

Best practice use of medicated grit





History of disease

The presence of *Trichostrongylus tenuis*, a parasitic strongyle threadworm, which lives in the guts of red grouse has been known for more than 100 years. Its impact on red grouse is often referred to as the disease strongylosis. Research started in the 1980s by the Game and Wildlife Conservation Trust (GWCT) established that infection with strongyle worms can cause 4-6 year cyclical fluctuations in grouse numbers. Once we established the impact of worms on grouse survival and breeding success, our research focused on ways of reducing that impact. In doing so, we have helped reduce the severity and frequency of cyclical grouse population crashes, resulting in greater stabilization of grouse numbers, which in turn has increased the likelihood of shooting.

History of control

GWCT has been at the heart of the development of an indirect method of strongyle control using medicated grit. This has centered on the need for red grouse to naturally consume grit, which they store in their gizzard, to aid the digestion of its fibrous diet of heather shoots. To do so, grouse consume approximately 35g of grit per month. Grit can occur naturally on moors but is also provided at gritting stations by gamekeepers. To kill strongyle worms, the quartz grit is thinly-coated with fat, into which an anthelmintic drug has been impregnated. This is known as 'medicated grit'.

.....

Medicated Grit

Medicated grit was first developed in the 1980s by the Strathclyde Chemical Company. The original drug used in medicated grit was fenbendazole, part of the benzimidazole group of drugs, sold by Hoechst Animal Health under the trade name of Panacur. The benzimidazole group of drugs are ideal because they are not soluble in water, do not break down in sunlight and work well as a drug taken in split doses. Split dose drugs work by allowing the animal to take in small amounts of the anthelmintic over a period of days, which then accumulates in the body and kills the strongyle worms. Medicated grit is only available under license. A veterinarian prescription is now required before purchasing medicated grit from the manufacturers. Evidence of high strongyle burdens in grouse will be required by the veterinarian before they can dispense the appropriate prescription.

Early experiments by the Trust showed that this type of medicated grit was associated with an average 44% reduction in worm burdens in grouse and an increased grouse productivity of 40%, the latter largely through improving chick survival. Reducing parasites helps to improve body condition in adult grouse and also reduces their scent emission, making the birds less vulnerable to mammalian predators when breeding.

Improved formulation

In 2007, an improved form of medicated grit was developed. This involved a change in the drug used from fenbendazole to flubendazole; still part of the benzimidazole family of drugs, but one licensed for use in game birds. Simultaneously, the fat was also changed from one that had a temperature-based melting or slip point to a stable non-slip fat. This lengthened drug persistency on the grit instead of slipping-off when temperatures reached those typical of late-spring. This temperature-resistant persistency brought a new problem. To comply with the law, the medicated grit containing the drug has to be withdrawn from grouse 28 days before grouse are harvested and consumed as food. To do this, the new medicated grit was placed in a box with a lid, which could be closed to prevent access by grouse before and during the shooting season.

Subsequent use of medicated grit has increased markedly so that after 2009, the year when those estates not using medicated grit last crashed, virtually all driven grouse moors use it. Parasite-induced population crashes in grouse now seldom occur and generally worm levels have remained very low (see Figures 1 & 2). Increased efficiency and use of medicated grit and the subsequent increases in grouse densities (see Figure 3) may have brought their own problems. These include the greater likelihood of resistance to flubendazole amongst strongyle worms and the density related emergence of further grouse diseases such as respiratory cryptosporidiosis or bulgy-eye.

Assessing grouse for worms

Before commencing parasite management, it is important to know what levels of worms are present in grouse. Strongyle worms should be counted from a sample of 20 adult grouse randomly selected from those shot, preferably in August and again at the end of the shooting season.

Worm counts can either be done by estate staff, once trained by GWCT, or the guts from those grouse selected can be delivered (or posted using a bio-bottle) to GWCT offices and we will do them for you. As a rough guide, we know from previous research that more than an average of 2000 worms per adult grouse can severely impact on productivity and survival. It is the spread of individual worm values across the measured sample, guided by the average, that will help steer decisions on whether medicated grit is required to control worm parasites. Importantly, these count results should be discussed with your vet when asking for a medicate grit prescription.

Mean infestations above 500-750 worms per adult bird in early autumn may require the use of medicated grit through the winter before the next breeding season. The relationship between autumn worm counts and those in the following spring can however be highly variable and difficult to accurately predict. Larval pick-up in the intervening period will be strongly influenced by winter weather; mild and wet weather being good for worm larval survival and subsequent pick-up by foraging grouse.

If late-autumn worms counts are still not sufficiently high to merit using medication, then we recommend further sampling. This should be done in late-winter; but this time through counting worm eggs in freshly gathered grouse caecal pats. Strongyle eggs are passed out in the chocolate-mouse type caecal droppings, which are produced every night whilst grouse are at roost.

The following criteria are import when collecting caecal samples

- Only collect fresh caecal material. Those pats with hard dry skins should not be collected.
- Ideally 48 hours of frost-free conditions are required before collection of caecal.
- Only the viscus brown “chocolate mousse” type material (as shown below) should be collected, avoid contamination with fibrous droppings.
- Store one sample per polythene bag, insert hand into bag, collect caecal, turn bag inside out and tie top of the bag. Try to keep the sample together ideally in the corner of the bag.
- Label each bag clearly, with date/moor/beat/drive/reference number.
- Store samples in cool conditions such as in a fridge. Do not keep in heated vehicle or in direct sunlight. Do not freeze them.
- Deliver samples to GWCT (or a vet who conducts this service) quickly, either in person during office hours or, prior to collection, ask us for a “Bio bottle” and send to us by overnight postal delivery.
- Aim for samples to always be delivered to GWCT or a vet within 48 hours of collection.

From the number of eggs counted, the approximate worm burden in the bird can be calculated. We and others have carefully calibrated worm egg counts with those of adult worms from the same grouse at different times of year and different parasite intensities. GWCT or your vet can do these egg counts and let you know the approximate adult worm equivalent.

By using egg counts to monitor parasite intensity frequently, more informed decisions can be made over the necessity of using medicated grit. Ultimately, this may be of critically high importance as repeated over-exposure of worms to flubendazole is likely to cause resistance to the drug amongst the worms.



Strongyle worms should be counted from a sample of 20 adult grouse randomly selected from those shot, preferably in August and again at the end of the shooting season. At other times of year through counting worm eggs in freshly gathered grouse caecal pats. © GWCT

Deployment of medicated grit and grit box hygiene

A lattice of grit sites should be established across the moor, whose frequency broadly relates to the grouse pair density in spring, i.e. a grit station in each territory. Grit sites should be either marked, using sections of alkathene pipe or small posts, or the grid reference of each grit site recorded within a hand-held GPS.

Grouse counts in Spring, repeated in July, give reliable estimates of pre- and post-breeding densities. By subtracting the number of grouse harvested, together with those expected to die from natural causes during the autumn/winter, from the July grouse density, this gives an approximate density in the next spring and hence the number of gritting stations required. GWCT can assist with calculating these figures if both the count and bag data are made available to us.

Siting of grit boxes is important. Place them in short vegetation, at least 5 m away from running and open water. Place stones around them to make them more obvious to grouse. With the recent occurrence of respiratory cryptosporidiosis (bulgy-eye) involving the protozoan parasite *Cryptosporidium baileyi* in grouse, the siting and maintenance of grit boxes has become even more important. Grouse potentially spread the infective stages of cryptosporidia (oocysts) in mucous expelled from their nasal cavities and beak, as well as via both the fibrous and caecal droppings. Thus preventing contamination of grit boxes by grouse faecal material is important. Using small (20 x 15 cm), well-drained trays, that grouse cannot easily sit in may help to reduce contamination from faeces. Raising boxes slightly off the ground will aid drainage. Preventing the boxes holding moisture is essential because cryptosporidial oocysts require moist environments for their survival. Ultimately, the development of grit boxes more akin to poultry food pellet dispensers may be worthwhile to prevent faecal contamination. To-date, we have not conducted research trials to consider whether grouse would use these types of dispensers so currently it's just a thought.

Regularly changing gritting station positions by only 2-3 m each year may reduce accumulation of infected faeces near the tray. This may also fit with the changing availability of shorter vegetation created by burning/cutting patterns.

Medicated grit can only be placed in gritting sites and made available to grouse once shooting on the moor and adjoining neighbouring moors has finished in the autumn. It must be withdrawn from grouse at least 28 days before shooting starts. About 500g of medicated grit should be placed in each tray. A grouse consumes approximately 35g of grit per month, therefore 500g will last a pair of grouse approximately seven months.

Grit trays should be checked regularly to monitor their use on the basis of droppings being present. If time permits, remove faeces. Replenish used grit as required. Unused trays may benefit from relocation.

Only use fresh medicated grit each year. Do not place new medicated grit on the top of old. This will not only dilute the effectiveness of the anthelmintic, but it may also increase the risk of infection from cryptosporidia. Remove unused medicated grit at the end of June/early July and responsibly dispose of it using a legal waste disposal contractor. Ideally, trays should also be removed and cleaned by power washing, before re-using.



It is important to monitor hygiene at grit trays to avoid risk of infection. © GWCT



An example of a dirty grit tray © GWCT

Plain grit

When medicated grit is not being used, plain quartz grit should be made available instead. Retention of grit keeps the birds habituated to those sites. Plain grit can be placed in a clean tray situated one to two meters from the previous medicated location to avoid contaminated faecal accumulation. Don't place grit on the ground because if it is not totally consumed, it can provide birds with a source of non-medicated grit sources when you want them to consume medicated. Offer a similar quantity (500 g) at each location, with the intention that it will all be consumed before medicated grit is required again. Good grit tray hygiene is also essential when using plain grit to avoid the risk of infection from cryptosporidial oocysts.

Use medicated grit wisely to offset resistance build up in grouse

Most estates have been providing medicated grit as a safety precaution irrespective of whether measured worm burdens show that it is necessary. Historically, this type of overuse of benzimidazole worming drugs in domestic livestock has led to costly drug resistance amongst parasitic worms within only three to five years of use. Here, resistance to one benzimidazole-based drug has resulted in resistance to others within that general drug group. Over-use of medicated grit may act in a similar fashion, accelerating the on-set of resistance amongst strongyle worms infesting red grouse. Whilst the livestock industry has developed further drugs, the grouse world has only one drug it can use.

Avoiding resistance

Grouse may not need medication every year. If worm burdens are low in the autumn, continued parasite monitoring through faecal egg counts in late-winter is recommended. This will help in deciding whether medication is required that year. Whether to use medication should not be based solely on autumn worm burdens. Instead, grouse densities, age structure, recent weather and moor location, which determines precipitation and humidity that affects survival of free-living stages of parasite larvae, should all be taken into consideration.

To help prevent resistance, exposure of strongyle worms to flubendazole needs to be minimized rather than maximized. This is best done by only using medicated grit when totally necessary to prevent a population crash. By accepting that some worms at low to moderate levels may dampen grouse breeding success without impacting adult grouse survival will help. Ensure that when medication is used, a full treatment is provided that kills adult worms.

By careful monitoring of either adult worms of shot grouse, or worm eggs in caecal material, it may be possible to have multiple years without resorting to medication. If medication is needed, then the same monitoring may allow its provision to be delayed until March. Both these procedures will reduce worm exposure to the anthelmintic, but still achieve the required parasite control. By using medicated grit wisely, and only targeting years when it is required, we should be able to keep medicated grit for longer. If resistance by the worms to the drug in medicated grit becomes common and widespread, medicated grit will no longer kill worms. As no alternative drugs are currently available the boom and bust of grouse cycles, recently consigned to history, will be back.

Signs of cryptosporidiosis



Above: Respiratory cryptosporidiosis is known colloquially as 'bulgy-eye' © GWCT

Worried about managing your shoot?

The GWCT advisory team runs courses on:

- Grouse health and disease
- Heather burning
- Best practice predation control
- Sustainable management of released pheasants
- Grey partridge conservation
- Identifying farmland birds
- Managing woodlands
- Shoot biodiversity

Get the latest advice first by signing up to our shoot management newsletter at www.gwct.org.uk/shootownersnl

Best practice check list

1. Conduct both early and late-autumn counts of adult strongyle worms from at least 20 adult grouse per beat. If they are low to moderate, then consider delaying the decision on whether to medicate until counts of worm eggs in grouse caecal pats (faecal egg counts) are conducted in late-winter or early-spring.
2. Whether to use medicated grit should be based on not just the mean value of worms from sample counts but also on the spread of values across the sample. Also consider grouse densities and age structure, weather patterns and moor location.
3. Avoiding over-exposure of worms to medicated grit is critical and may help delay the onset of resistance to the worming drug.
4. Medicated grit is only available under license administered by a veterinarian. Evidence of strongyle burdens that are likely to impact on grouse are required before a prescription is provided.
5. Comprehensive records of medicated grit use must be kept and include:
 - Date and quantity of medicated grit purchased
 - Manufacturer
 - Batch number
 - Expiry date
 - Date placed on moor
 - Location of all grit stations (GPS locations if possible)
 - Date of withdrawal
 - Date of first shoot
 - Date and disposal method of old medicated grit
6. Provide a grit site per spring territory. Estimate the grouse density by conducting spring and July grouse counts. Use small trays (20 x 15 cm) to help prevent birds defecating in them. Trays should have good drainage by slightly raising them or putting on a gravel base. Avoid gritting on areas with standing water or proximity to running water. Faecal material should be removed from trays on a regular basis. If required relocate trays two to three meters if faecal contamination is a problem.
7. Only place about 500g of medicated grit in each tray as that quantity will last a pair of grouse about seven months.
8. Remove all old medicated grit from the tray, remove it from the moor and dispose of old medicated grit via a licensed waste disposal contractor. Clean grit trays. If possible, remove them and wash to reduce the possible spread of cryptosporidia. Medicated grit should only be available to grouse after shooting has ceased. A more targeted, shorter period would be better, but only when needed.
9. To comply with the law, medicated grit should be withdrawn at least 28 days before the start of shooting to prevent the drug entering the human food chain. Once medicated grit is withdrawn ensure grouse have access to plain quartz grit.
10. When not using medicated grit, including during the shooting season and 28 days before shooting commences, supply grouse with plain grit. Place approximately 500g of plain quartz in a clean tray, if necessary two to three meters from the medicated site if contamination with faecal material is a problem.

Figure 1

Average annual worm burden in autumn-shot adult grouse from between 8 – 18 sites across northern England, 1990-2019.

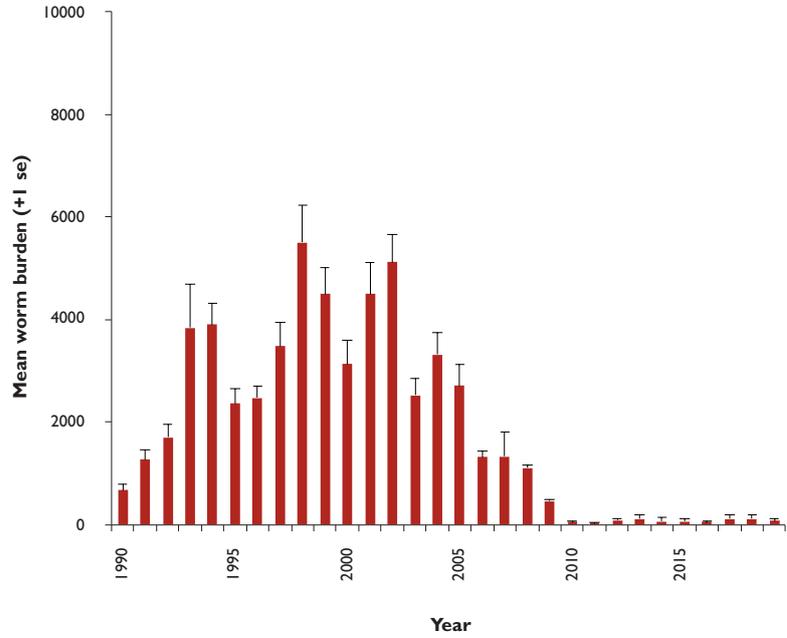


Figure 2

Average annual worm burden in autumn-shot adult grouse from between 3 – 17 sites in Scotland, 1990-2019.

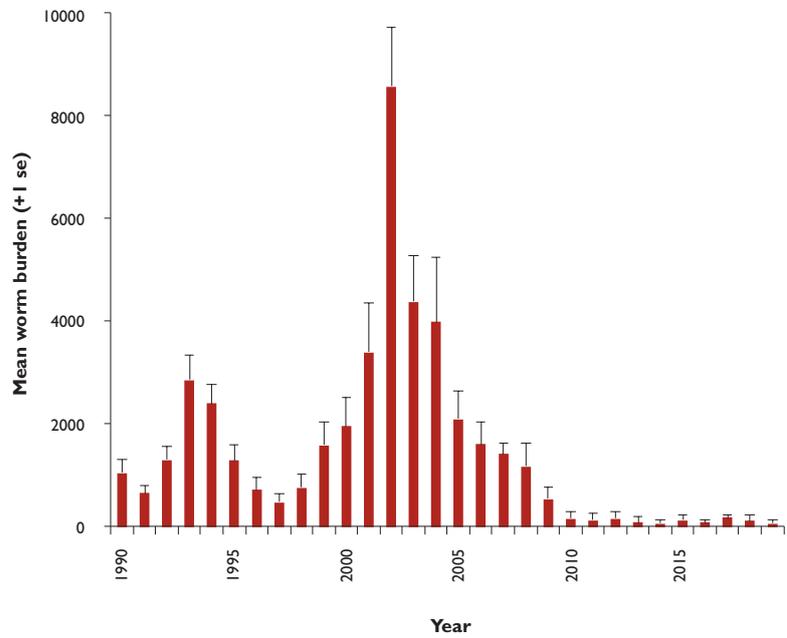
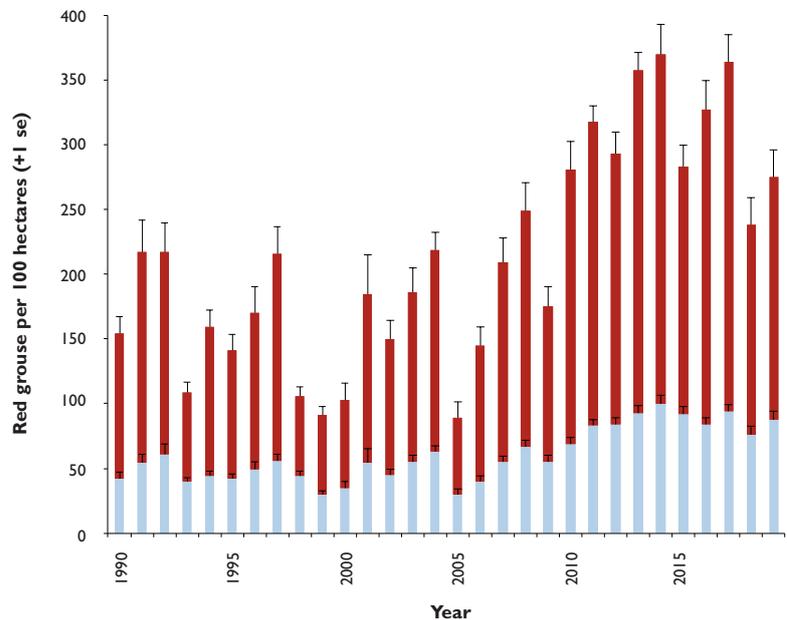


Figure 3

Average density of young and adult grouse in July from 25 sites in northern England 1990-2019.

■ Adults
■ Young





Game & Wildlife
CONSERVATION TRUST

Game & Wildlife Conservation Trust
Upland Research Group
The Coach House
Eggleston Hall, Barnard Castle
Co. Durham, DL12 0AG

Tel 01833 651936
Email uplands@gwct.org.uk

Game & Wildlife Conservation Trust
Scottish Office
Unit 95, Perth Airport
Perthshire
PH2 6PL

Tel 01738 551511
Email scottishhq@gwct.org.uk