

# Correct administration of anthelmintics

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## Abstract:

This seemingly simple topic encompasses many facets.

Correct administration of anthelmintics involves good management and dynamic planning. Dividing the flock / herd into groups / classes facilitates correct dosing. Weanlings and late pregnant/lactating ewes must get most attention and the best circumstances.

All measures and methods must be practical, integrated and financially defensible. Use knowledge in stock flow, reproductive programme, grazing systems, pasture or veld conditions and weather to decide on appropriate and integrated worm management actions.

Cull and select replacements based on resistance (FEC) and/or resilience (FAMACHA<sup>®</sup>/haematocrit).

Select and use the best drug for each situation. Ensure that the correct drug dose is given in the most effective way.

## MANAGEMENTAL AIDS TO ASSIST WITH ANTHELMINTIC ADMINISTRATION

To assist with the correct administration of anthelmintics, the following management aids should be included into the planning:

- **Separation of Groups**

Since different classes of animals vary in their susceptibility to worm infection and its effects, they should be separated into groups, which are grazed, treated and managed as distinct entities. If these distinctions are not made one may be forced to treat the flock / herd according to the most susceptible group. The most susceptible groups can still be managed and treated more intensively in a mixed flock, but this becomes more difficult.

Depending on the size and composition of the flock / herd, animals could also be grouped according to sex, weight and age.

- **Identify the groups most at risk**

Research has shown that the more susceptible animals are kids/ lambs/weanlings; and pregnant/lactating ewes or does. The former are susceptible because they cannot yet mount an effective immune response to infection, the latter are prone to infection because of a temporary suppression of immunity. (PPRR). These groups must get special attention.

- **FEC**

Regular (monthly or 2 - monthly) monitoring of faecal egg counts on a group or flock basis will help to indicate when dosing is really needed, and equally important, when

it can be delayed or even omitted.

- **FECRT**

Every farmer should have the flock tested for drug resistance in the worm population on his farm, at regular intervals of not less than two years. Only by knowing exactly what the state of anthelmintic resistance on a farm is, can appropriate action be taken.

- **FAMACHA<sup>®</sup> evaluation**

Apart from selection and culling, this system also allows frequent, cheap and easy monitoring of the current situation as regards worm infection, but applies only to haemonchosis.

- **Bottle jaw**

Animals with a soft swelling under the jaw are probably suffering from certain forms of parasitism especially wireworm. This check can be done with examination of the eyelids.

- **Nasal discharge**

In an otherwise normal sheep or goat, a clear nasal discharge is a sign of probable nasal bot infection and animal can be treated on this basis.

- **Body condition scoring**

There are very many factors that influence BCS, but in a given flock the animals with lowest scores are likely to be more parasitised and thus benefit from treatment.

- **Dag scoring**

Although there are many other causes of diarrhoea, if these can be eliminated as possibilities then a scoring system for the severity of diarrhoea will help identify animals that will benefit from treatment.

- **Five point check**

It is possible to combine examination of the nose, eye, jaw, back and tail quickly to identify animals in need of treatment.

- **Establish the important parasites species present**

Unless the prevalence and importance of worm species is known, worm management becomes dangerous and unpredictable guesswork. It can also be ineffective and very costly.

- **Use the most suitable drug**

If the parasites are ranked in order of economic importance and their susceptibility to groups of anthelmintics is known and combined with knowledge on the anthelmintic resistance situation on the farm, it is then possible to decide which drug(s) and formulations will be the most suitable in each situation. This includes their cost and a cost/benefit analysis. Neither the cheapest nor the most expensive drug is necessarily the best one to use. Beware of generic drugs sold by an unknown company.

- **Avoid too frequent treatment**

The old approach of "dosing clean" must be completely abandoned, although not by reducing the dosage rate per animal. The aim has to be to treat only sufficient times and enough individual animals to maintain the equilibrium between parasite, host and environment (that is, worm management). Overtreatment ensures that only resistant parasites can survive. Minimal treatment programmes must be the new watchword, but every treatment must be effective.

- **Treat all and stay**

If **all** sheep are to be treated, they should remain in the camp (paddock) where they were grazing before treatment. This will prevent sheep from contaminating a new pasture with only those resistant parasites which survived treatment, thus in the process unwittingly causing the selection for resistance parasites. In most cases they should remain in the paddock for at least 2-3 weeks after treatment to pick up unselected larvae for propagation of the susceptible worms in the new camp/paddock. However, should a long-acting anthelmintic be used, this period will have to be longer (2 to 3 weeks after the effective residual action ends). Particularly bolus (slow release) formulations should be used with great caution.

- **Treat selectively**

It is preferable to treat only those sheep or goats unable to cope with the current infection challenge provided the percentage of non-copers remains below 20%. This can be done with the FAMACHA<sup>®</sup> system for haemonchosis, or possibly with Body Condition Scoring for other parasites. If clinically unaffected animals are left untreated, an immediate move to new pasture will not be detrimental. In the absence of such selective treatment, just leaving a small percentage (10-25%) of the flock intentionally untreated can be beneficial to slow AR development.

- **Weather monitoring**

Factors which affect the survival, development and infectivity of larvae on pastures must be considered. Temperature, rainfall, rainfall pattern, humidity and cloud cover will all have an effect and must be considered when making worm management decisions.

## **ADMINISTRATION OF ANTHELMINTHIC**

- **Dose over the tongue**

By placing the tip of the gun towards the back of the mouth, over the tongue, closure of the oesophageal groove does not occur and thus the full dose lands in the rumen where it is absorbed more slowly - this is particularly important for anthelmintic groups which rely on prolonged blood levels for their effect, like the benzimidazoles and macrocyclic lactones.

This prolonged level of activity (a long so-called "killing zone") means that the drug against which worms have developed a moderate degree of resistance can be made more effective, although of course the resistance of the worms is not reduced, but rather partially overcome. However, dosing (drenching) over the tongue, if done carelessly, can result in two very severe consequences:

1. the dose can land up the lungs, and cause pneumonia
2. the nozzle of the dosing gun can penetrate the pharynx and cause severe,

fatal infection.

If the sheep jumps forward, the operator must let the gun 'ride' with the sheep, and not oppose it, and the dose must be delivered by a measured, steady pressure rather than a single squeeze.

- **Reduce feed intake**

It has been shown in the case of benzimidazoles and closantel that reducing feed intake (i.e. starvation) for 24 hours prior to treatment will improve the absorption of the remedy because of the lower rate of flow of ingesta. As in the previous case, this results in a more effective exposure of the parasite to the drug.

In turn, this means that the drug is clinically more effective and can partially overcome drug resistance.

- **Repeat the dose**

This only applies to benzimidazoles and macrocyclic lactones. Two doses given 12 hours apart will again increase the "killing zone" of these drugs, allowing more time for a cumulative killing effect. Thus resistant worms can still be killed, although this is achieved at a cost since two normal doses rather than one are needed. A double dose, given at one time, will have **no** beneficial effect with these two groups of anthelmintics.

- **Increase the dose**

This only applies to drugs which rely mainly on peak concentrations for their effect. In this case, a double amount of drug given at one time can overcome drug resistance in worms. This is useful for the imidasothiazoles (levamisole). There is however a relatively low safety margin, only 2x – 3x the therapeutic dose may sometimes cause problems of toxicity.

- **Correct dosage**

It may seem too obvious, but a lot of problems are caused by not weighing sheep, not calibrating and checking the dosing gun for accuracy and repeatability, and not reconciling the amount of drug used with the number of sheep treated. Under dosing may be a factor leading to anthelmintic resistance, but it is more likely to be the cause of ineffective treatment.

- **Drug combinations**

Combining drugs from different activity groups in one dose may temporarily improve the effective clinical action of these drugs, but only if each drug concerned is unaffected by resistance. However, many authorities believe that this will not slow the development of resistance and could even enhance it. If drugs are mixed, this can only be done if the formulation has been fully tested and carried by experts, in registered products. Home made combinations are dangerous and illegal. Such combinations often just give temporary relief and disguise the emergence of AR until it is severe and multiple.

- **Sustained delivery**

Medicated blocks or controlled release capsules will increase the clinical efficacy of those drugs which rely on prolonged action for their effectiveness. However, we have to bear in mind that prolonged exposure to a drug at low levels will increase selection for resistance. This approach will therefore not be permanent, and should

only be used for very specific, limited purposes (e.g. weaners on green pasture) and not the entire flock in all circumstances.

- **Goats are different**

Because of differences in the rate of metabolising drugs, goats must be treated as different to sheep. This means that goats must often be given a higher dosage rate than sheep except where there is a possibility of toxicity. Note that many anthelmintics may not be registered for use in goats, or that the recommended dose given is the same as for sheep. Unfortunately, therefore if the product is not registered for use in goats, or the dosage rate is increased, the user has no legal redress if the product is used and fails, or causes losses.

- **Nutritional supplementation**

Since resistance and resilience are dependent on adequate nutrition, and the most important factor identified is protein, it is possible to ameliorate the effects of parasites by feeding animals better. We need to know when and how much of what supplement must be supplied to which class of animal, and what the cost / benefit ratio would be before this aspect can be fully integrated into our overall approach. Other nutritional factors to consider are iron, copper, cobalt and selenium.