

Controlling Parasites in Cattle New Guidelines



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Foreword

Anthelmintic resistance in cattle parasites is now widespread in New Zealand and South America. Resistant worms have already been found on two beef farms in England and it is likely that many UK dairy herds have worms with some level of resistance.

The situation in Wales has not yet been determined. However, results from the 2005 Wales “Worm Watch” project showed that some degree of wormer resistance exists in sheep parasites on more than 80% of Welsh sheep farms and so we must not be complacent. It is important that we learn lessons from what we know in sheep so that we can help to delay the problem in cattle.

This booklet aims to provide background information about the more common cattle parasites, measures for their control and the strategies available to slow the development of wormer resistance in your herd. However, there is no magic formula that can be applied to all farms. Specific advice should always be sought from veterinary surgeons and advisors.



Changing patterns of parasite infections

Worms cause considerable production losses in cattle. Acute outbreaks in a herd are less common in cattle than in sheep but sub-clinical infections reduce growth rates, milk production and fertility and lead to an increase in calving interval. These effects can often go unnoticed. However, since they usually affect a large number of cattle over long periods of time they can incur high costs over time.

The original guidelines for worm control were drawn up nearly thirty years ago. Since then the pattern of parasite infections has changed, as has the type of products available. All of these affect the way that we treat worm infections.

Climate change has brought warmer, wetter weather patterns and increased the grazing season. Since temperature and moisture levels affect the development of infective larvae, this has also changed the pattern of worm populations.

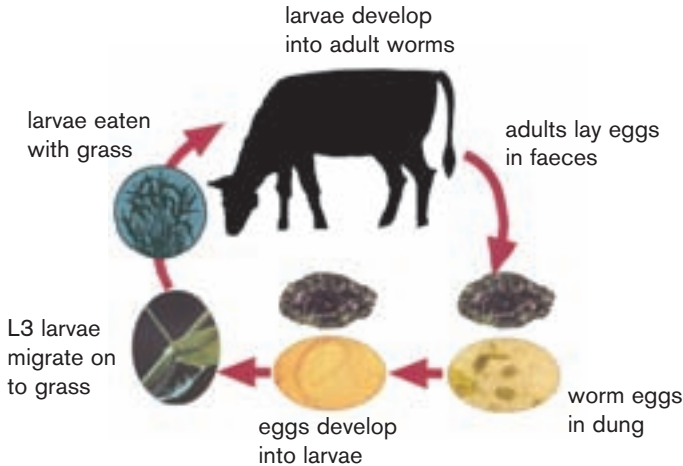
Due to the milder winters, worms that do not survive well in very cold climates are now being found throughout the UK. Warmer wetter weather also favours the snail populations that harbour liver fluke.

Parasite problems in cattle usually occur in two main seasons. The first season is from July to November when worms that have been ingested as larvae from the pasture and which have developed into adult worms within the animal, cause infections.

The second season is when a proportion of larvae from gut worms and lungworms swallowed in the autumn are able to survive within the animal by entering a dormant state. In the spring, these dormant stages can be reactivated and can resume their normal cycle, often causing disease between February and May.

Likewise, the ability of different worm species to cause disease varies with the time of year. Hence infection by *Cooperia* (the small intestinal worm) is more common in cattle during the spring and early summer, whilst infection with *Ostertagia* (the small brown stomach worm) and *Dictyoaulus* (lungworm) is often seen during the late summer and early autumn.

Most worms have a similar life cycle:



Eggs passed out of infected cattle develop into infective larvae on the pasture. Once ingested, infective larvae mature into adult worms. They then begin to shed eggs and the cycle begins again.

Lungworm larvae do not remain in the gut but migrate through the gut wall to the lungs where they lay their eggs. Hence the symptoms of lungworm infection include coughing and breathing difficulties. Since these signs are often associated with other diseases such as pneumonia, a careful examination of affected cattle is advised.

Some parasites also have an intermediate host. In the case of liver fluke the intermediate host is the mudsnail.

It is therefore very important that the strategies for worm control in your herd take into account the season and the climate during that year and ensures that any treatment is directed against the worms that are actually present at that time.

Wormer resistance - the unseen hazard

Wormer resistance affects more than 80% of the sheep farms that have been tested in Wales (Wales Worm Watch Project, 2005). Wormer resistance has now been found on beef farms in Somerset and Gloucester.

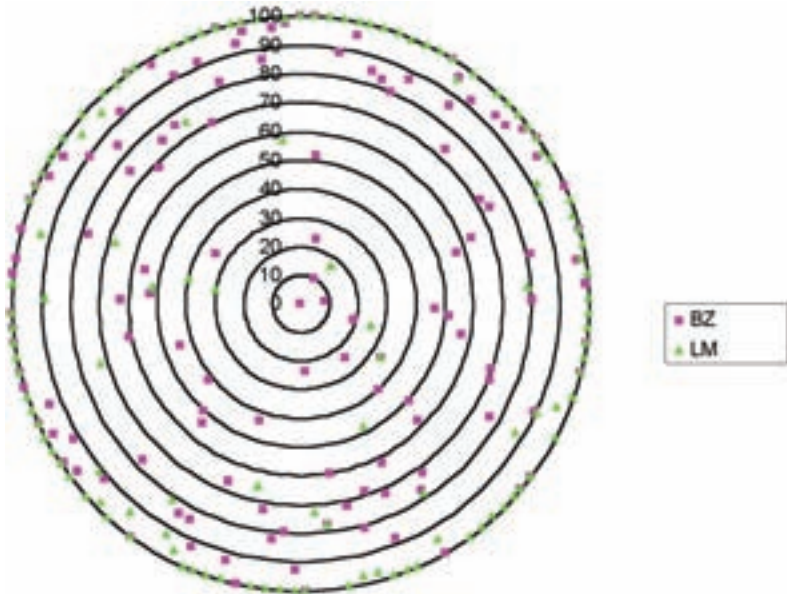
A survey of management practices for worm control on 72 beef enterprises in England in 2006 has shown that in many cases current control measures are not adequate or appropriate. Resistance of parasites in beef cattle will only be noticed when there is a major failure of wormer effectiveness.

This also has serious implications for dairy farms where calves are grazing without adult cattle on the pasture, as they are frequently treated for parasites and the same pastures are used year after year.

Experience has shown that resistance develops slowly at first and then escalates quickly, so we need to do everything we can to slow the development of resistance now.



The good news from the Wales Worm Watch Survey 2005 is that the levels of resistance which were found on most sheep farms are still sufficiently low that production is not yet being dramatically affected. This means that there is still time to slow the development of wormer resistance on beef and dairy enterprises by changing your approach to worm control.



Results from the Wales Worm Watch Project show the percentage of sheep roundworms from each farm that were killed by Benzimidazole (Group 1) or Levamisole (Group 2) in laboratory tests. 100% (outer ring) means that all roundworms were killed by the product, 0% (inner ring) means that no roundworms were killed by the product.

These tests clearly show that in most cases the wormers used are still more than 90% effective and at this level you can still maintain control. So whilst wormer resistance is with us, it is not too late to do something now to slow its development.

BUT WE MUST ACT NOW!

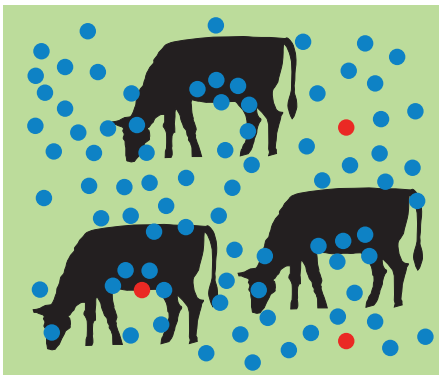
What is wormer resistance?

A worm is considered to be resistant if it can survive exposure to the standard recommended dose of that particular chemical group of wormer*.

Wormer resistance is heritable - the worm's ability to survive is passed on to its offspring.

*this refers to all anthelmintics including drenches, pour-ons, boluses and injectables

Wormer resistance already exists in natural worm populations but it usually occurs at very low levels. The parasites that are wormer resistant are normally less able to survive inside the animal than normal parasites. So, in a normal worm population, a few wormer resistant parasites shouldn't pose a problem.



Wormer resistance naturally exists in worm populations but it usually occurs at very low levels

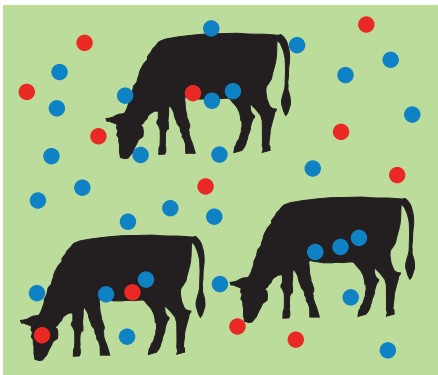
● susceptible ● resistant

However, the balance of the worm population in the UK is no longer 'normal'

Cheap wormers have been the farmer's friend in the battle against worms. However, the frequent, indiscriminate use of these products at a sub-lethal level due to under-dosing of cattle, has repeatedly exposed parasites to levels of wormers which are too low to kill them. This has resulted in a rapid increase in the numbers of resistant worms in the population.

Worming only affects those worms which are **within or on the animal at the time** of worming. The eggs and larvae on the pasture are not exposed to the wormer and are not affected. In general, the population on the pasture is usually much bigger in comparison to the population exposed to wormer.

Worming removes the parasites which are susceptible to that particular wormer but any worms which are resistant to that particular group of products continue to survive and produce eggs, which are then passed out onto the pasture. If wormers are not used properly, then the numbers of resistant worms increases dramatically and the balance changes towards resistance.



If the wormers are not used properly, then the percentage of resistant worms increases dramatically and the balance changes towards resistance.

● susceptible ● resistant

In cattle this is likely to be made worse by the frequent use of broad-spectrum endectocides (the avermectins) which are used to control both internal parasites and external parasites (such as scab, bloodsucking lice and ticks).

In other countries, endectocides are already failing due to *Cooperia* worms surviving treatment. Ivermectin resistance has already been found in *Cooperia* in England.

Wormer resistance - its effects on production

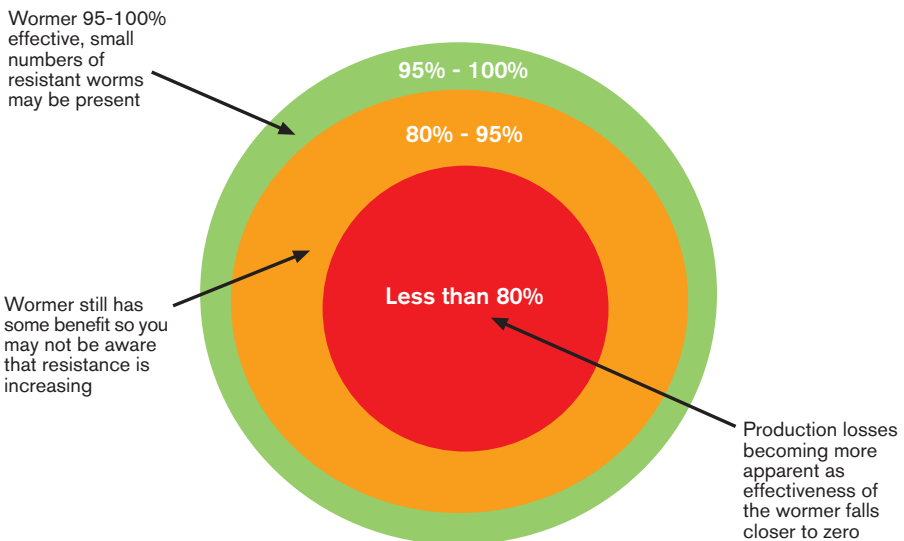
Wormers only ever claim to be around 95% effective and so we do rely on the larger 'normal' worm population to out-compete the surviving resistant worms. As the number of resistant worms increases, then the effectiveness of the wormer falls.

When the effectiveness of a wormer drops to 80 – 90%, it will still have some beneficial effect so you may not be aware that resistance to a wormer is present or even increasing in the herd.

By the time the effectiveness of a wormer drops to 80% or below, animal production is likely to be affected as a result of worms remaining within the animal and increasing on the pasture. If that particular product continues to be used then the level of resistance will increase rapidly.

The results from the Wales Worm Watch project showed that whilst some sheep farms are already experiencing problems with wormers that are less than 80% effective, the effectiveness of wormers on many farms is at a level where careful use of wormers can still form part of the farm's parasite management strategy.

How effective is the wormer you are using?



Wormers within the same group share the same mode of action

Wormer resistance is specific to a particular **group** of wormers and not to the individual wormer. When resistance appears to one wormer in a given group, then other wormers **in the same group** will also be affected.

Broad-spectrum wormers kill more than one type of parasite. These wormers are divided into three classes or groups based on their structure and mode of action.

Wormers Used Against Cattle Parasites

Group	Type	Compounds
1 'White' includes drenches and boluses	Benzimidazole (BZ)	Albendazole Fenbendazole Netobimin Mebendazole Ricobendazole Oxfendazole
2 'Yellow'	Levamisole/Morantel (LM)	Levamisole Morantel
3 'Clear' includes the endectocides, injectables, boluses and pour-ons	Avermectin / Milbemycins	Ivermectin Doramectin Abamectin Eprinomectin Moxidectin

Controlling parasites in cattle - new guidelines

It is important to update the recommendations for worm control in cattle in light of the changing patterns of parasite infection and the increasing development of wormer resistance. The latest guidelines highlight the key areas that can help to slow the development of wormer resistance in UK beef and dairy herds.

1. Work out a control strategy with your veterinarian or advisor

The factors which affect worm infection patterns are now so numerous that controlling worms is a complex process. The need to combine an expert knowledge of parasites with a practical and detailed understanding of the individual farm and its livestock is greater now than ever before. Veterinarians, advisors and farmers must work together to achieve this.

The climate and production pressures on the farm vary from year to year so this must be an ongoing dialogue. Faecal Egg Counts (FECs) provide valuable information about the worm status of a herd and can be used to help decide if worming is necessary, or if it can be safely delayed or left out completely.

An integrated approach is key to success and the strategies required will be different for beef and dairy enterprises and from farm to farm.



2. Avoid bringing in resistant worms – use quarantine treatments

Bringing new stock onto a farm, sometimes from several sources and usually without effective quarantine treatments, is a major contributor to the appearance of wormer resistance on your farm.

Recent indications are that only 40% of farmers who buy in calves quarantine new animals.

Quarantine strategies should be applied to all cattle purchased from other herds (including bulls) and to cattle that have been grazing on other farms (or common grazing).

Effective quarantine treatment applies to dairy and beef cattle

Treat all the cattle brought on to the farm

- Assume that all incoming stock have resistant worms
- Treat with two different wormer groups; E.g. Levamisole (yellow) and Benzimidazole (white)
- Give the treatments one after the other - **never mix together** and give the **full dose** of each wormer. Remember to dose to the heaviest animal in the group

Hold cattle off pasture for 48 hours after treatment until any worm eggs present in the gut have passed out in the faeces

After 24 hours, about 90% of the eggs will have been passed from the animal and by 48 hours, 99% will have gone.

- Ensure that the incoming stock have feed and water while they are held off pasture
- Dispose of the faeces – incinerate, compost or apply them to ground that isn't grazed

Turn treated cattle out on to 'dirty' pasture

After their quarantine period on hard standing, treated cattle should be turned out onto pastures previously grazed by resident cattle in the same grazing season. This will help to ensure that any eggs from resistant worms that survive treatment are outnumbered by the normal resident (non-resistant) populations.

3. Check that the wormer is effective on your farm

It is pointless using wormers without knowing which ones are effective in your herd. A recent pilot survey in Wales has shown that very few cattle farmers ever check that the treatment they are using is actually effective. In many cases, farmers also treat external parasites but have no indication of whether that treatment has in fact worked.

There are a number of ways in which you can test how effective the wormer has been against the worm population present from simple post-treatment Faecal Egg Counts (FEC), to larval development assays. Bear in mind that FEC won't detect lungworm since their eggs hatch in the gut and will not detect fluke since their eggs are heavier than normal worm eggs and do not float. Your veterinarian or advisor will advise you on the right test for your farm.

Post-treatment Faecal Egg Counts (FEC)

In this simple and relatively inexpensive test, faecal samples are taken from cattle pre-treatment and then a certain number of days after treatment to check that the wormer has worked. The exact number of days varies according to the product. This should be discussed with your vet or advisor.



FECs can be done on the farm or in the laboratory and are interpreted with advice from a vet or advisor

Faecal Egg Count Reduction Test (FECRT)

The FECRT is a more detailed way to identify which wormers are effective against the worms present on the farm (at that time) and these are undertaken with support from a veterinarian or advisor. Since worms have to be present to do the test, it is normally done on cattle where there is an average of 250 eggs per gram and no zero counts in the pre-drench test.

If the wormer tested has been effective, it should kill all worms present and the egg output reduces by between 95%-100%. At less than 95% reduction in egg output, wormer resistance is present. If the reduction is less than 90%, the wormer can be regarded as ineffective.

Ideally, FECRT would be done on ALL first year grazing cattle. At least 15 cattle per drench treatment tested is recommended.

Larval development tests

A range of laboratory tests are available and can be done where product failure or resistance is suspected. Samples are sent to a laboratory where eggs are cultured with different doses of wormer. Any eggs which are susceptible to that particular wormer are killed whereas eggs which are resistant hatch and develop into larvae.



Larvae



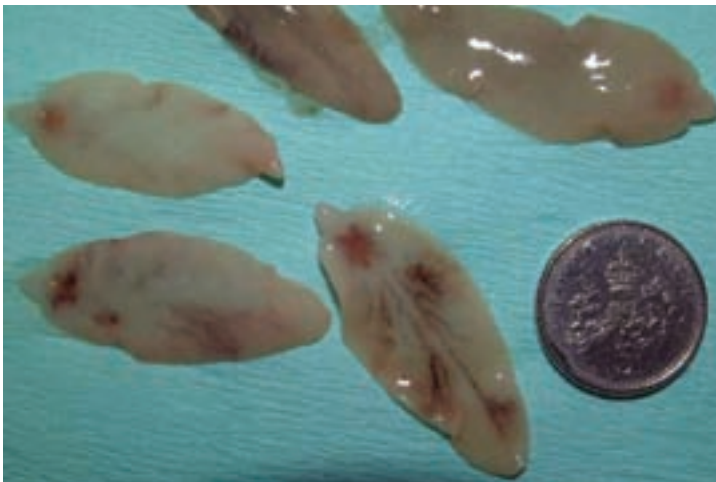
Eggs

4. Only use wormers when necessary

The single most important measure to slow the development of resistance is to reduce the exposure of worms to treatments by only using wormers when needed.

Liver fluke control should be tailored to individual farm needs. Since low levels of liver fluke infection can affect weight gain, farmers often treat their cattle “just in case”. This practice is no longer acceptable and the timing and frequency of liver fluke specific treatments should be based on the published forecast for the year, previous farm history, results of abattoir returns if available and faecal monitoring. Monitoring should be a key feature of control and herds should be checked for the presence of fluke before flukicides are used, unless already known to be infested by fluke and monitoring is carried out at regular intervals. Combination products often result in poor timing of fluke treatments and also leads to unnecessary additional use of anthelmintics which can contribute to development of resistance in worms. Triclabendazole-resistant liver flukes have been found in the UK and Eire.

For lungworm, vaccination is the best and most effective method of preventing disease and vaccination should be a priority on farms with a previous history of infections. However, indications are that farmers are moving away from vaccinations, preferring instead to rely on the wormers to prevent infection. As a result, the incidence of lungworm is increasing, even in adult cattle.



Liver fluke

Dosing adult cattle

Adult cattle are normally immune to worm infections. This is an acquired immunity and depends on the animal having sufficient exposure to the worms during its life. A fit, healthy adult beef or dairy cow will carry a small worm population, but this is necessary to maintain their immunity.

Despite this, surveys indicate that many farmers dose adult cattle several times per year, regardless of the fact that in most cases it is unnecessary and, in many cases actually reduces their natural immunity temporarily.

Unlike adult sheep, which historically tend to be routinely treated with wormers, the non-treatment of adult cattle has probably contributed to the slower development of wormer resistance in cattle.



Fit, healthy adult cattle are unlikely to need worming

Treating calves

Disease caused by internal parasites occurs predominantly in young cattle, with calves often being exposed to larvae as soon as they begin grazing. Calves will normally become immune to worms by the time they are two years old but this does depend on them having sufficient exposure to the worms during this period.

The repeated treatment of calves, irrespective of need, is believed to have contributed to the development of resistance in cattle parasites, with young susceptible animals sometimes being treated up to twelve times. Every effort should be made to reduce the number of treatments and integrate control with grazing management. In fact, selective treatment has been successful on many cattle farms where only first year cattle have been treated and second year calves were allowed to graze on pasture grazed by older animals the previous year.

Weaned autumn born calves and spring born calves in their second season are more susceptible to worms. Strategies for worm control are different for beef and dairy calves and for calves born in the spring and in the autumn.



Beef Calves

These calves are often grazing with their dams and so they are likely to be exposed to lower levels of infection.

- Spring born calves at foot generally do not need to be treated for gut worms while with their mothers. The adult cows will have a cleansing effect on the pasture.
- Use Faecal Egg Counts (FEC) to monitor and only treat if needed using a wormer that is effective against the parasite present. If FEC are low, other factors such as condition, scouring and growth rate should be taken into account.
- In planning a worm control programme the grazing history from the previous twelve months should be taken into account. Where susceptible groups of cattle are turned out onto contaminated pasture, a worm control programme will be required.
- Consider whether vaccination against lungworm is required based on farm history. Lungworm can cause problems both before and after weaning.
- Weaned autumn born calves and spring born calves in their second season are susceptible to gut worms – treat as needed and at housing.
- Worm all calves at housing to remove any larvae that have migrated into the tissues and become dormant within the animal. The levamisole group (yellow drenches) is not effective against dormant larvae and should not be used. The benzimidazole group (white wormers) and the avermectin group (clear drenches) are effective against the inhibited (dormant) worm larvae.
- White wormers should be used several days after housing to ensure all worms are at the susceptible stage. The avermectin group has persistent activity and can be used before housing the cattle when they are still grazing.

The benefit in treating beef animals beyond two years of age is debateable.

Dairy calves

Surveys suggest that some dairy farmers routinely overtreat calves during their first year, treat them again during their second year and then use eprinomectin for good measure when they become adults. Hence these animals rarely get to develop their own natural immunity and the repeated exposure of worms to the same groups of wormer can accelerate the development of wormer resistance without it being detected.

- Monitor Faecal Egg Counts (FEC) to determine the infection levels. If levels become high then review your control strategies. It may be better for calves to experience some infection during their first year than in year two when you are needing them to get pregnant.
- Only drench on need using a wormer that is effective against the parasite present.
- Lungworm is most common in dairy-type calves and won't be detected by FEC – vaccinate all calves.
- Dairy calves should be wormed at housing after their first grazing season – see beef calves section.



5. Choosing the right wormer for the job

Unnecessary exposure of worms to a wormer increases the proportion of worms that are resistant, so it is vital that the wormer used is the right one for the worms present at that time and that it is actually effective against those worms.

Beware of using combination products:

If liver fluke is the target, use a flukicide on its own and avoid products which contain a flukicide plus a broad-spectrum wormer. The flukicides you can use will depend on the timing of treatment in relation to when your cattle are likely to be housed and the effectiveness of the particular flukicide against the flukes present on your farm. Remember that some flukicides are effective against immature flukes and others are only effective against adult flukes.

Wherever practical, vaccinate against lungworm rather than using wormers to treat infection.

Before choosing a treatment, always check:

- Is it effective against the parasites present?
- How long is it effective for?
- How is it to be applied?
- Does it have any other benefits?
- What is the withholding period and export/slaughter interval? Bear in mind that some products which use the same active ingredient could have different withdrawal periods.

If animals are known to have infection with both internal and external parasites then the use of an endectocide may be a good choice. However, oral treatment for internal parasites and separate treatment for mange or lice could be just as effective and even taking into account the extra labour needed for drenching, it can still be much more cost-effective to use separate treatments, only when required.

Advice should always be sought from veterinary surgeons and advisors on the most appropriate treatment for use at that time.

6. Administering wormers effectively

The most common method of treatment currently used by beef and dairy farmers in England and Wales is a pour-on product, with injections and boluses being the next most common, followed by drenches.

Regardless of the product of choice, it is important that the right dose of wormer is given correctly to ensure maximum efficacy. Recent surveys have shown that farmers could significantly delay the development of wormer resistance on their farms by worming correctly.

Several general principles apply:

Always weigh cattle before dosing and dose to the rate recommended for the heaviest cattle in the group

If the weight range is such that the lightest cattle might receive more than a double dose of wormer, divide the cattle into two groups based on weight to avoid excessive overdosing.

Check that the dosing gun is accurate

Deliver two or more 'doses' of wormer into a graduated measure such as a 20ml syringe. Don't use water to check the gun - it is less viscous than the wormer and so won't give an accurate measure.

Restrict feed before dosing

The effectiveness of some white and clear wormers can be improved by withholding food for 24 hours before dosing because it slows the flow rate through the gut, increasing the contact time with the wormer. Always maintain access to water.

Always apply the product correctly

Follow the manufacturer's recommendations for the application of pour-ons, injectibles, boluses and drenches.

Pour-ons

Avoid administering treatment if the hide is wet, or if rain is likely. The efficacy of the product will also be reduced if it is applied to skin which has been thickened by scabs or to areas which are caked in mud and faeces.



Injectables

An increasing number of carcasses are being condemned as a result of abscesses caused by injection with contaminated needles. It is important to ensure that your aseptic technique is good to reduce any unnecessary losses later on.

Boluses

Boluses have the advantage of providing a single treatment to young stock in summer, which reduces the need to handle cattle after turnout. However, this method could potentially contribute to the development of wormer resistance. Care should always be taken when administering boluses according to the manufacturers recommendations. Ensure that each animal has swallowed the bolus by observing the animal for a short time after dosing.

Drenches

Care must be taken when dosing animals to avoid causing injury to the mouth and throat. Always check your dosing technique to avoid delivering the wormer into the mouth. If any wormer is delivered into the mouth it may bypass the rumen completely and this means that the worms may not be exposed to the levels of wormer needed to kill them.



7. Reduce your dependence on wormers

There are a number of management decisions that can help to reduce the need for worming. Grazing management is a key tool for cattle farmers. Field plans, grazing records and basic risk assessment for pastures are important to help you to manage your grazing effectively.

Grazing management can help to avoid any unnecessary exposure to some worms whilst allowing cattle to build up their own natural immunity to the parasites that are present. Older, resistant animals reduce the contamination levels on pastures so rotate different age groups of cattle through paddocks.

Intensive grazing increases the likelihood of internal parasite infections. Cattle which are raised under extensive conditions at low stocking rates rarely suffer from clinical infections.

Avoid overgrazing pastures – cattle on overgrazed pasture graze closer to the ground and are more likely to pick up infective larvae.

Avoid grazing contaminated pasture during the peak season. Moving your cattle onto fresh ungrazed pasture such as silage aftermath before the summer peak can help to reduce the likelihood of infection.

Pastures which have not been grazed (or have been grazed by sheep) during the previous season are considered 'clean'. There is relatively little cross infection between worms which affect sheep and those which affect cattle although nematodirus can occasionally cause problems in young calves.

If flukes are a problem and it is not possible to improve your drainage, try to reduce the chances of infection by fencing off problem areas.



Avoid stress wherever possible

Factors such as severe weather conditions or weaning can lower an animal's resistance to disease, including infection by internal and external parasites. Make every effort to minimise stress.

Grouping calves by age

Keeping calves in age groups at turnout has benefits when it comes to the need for treatment and the use of FECs to work out when treatment is needed. Calves in age groups can then be weaned together and share the same withdrawal times after treatment.

Nutrition

Good nutrition helps to ensure that an animal is less susceptible to disease and should always be part of the overall management plan.

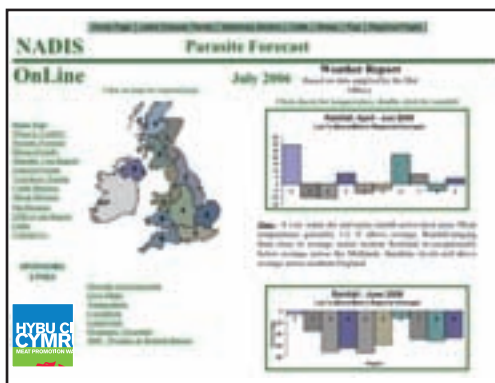
Monitor rainfall and temperature

Since temperature and moisture affect the levels of infective larvae on the pasture, management strategies should take into account the climate of the current year.

In dry years, such as 2003, the levels of infective larvae on the pasture are lower, but once it rains, there tends to be a huge increase in infectivity as the infective larvae emerge from the dung. Heavy worm burdens are therefore often seen in the autumn and winter following a dry summer.

The risk of severe outbreaks of liver fluke increases following wet springs and summers. Forecasting systems help to predict the likely incidence and severity of liver fluke based on data from the preceding months.

The NADIS national disease forecasts can be a very useful source of information on the incidence of parasite infections across the UK to help farmers plan their fluke and parasite control strategies. This information can be accessed via a link on the HCC website www.hccmpw.org.uk.



Future approaches

Considerable research is being undertaken worldwide to provide alternatives to wormers for the future. With careful management of our use of wormers in the meantime, we may be able to extend their life until some of the research yields answers which can be converted into practical recommendations:

Alternative forages and feed additives

Considerable research is being done to look at different feeds which might help to reduce worm burdens in sheep. Chicory and plants containing tannin have been shown to help to inhibit parasite development but the way that these effects occur have not been fully determined.



Chicory (Cichorium intybus)
56 days after sowing

There have also been some reports that a number of substances such as diatomaceous earth, wormwood and garlic can affect parasite infections. The effects of these substances still need to be scientifically proven.

Vaccines

Despite considerable research there are, as yet, no commercially available vaccines for the control of gut parasites in cattle. The development of vaccines against the major parasite species has proved to be particularly problematic.

Genetic markers

Research is taking place in the UK and abroad to identify genetic markers which will help to tell us which animals are naturally susceptible or resistant to parasite infections. The use of these markers alongside a prudent breeding and culling policy will help to breed animals with an inherited ability to resist parasite infections.

Biological and other control mechanisms

It is possible that various improved environmental strategies may increase the number of natural enemies of parasites and help to provide a natural/biological approach to parasite control. Research that is currently investigating the impact of a particular type of fungi as part of a grazing management system to control parasites is encouraging.



Finally, remember

Wormer resistance is not the only reason that wormers sometimes appear to fail to control parasites.....

Scouring is not ONLY caused by parasite infections

Always check that the cause of scouring IS WORMS before worming unnecessarily

So check it out:

- Could the animal's weight have been underestimated giving an insufficient dose of the wormer?
- Has the right dose been delivered to the right place?
- Were the manufacturer's instructions read and followed?
- Were the products stored correctly?
- Were the products within their use-by date?
- Were the products mixed with any other products?
- Was the correct drug used? Do you know what the treatment was aimed at?
- Have the animals been re-infected by highly infective pastures?

Further information

For further information on any of the content in this booklet or on the work undertaken by HCC please contact HCC on:

tel: 01970 625050,

email: info@hccmpw.org.uk

or visit www.hccmpw.org.uk.

Advice can also be sought from your vet or advisor.