Anthelmintics

Wormers

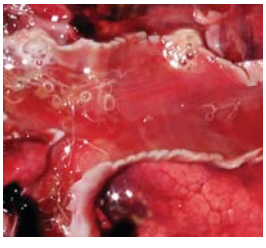
Cattle can be affected by many different endoparasites. However, there are four main worm and fluke species of particular importance.



Ostertagia ostertagi
(Gut worm)



Cooperia oncophora
(Worm in small intestine)



Dictyocaulus viviparus
(Lungworm)

Fasciola hepatica
(Liver fluke)

The presence of worms stops animals utilising the nutrients in their food properly, leading to checks in growth and performance. For example, replacement heifers may not reach target weights for serving; finishing cattle may take longer than expected to be reach the required specifications for marketing.

Left untreated, infection with these parasites can cause serious disease and death.

Parasite	Disease caused	Signs in affected animals
Ostertagia ostertagi (Gut worm)	Parasitic gastroenteritis	Profuse, watery, bright green diarrhoea. Significant weight loss up to 20% in 7–10 days.
Cooperia oncophora (Worm in small intestine)	Parasitic gastroenteritis	Loss of appetite. Poor weight gain.
Dictyocaulus viviparus (Lungworm)	Bronchitis and pneumonia. Also known as husk/hoose	Persistent coughing. Laboured breathing.
Fasciola hepatica (Liver fluke)	Damage to liver and bile ducts seen at slaughter	Poor weight gain. Loss of body condition. Reduced fertility.

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It's all about life cycles

Many parasitic worms follow a typical life cycle. This includes an egg-producing adult stage, followed by a series of larval stages which eventually develop into new adults.

Parasitic worms have to spend some of their time living and feeding in a live host. This is when they cause most damage to grazing livestock.

Some also require an intermediate host. For instance, mud snails act as an additional and essential host in the life cycle of the liver fluke. If snails are absent, for example during dry weather, infection levels are much lower than in wetter seasons.

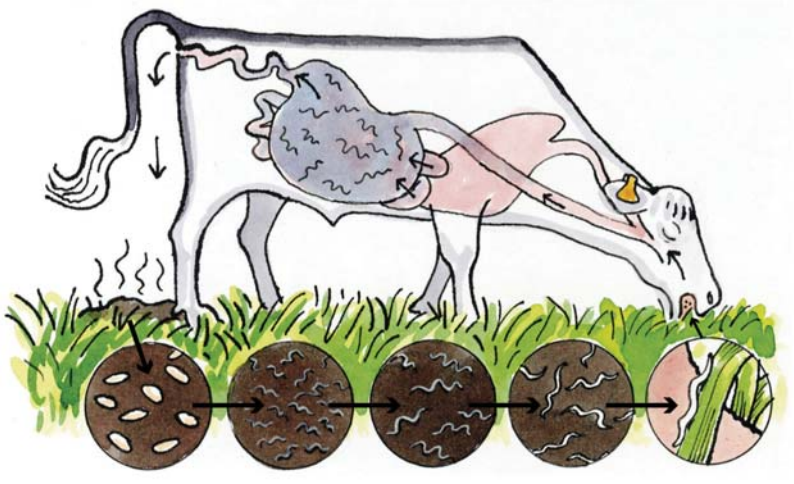
Worms also have 'free-living' stages when they can exist outside a host. This is the time when they live on pasture waiting for a susceptible host to eat them.

Life cycle of gut worms

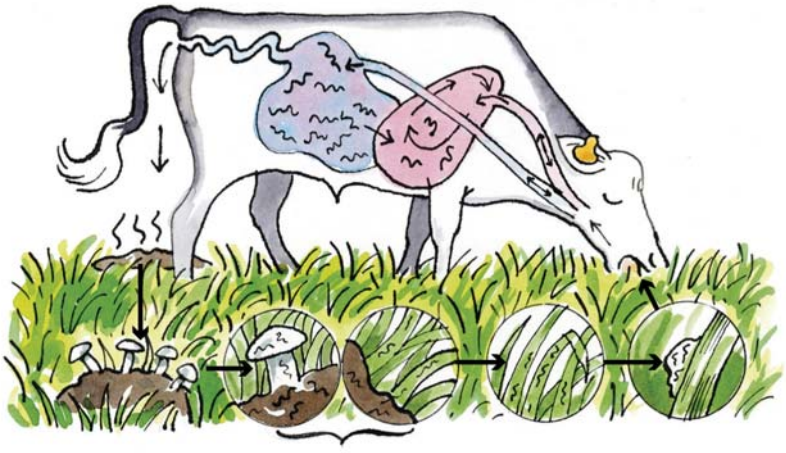
Eggs pass out in the manure. Under the right conditions, they develop within the dung-pat, passing through three larval stages. In moist conditions the third stage larvae migrate from the manure to the pasture.

If cattle eat the grass, the larvae shed their skin in the rumen and develop in the fourth stomach or intestine to become sexually mature adults. The female worms then produce new eggs.

The complete life cycle of gut worms takes about three weeks.



Life cycle of lungworms



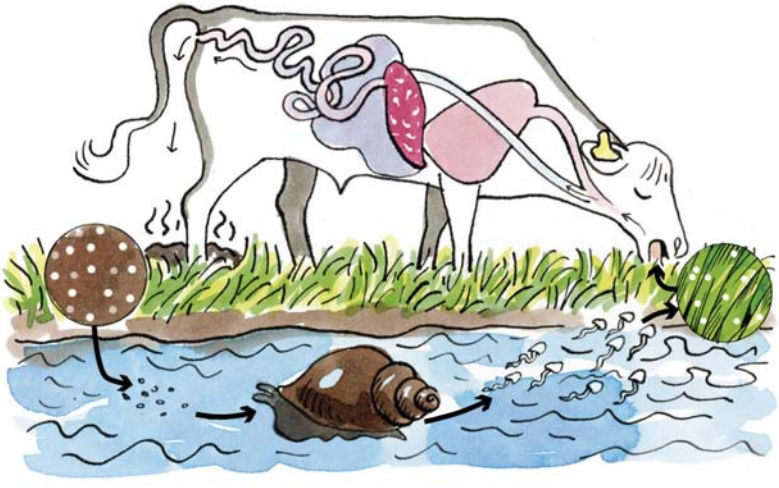
Adult female worms produce eggs in the lungs which hatch almost immediately. The first stage larvae migrate up the wind pipe, are swallowed and pass out with the dung.

The larvae develop through two more stages before leaving the dung pat and move onto the grass, either through their own movements, or by hitching a lift on wind-borne fungi which grow on manure.

After they have been eaten, the larvae penetrate the animal's stomach lining and travel to the lungs where they mature into adults.

The complete life cycle of lungworms takes about four weeks.

Life cycle of liver flukes



Adult fluke eggs pass out onto pasture in the dung. The next parasite stage develops within the egg, and then hatches out and actively seeks the mud snail host. Within the snail it undergoes two more stages, before emerging and attaching itself to wet grass.

After being eaten by cattle, young flukes migrate to the liver, through which they tunnel, causing considerable tissue damage. This will lead to condemnation at the abattoir, as affected livers are not allowed into the human food chain.

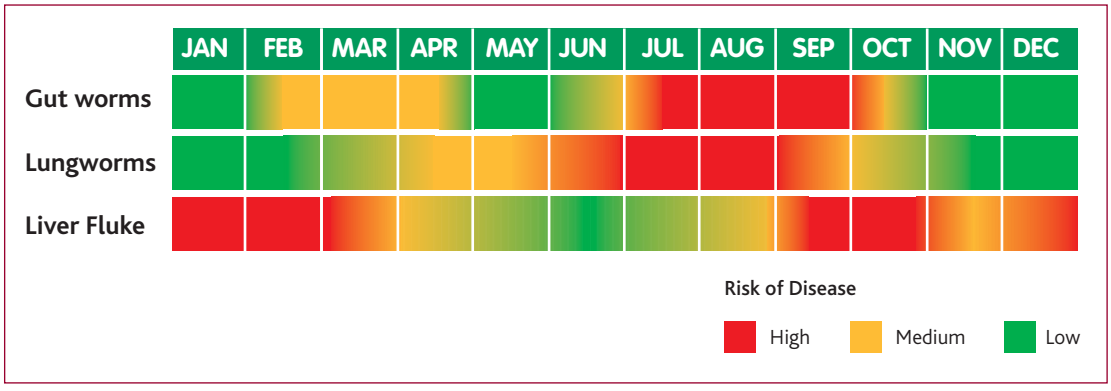
The whole cycle takes about 18–20 weeks – with 12 weeks inside the animal and eight weeks on the pasture.

High risk periods

The risk of infection differs for each type of parasite and at different times of the year. The level of infection is often weather dependent.

Disease caused by gut and lungworms is usually seen in summer, while liver fluke damage occurs mainly in autumn/winter.

Risk of disease throughout the year



Natural immunity

Cattle acquire natural immunity to gut and lungworms following repeated exposure.

Required duration of exposure to the parasite to gain immunity

Parasite	Exposure
Ostertagia	two grazing seasons
Cooperia	8–12 months
Lungworm	one grazing season

Single-suckled calves grazing with their mothers do not usually suffer from gut worms because the cows act to reduce the worm challenge on the pasture. However, once weaned, they can suffer from high worm burdens, as they have not been exposed to sufficient worms to gain immunity during their first grazing season.

Infection of pasture with gut worms

Eggs deposited in spring develop slowly to the third larval stage. As temperatures increase from mid-July, most eggs that were deposited between April and June start to reach the infective stage. If sufficient numbers of these larvae are eaten, scouring will be seen at any time from July until October.

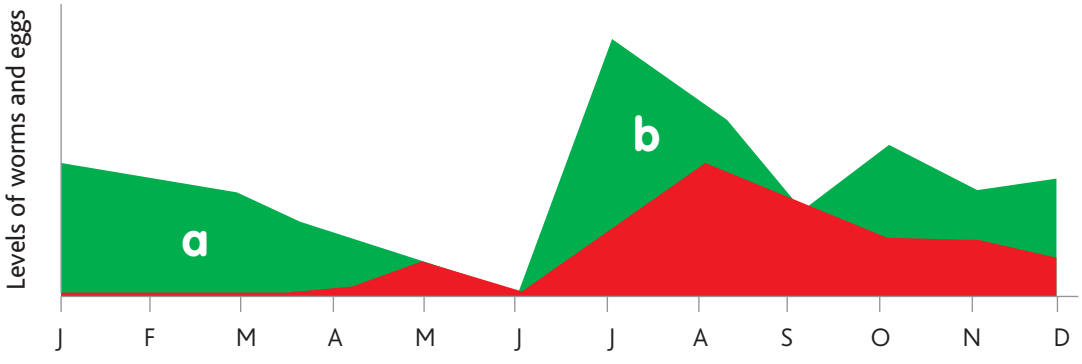
With the gut worm (*Ostertagia*, Type II) winter scour can occur in yearlings in late winter following their first grazing season. Calves pick up infective larvae the previous autumn. If not treated, the immature worms remain dormant (inhibited) before resuming development in the spring. If present in large numbers they can cause depressed appetite and severe diarrhoea.

Most of the larvae left on pasture at the end of the year survive over winter, gradually dying off in spring, so only small numbers are left by June. Most pastures not grazed by cattle in spring, can be considered safe for young calves to graze after mid-summer.

However, calves turned out early onto pasture carrying overwintered larvae (green [a] graph 1) will become infected and contaminate the pasture with parasite eggs (red on graph 1). These eggs develop and produce a build-up of new infective larvae from mid-summer onwards (green [b] graph 1).

The pattern of events for lungworms is similar to gut worms, with a few small differences.

Graph 1: Infection of pasture with gut worms



Infection of pasture with liver fluke

Fluke eggs hatch in warm, moist conditions. In wet springs and summers, snail populations multiply rapidly and become infected with fluke parasites.

If wet weather continues, the snails shed massive numbers of infected stages onto the pasture which, if eaten by cattle, leads to liver fluke disease.

Dry or cold weather in early summer reduces the number of snails and parasite transmission, so fewer fluke eggs hatch and contamination in autumn is much lower.

Snails infected in late summer can overwinter in large numbers in mild winters, leading to contaminated grazing the following spring. This can cause significant early season infection.

Wormers

A wide range of cattle wormers is available in the UK for the control of gut worms. These fall into two main categories:

- Broad-spectrum
- Narrow-spectrum.

Broad-spectrum

The broad-spectrum products fall into three groups based on their chemical structure and mode of action. They all control *Ostertagia, Cooperia* and lungworms, as well as other gut roundworms.

Group 1
Benzimidazoles (BZ)
1-BZ
White drenches

Resistance status:

- Cases on most UK sheep farms
- No resistance reported on UK beef farms

Group 2
Levamisoles (LV)
2-LV
Yellow drenches

Resistance status:

- Cases increasing on UK sheep farms
- No resistance reported on UK beef farms

Group 3
Macrocyclic lactones (ML)
3-ML
Clear drenches

Resistance status:

- Cases increasing on UK sheep farms
- A few cases reported on UK beef farms

Narrow-spectrum

Products in this group are more specific in the parasites they kill. Most anthelmintics in this category are active against liver fluke.

Wormers can be given to cattle via several different delivery methods, including pour-ons, boluses, injections and oral drenches (see pages 12 and 13).

Always consult the data sheet, read the product label and follow the manufacturer's recommendations before using any wormer.

Persistency

Using less persistent products, interspersed with periods when the stock faces light re-infection, reduces the risk of resistance.

Products vary in the length of time they remain active in the animal's system. While wormers that have sustained activity will kill most of the target parasite in one treatment, they potentially favour the development of resistance.

Withdrawal periods

All anthelmintics have strict withdrawal periods before which cattle must not be slaughtered/enter the human food chain. These vary from as little of five days up to eight months. Follow the manufacturer's recommendations at all times on withdrawal periods.

Treatment strategies

The worm challenge on every farm is different and changes every year. Treatment plans should take into account unique factors such as farm location, disease history, current season/weather and the type and age of stock.

In general for:

Gut worms

Target treatments at youngstock in their first and second grazing seasons. Use in conjunction with a grazing system that minimises the risk of infection (see page 17).

Calves can be dosed at the onset of disease, or wormed preventatively early in the season to limit pasture contamination. This will reduce the animals' exposure to infective larvae later in the year.

Lungworm

Lungworm is controlled by most products active against gut worms. In high risk situations, vaccination of calves with irradiated larval vaccine offers the most reliable protection against parasitic respiratory diseases.

Liver fluke

In fluke areas, yearling and adult cattle should be treated after housing. Products vary in their ability to kill immature larvae, and the timing for use is specific to the product being used. Animals kept outdoors may require additional treatments, depending on the fluke risk. Given the resistance issues emerging with the flukicide triclabendazole it is important to limit use of this product. Use an alternative product for treating mature fluke in cattle.

NB: Keeping stock off wet areas which could harbour the mud snail will help reduce incidence of disease.

Delaying resistance

Resistance is the inherited ability of a parasite to tolerate a normally effective dose of a wormer. Resistance builds up over successive parasite generations on a farm.

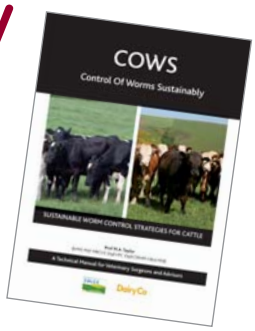
Cases of wormer resistance are still relatively rare. Reported cases of resistance to some products may be due more to treatment failures as a result of poor practice.

Most experts agree that resistance is inevitable, but can be delayed by responsible wormer use.

Factors that increase the chances of wormer resistance are:

- Under-dosing
- Continuous use
- Continued use of wormers with the same mode of action
- Using combination wormers/flukicides when only one parasite group is targeted
- Speed of re-infection from contaminated pastures with non-resistant parasites.

COWS – Control of Worms Sustainably



COWS is a new approach to cattle worming to ensure more effective and responsible use of wormers.

Each wormer treatment should be justified for its known benefit to the cattle being treated.

Guideline 1
Work out a worm control strategy with your vet or advisor

Developing a cost effective, reliable and sustainable worm control programme is not straightforward, as so many factors come into play, and the situation changes every year.

Consultations between farmers, their vets and advisors, need to be on-going. An agreed worming strategy should form an integral part of the Herd Health Plan.

Results of wormer and faecal egg count (FEC) tests, and parasite forecasts should be used to support all treatment decisions.

Guideline 2

Quarantine imported animals to avoid introducing resistant worms

Purchased stock pose a potential risk of introducing resistant worms. Take steps to prevent their introduction.

Three steps for successful quarantine (gut and lungworms)

1. Treatment

All cattle brought onto the farm should be treated with a product likely to remove all worms.

As suspected resistance has been mainly with Group 3 wormers involving roundworm species, using a product from Group 1 or Group 2 would be sensible.

Best practice is considered to be sequential treatment with both. Do not mix the two products, but administer one after the other.

2. Holding

Hold cattle off pasture for 24–48 hours, until any worm eggs present in the gut have passed out with the dung.

Cattle should have access to food and water during this period. Manure produced during this post-treatment period should not be spread on grass that will be grazed by cattle.

3. Turnout onto contaminated pastures

Bought-in cattle should then be turned out onto pasture contaminated with the farm's natural population of worm eggs and larvae. This ensures that any resistant worms that may have survived the treatment, will be significantly outnumbered by the pre-existing free-living stages on the contaminated pasture.

This also encourages rapid infection of the new cattle with indigenous worms, shortening the period when any introduced worms are dominant.

The results of any quarantine treatment can be assessed by sampling treated cattle by FECs (more details on page 12). If results suggest that eggs are still present, a further treatment may be needed.

Quarantine procedures for liver fluke

Fluke resistance to triclabendazole from wormer Group 1 has been reported in sheep, and more rarely in cattle. Quarantine strategies should take a 'risk-based' approach, and a treatment with one of the other fluke products may be appropriate. If in doubt consult your vet or advisor.

As infected animals can pass eggs for up to three weeks after the adult flukes have died, treated cattle should be kept off pastures for at least four weeks after treatment.

Any sheep brought onto the farm should also be treated according to SCOPS guidelines, as they could be an important source of resistant fluke to all grazing animals.

Guideline 3

Test how well a wormer works on your farm

Testing how well a product is working helps identify whether resistance to certain wormers is developing, or whether poor results are down to poor technique, such as under-dosing.

The presence of wormer resistance can be investigated by:

Post-dosing faecal egg counts (wormer tests)

Faecal samples are taken from a group of ten animals that have been grazing together, one to two weeks post treatment, depending on the product used.

This provides an estimate of the effectiveness of the wormer. Failure to reduce the egg count requires investigation.

Faecal egg count reduction tests (FECRT)

A more complicated test, on different groups of animals. Egg counts are performed on samples taken before and after treatment.

Wormer resistance is suspected if the reduction in faecal egg counts of the test group compared with a control group that was not treated, is less than 95%.

Guideline 4

Use wormers correctly

All cattle should be dosed at the rate recommended for the heaviest animal in the group. Weighing two or three of the biggest animals and taking an average will give the most accurate guideline.

If the weight range is such that the lightest animal might receive more than a double dose, divide the group in two and calculate a dose rate for each, based on the heaviest animal in each sub-group.

Always use the full dose rate, even where two products are being administered at the same time eg for a quarantine treatment.

Delivery methods

Pour-ons

Apply along the length of the flattest part of the back, from the withers to the tail head.

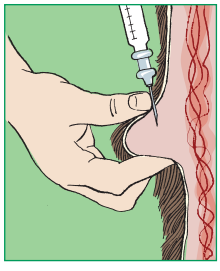
In general do not treat when the hair is wet, or rain is anticipated within two hours of treatment. NB some products are waterproof and can be used on wet animals.

Avoid damaged skin and areas covered with mud or manure.

Injectables

Injections should be given subcutaneously at the site recommended by the manufacturer.

- Always use a clean, sterile syringe and needle. If using a multiple injection gun, disinfect needle between injections
- If injection site is dirty, clean skin and swab with an alcohol impregnated wipe or cotton wool
- Before injecting, read the label. Some products need to be shaken before use
- Use the correct sized needle for the size of animal and injection site
- Restrain the animal adequately
- Raise a fold of skin and inject carefully into the space created
- If a large dose is to be delivered split between two injection sites. Briefly massage the site afterwards



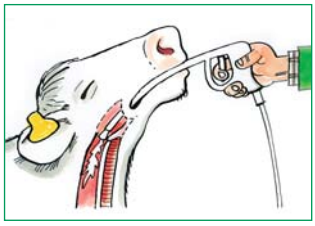
- Dispose of needle and syringe in appropriate clinical waste and sharps containers.

Boluses

Boluses should be administered with the correct applicator. The animal must be restrained and great care taken not to damage the throat or cause choking.

Insert the applicator from the front of the mouth over the back of the tongue, with no more than gentle firm pressure. As the animal begins to swallow, passage into the throat becomes easier. Once in the throat the plunger should be pressed to release the bolus. The applicator is then gently removed while checking that the bolus has been swallowed.

Oral drenches



Oral drenching guns are designed to deliver over the back of the tongue so that the entire dose is swallowed into the rumen. Bad dosing technique may allow the product to by-pass the rumen which will reduce its potency.

Drenching equipment must be correctly calibrated and in good working order. Test it with product just before treatment starts by delivering two or more doses into a graduated measuring cylinder. Do not use water as this will give a false result.

Faulty equipment, or attempting to dose too quickly, may mean the barrel of the gun does not fill properly, or that the liquid is full of bubbles.

Risking resistance

Under-dosing, using faulty dosing equipment, or treating in inappropriate conditions, can encourage wormer resistance to develop.

This is because worms with some resistance to the product can survive a lower dose treatment, where a full dose would have killed them.

Storage

Wormers should be stored securely, away from direct sunlight at 4–25°C. Check the 'use by' date, and once open use within the period shown on the packaging.

Guideline 5

Use wormers only when necessary

There is a trade-off between tolerating some level of worms on the farm, and minimising potential selection for wormer resistance. Each situation and each farm will be different. Regular blanket treatments should not be the only option considered.

Adult cattle

Cows have usually developed strong immunity to gut worms and do not usually require treatment. In fluke areas, flukicide treatment may be required (NB dairy cows are best dosed at drying off).

Youngstock at turnout

Calves born and raised indoors are usually worm-free at turnout and should not require treatment if grazing worm-free pasture. However, if the worm challenge is expected to be high, worming to prevent disease and further pasture contamination should be considered.

Youngstock at grass

Treatment of calves at grass should be based on the 'risk' level of the pastures they are grazing (see page 16).

By providing low risk grazing (new ley, pasture grazed by sheep) at the start of the season, worming can generally be avoided.

Where only medium and high risk pastures are available, cattle will need treating at some point during the grazing season, unless they can be moved to low risk pasture, such as hay or silage aftermaths, from mid-July onwards.

Monitoring

FEC monitoring can provide useful information about the worm status of the herd, and help producers decide whether treatment is necessary. If the results show that grazing calves have high FECs, treatment will be justified.

Regional weather forecasts and parasite risk assessments such as the service run by the National Animal Disease Information Service (NADIS), can also be consulted before deciding if and when to treat.

How to take a good dung sample

- Collect fresh dung (less than one hour old)
- Put in airtight container or plastic bag
- Keep cool but not frozen
- Deliver to lab within 48 hours

Guideline 6
Use the right wormer in the right way

Treatments should be targeted according to the parasites (and their life cycle stages) present, the time of year and previous treatment history.

Use narrow-spectrum anthelmintics where possible. For example, treating calves at grass with a Group 2 wormer instead of a broader spectrum Group 3 product, is equally effective against *Ostertagia* and *Cooperia* gut worms.

Avoid inadvertent use

Take care when using combination products (flukicide plus broad-spectrum wormer), and do not use when only liver fluke is the target for control. Use a specific flukicide instead.

Guideline 7
Preserve susceptible worms on the farm

Practising a strategy of 'dose all' and moving to pastures with low contamination levels, is now considered highly selective for wormer resistance and should be avoided.

Strategies to reduce resistance developing:

- leave a few calves in good body condition untreated
- delay moving after dosing.

This allows treated calves to become lightly re-infected with susceptible worms which will dilute the numbers of surviving resistant worms.

Guideline 8

Reduce dependence on chemical treatments

Grazing management which avoids parasite burdens large enough to affect production and induce disease, but allows animals to build up immunity, can reduce the need for worming with chemical treatments. The aim is to generate low risk pastures and/or avoid highly infective grazing.

This can be achieved by moving young susceptible stock to less infected fields, or by mixing these animals with older immune stock, or with other livestock species that are not affected by cattle worms.

Risk assessment for pastures

	High Risk	Medium Risk	Low Risk
Spring	Grazed by first year youngstock in the previous year.	Grazed only by adult or yearling cattle the previous year (including cows with calves at foot).	New leys/seeds or forage crops. Sheep or conservation only the previous year.
From mid-July	Grazed by first year youngstock in the spring.	Grazed by adult cattle or conservation in the spring. Pasture clean at the start of the year and grazed by youngstock that have not come into contact with the parasites before.	Grazed by sheep or conservation only in the first half of the grazing season. Forage crops or arable by-products.

Bioactive pastures

There is increasing interest in forages such as chicory that have been shown to reduce worm burdens and egg excretion of sheep. However work with cattle is limited.

Risk and Control Summary

System	Features	Implications for control
Spring calving suckler herds	Cows are typically immune (except fluke) and excrete low numbers of worms.	No treatment needed except for possibly a flukicide after housing.
	Calves are susceptible to infection but as they are suckling until weaning, only acquire modest worm burdens.	No treatment needed.
	High worm burdens may be acquired post-weaning, depending on pasture larvae levels.	Monitor FECs and treat when needed. Move to safer pastures after weaning.
	If exposure is low, beef calves may fail to acquire immunity and suffer reduced growth rates in their second grazing season.	Monitor FECs and treat when needed. Graze low or moderate risk pastures in spring. Treat at housing for worms that lie dormant (inhibited) inside them over winter, and fluke if needed.
Autumn calving suckler herds	Autumn born calves that have been housed over winter may acquire significant infection early in the spring.	Monitor FECs and treat when needed.
	High worm burdens may be acquired post-weaning depending on pasture larvae levels.	Monitor FECs and treat when needed. Treat at housing for worms that lie dormant (inhibited) inside them over winter, and fluke if needed.
Bought-in growing/ finishing cattle	Purchased cattle from dairy or beef herds of unknown management history. (See COWS Guideline 2 for quarantine recommendations.)	Varies depending on age at purchase and management system. FEC can be used to determine need to treat.

Other useful information sources

The BRP Beef and Sheep Parasite Control Guide: email **brp@eblex.org.uk** or call **0870 241 8829** for a free copy. Also available on the EBLEX BRP website: **www.eblex.org.uk/returns/publications**

National Office of Animal Health
www.noahcompendium.co.uk

National Animal Disease Information Service
www.nadis.org.uk

Wormer Purchase Checklist

Do you need to treat?

Have internal parasites been a problem before?

Have animals been grazing high-risk pastures?

Has wet weather/grazing conditions increased the likelihood of liver fluke infection? Have Faecal Egg Counts (FEC's) and/or blood tests been taken and the results indicated a problem?

What are the target parasites?

Treatments should be chosen according to the specific parasites (and their life cycle stages) present, time of year and whether a curative or preventative treatment is required.

In general problems usually occur for:

- Gut worms during grazing season
- Lungworms from June onwards
- Liver fluke from autumn onwards

What is the preferred application method?

- Pour-on
- Bolus
- Injection
- Oral drench

Manufacturers' recommendations should always be followed and the full rate applied. Dosing equipment should be calibrated with a sample of the product, not water.

Persistent or short-acting product?

Using less persistent products, interspersed with periods when the stock faces light re-infection, reduces the risk of resistance and allows natural immunity to develop.

While wormers that have sustained activity will kill most of the target parasite in one treatment, they potentially favour the development of resistance.

Withdrawal periods

Consider withdrawal periods carefully when choosing a product.

What products have been used recently?

In cattle, some resistance has been reported to macrocyclic lactones and triclabendazole. Avoid sustained use of products from one group to reduce the risk.

Lungworm can also be treated by vaccination which may require an annual booster.

What pack-size is required?

Cattle should be dosed at the rate recommended for the heaviest in the group. Weighing two or three of the biggest animals and taking an average will give the most accurate guideline.

If the weight range is such that the lightest animal might receive more than a double dose, the group should be divided into two and a dose rate calculated for each, based on the heaviest animal in each sub-group.

If a pack size is slightly less than required – it is better to leave one or two fit animals not dosed than under-dose the whole group.

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