Administer Anthelmintics Effectively

Under-dosing is recognised as a highly significant factor in the speed resistance develops (See Chapter 1 What is anthelmintic resistance (AR)?, section 1.3 Selection Mechanisms). It is critical, therefore, to ensure that every time an anthelmintic is administered the animal receives the correct dose

The key elements of accurate dosing are:

1. Dose at the rate recommended for the heaviest in the group.

Weighing a few of the biggest sheep in a group is essential so that they can all be dosed at the rate recommended for the heaviest sheep in the group. If there is a wide range in weight across the group, then it may be sensible to sub-divide the animals into smaller weight matched groups and dose accordingly. It is also important to check the scales are accurate before starting and always look at the dose rate for the product as it can change.

If two anthelmintics are being administered sequentially*, e.g. for quarantine treatment, the full dose rate for each anthelmintic must be used.

**NOTE do not mix products together, they must be given one after the other from separate drenching guns.*

2. Check and calibrate the dosing gun (or injection equipment).

Farmers must always check the drenching gun is working correctly and that it is calibrated regularly to ensure that it delivers the required dose. **This means before every treatment session** and also during the day if large numbers are being treated.

For drenches, this can be done by delivering two or three 'doses' into a graduated measuring device (e.g. a 20 ml syringe), immediately before dosing commences. Adjust the gun until the dose delivered is correct. It is important to use the anthelmintic and not water for the calibration because the higher viscosity of anthelmintic will be a better 'test' for the equipment (Figure 7).

Drenching guns need to be well maintained and replaced regularly. Clean with warm soapy water after use and check springs and tubes to make sure there are no kinks that will form air bubbles.

Figure 7. Calibration of drench gun.

Calibration of dosing equipment can be done quickly and effectively using a syringe barrel or a measuring cylinder.

3. Dosing technique (oral or injection)

Drenching technique is also a vital part of ensuring that the anthelmintic dose the animal receives is effective. Sheep must be properly restrained to restrict movement, ensuring they swallow the full dose and prevent serious injury from the gun nozzle penetrating the soft tissues at the back of the mouth. Drenching gun injuries are commonly seen at post-mortem. The use of a smaller nozzle for lambs is also advisable.

Correct Technique:

Place a hand under the chin and tilt head slightly to the side. Slot the nozzle in the gap between molar and incisor teeth and then over the back of the tongue. If the nozzle isn't fully over the back of the tongue and just in the mouth, it may trigger the oesophageal groove mechanism. Here the drench would by-pass the rumen, going directly to the abomasum (true stomach). Some anthelmintics mode of action require them to enter the rumen e.g., white (1-BZ) drenches bind to the particulate matter in the rumen. Then they are released gradually as the material moves down the gastro-intestinal tract. If they enter the abomasum directly, they are absorbed and metabolised very rapidly, and the parasites may have insufficient exposure to the anthelmintic to provide an effective treatment. See figure 8.

Figure 8. Good drenching technique

Injections

Injections are given either subcutaneously or intramuscularly at the recommended site of injection, following manufacturer's instructions. For injectable, long-acting moxidectin, for example, the site of subcutaneous injection is the base of the ear.

When given subcutaneously, care should be taken to ensure the needle is inserted correctly by parting the fleece and should be withdrawn from the skin with pressure applied at the point of insertion for several seconds to prevent leakage. Also ensure the needle isn't inserted through the skin, resulting in the solution by-passing the animal completely.

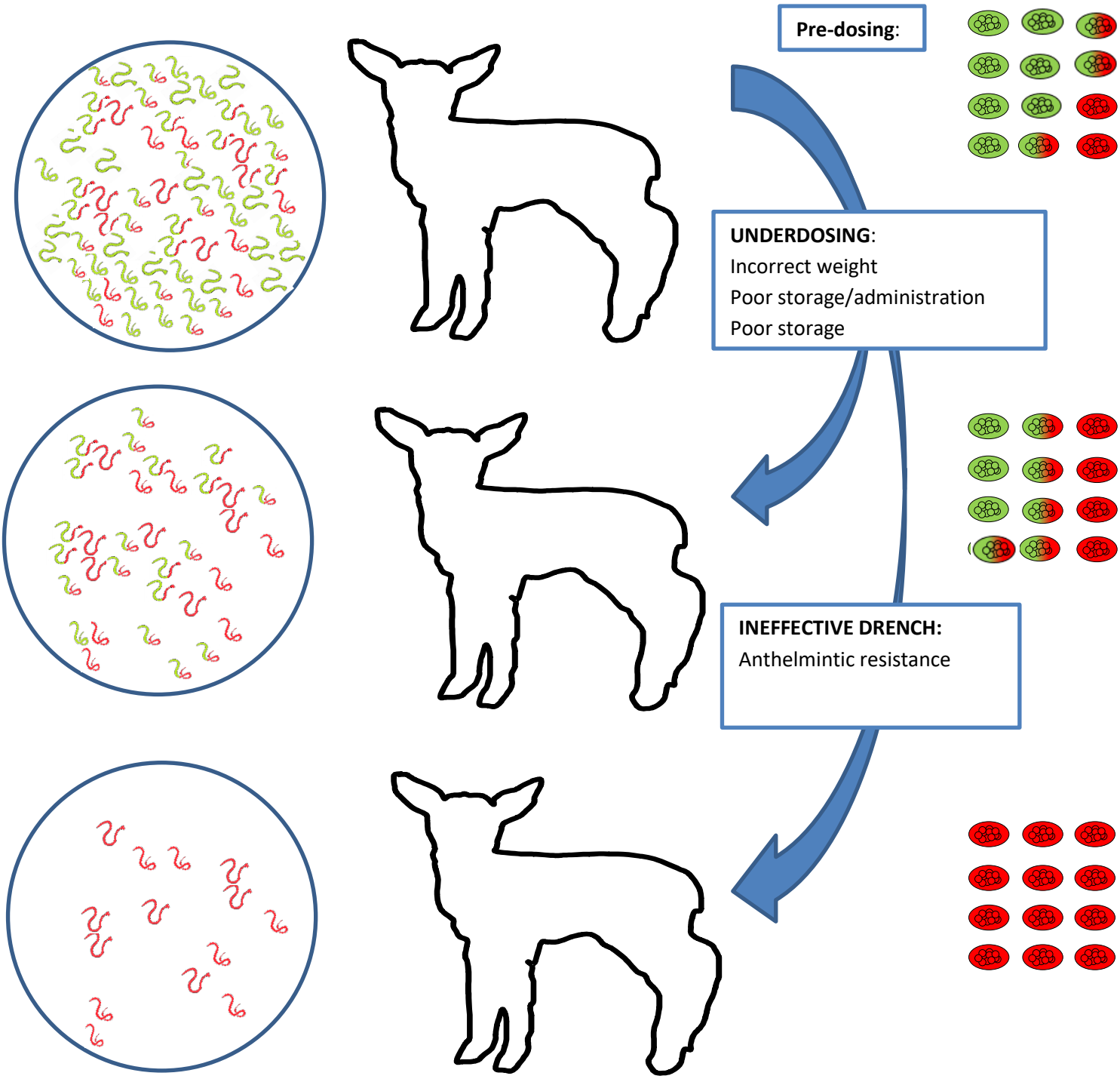
Restriction of feed before dosing

Where a period of feed-restriction is unlikely to be harmful, the activity of 1-BZ and 3-ML anthelmintics can be enhanced by withholding food for 24 hours before dosing. **NEVER WITHHOLD FEED FROM** ewes in late pregnancy and ensure access to water is maintained regardless of age/status.
This reduces the rate of digesta flow from the rumen, increasing the availability of the anthelmintic for absorption by both the sheep and the parasites. This has been shown improve anthelmintic efficacy where efficacy due to resistance has started to diminish but not completely failed.

Do Not Mix

Anthelmintics must not be mixed together or with any other products (such as mineral or trace element preparation) prior to administration. Mixing of products can change the dose rates, leading to incorrect dose being administered) and some anthelmintics formulations are incompatible, reducing the efficacy of the products involved. For information on when it is acceptable use of two different anthelmintics in the same animal or animal group, see chapter 1 What is anthelmintic resistance (AR)?, section 1.4 Managing Multiple Resistance.

Figure 9. Impact on roundworm population genetic makeup following different dosing events.



Fully susceptible (green) male and female worms mate to produce fully anthelmintic **SUSCEPTIBLE** eggs that become **SUSCEPTIBLE** larvae; heterozygous (red and green) worms (carrying both susceptible and resistant genes) mate to produce fully susceptible, fully resistant and heterozygous eggs and larvae. Fully resistant (red) worms mate to **ONLY** produce **RESISTANT** eggs and larvae.