NARACOORTE & PENOLA Veterinary centres

# CURRENT DRENCH STRATEGIES

1. **Warning – the dangers of ignoring this information.**
- Drench advice is district specific – generic advice is dangerou
- Common drenching practice represents the main cause of resistance to drench compounds.
2. **Some definitions**
3. **Description of the current situation with regard to resistance**
- The extent of the problem
- Are any drenches 100% effective?
- What does it cost?
4. **What management practices cause rapid resistance development?**
- Poor drenching technique
- The use of the incorrect compound for a given situation
- Timing of summer drenches/Drenching onto clean pastures
- Persistent compounds
5. **Refugia – this concept is CRITICAL, please read it.**
- Definition
- What purpose does it serve?
- Doesn't this compromise my overall worm control?

## 1. The Warning

Drench resistance is a problem that is currently threatening the viability of sheep production on many properties.

- Despite this, many producers continue to ignore resistance development in their worm management.
- Worm control programs are specific to each farm, and the use of generic or out of district advice is dangerous.
- The main cause of resistance development is the continued application of outmoded management models – eg "what I've done for years".

**Drench resistance is irreversible and has no cure.**

**It is present on every sheep farm in Australia, and getting worse on all of them.**

**Prevention / Delaying is our only hope**

**Drench compounds will not come to the rescue, only management decisions will help.**

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## 2. Definitions

- Resistance – a genetic property of a worm population to survive a drench.
- Reversion – the change back from resistance to susceptibility in a worm population. It does not happen in any measurable time span.
- Strategic drench – a drench used to affect the worm population over an extended period – like a first summer drench aiming to depress worm numbers for the entire following year.
- Tactical drench – a drench used to fix an immediate problem – a knockdown treatment. Successful strategic drenches will prevent the need for tactical drenches.
- BZ – benzimidazole or white drench
- LV – Levamisole or clear drench
- ML – Macrocyclic lactone drenches – ivermectin, abamectin, moxidectin etc.
- Ostertagia – Brown Stomach Worm – a scour worm
- Trichostrongylus – Black scour worm (several types)
- Haemonchus – Barbers pole worm
- Larvae – immature worms. Hatchlings are called L1 (Larval stage 1). They grow through stages on the pasture to L4, the infective stage. If ingested (eaten) L4 larvae have the potential to grow into adult worms (they don't all make it)

## 3. How bad is it?

The extent of resistance in Australia. These figures may well be out of date by the time you read them.

Every sheep property in Australia has drench resistance. On every property where drenches are being used the resistance is getting worse. The greatest loss is in production – half a kilo of wool and 2 or 3 kilograms of meat per sheep as an example.

- White drenches (benzimidazoles, or "BZ's") – resistance on 100% of farms, often total failure. There is good evidence to suggest BZ's should never be used alone anywhere now.
- Clear drenches (levamisole, or LV) – resistance on 90+% of farms, but usually less than to BZ's.
- BZ-LV combinations – over 95% effective on about 20% of farms. Less than 75% effective on another 20%. Testing necessary to assess before using for strategic drenching.
- Napthalophos combinations – variable results, needs testing to assess, and can change status rapidly.
- ML's – resistance to ML's is now present on 75% of farms, but this resistance is currently restricted to Ostertagia and Haemonchus.
- ML + BZ + LV combination compounds – often effective, but sometimes not even these work, and where do we go from there?
- Into the future. At the earliest, there may be a new compound out in 5 years if we are lucky, but assume 10.

**Are there any 100% effective products?**

- No
- Products may produce a result of 100% reduction by relatively inaccurate (but practical) tests, but close examination (post mortem) will reveal that even these products leave some survivors. These survivors are the progenitors of the developing resistant population.

- Manufacturer claims of 100% efficacy will be based on less sensitive testing techniques.

**What does drench resistance cost to the farmer?**

There are two parts to this answer.

- Short Term – labour costs, product (drench) costs and immediate production loss costs.
- Long Term – sheep production viability overall – if the resistance develops uncontrolled to a point where there are no effective compounds left for worm control, sheep production will be forced to change so dramatically as to be unviable.

## 4. What management practices cause rapid resistance development?

**Poor drenching technique**

- Underdosing exposes worms to sub-lethal doses, with survivors having a higher percentage of resistance.
- Too frequent drenching. The more times a population is exposed, the faster the resistance develops. The need for frequent drenching should indicate that a problem exists. Needing to drench any sheep more than 4 times annually is indicative of a problem.

**The use of the incorrect compound for a given situation**

- When a drench is required, the use of an incorrect compound will affect resistance development.
- "Underkill" – the use of a compound that leaves a population rich in resistant genes – such as using a failing combination drench in summer.
- "Overkill" – the use of a compound that while potent, could be replaced with another product causing less long term problems while being just as efficient on the chosen problem – such as using moxidectin as a winter drench when a combo at 80% efficiency will produce the same end result.
- Use of Broad-spectrum drenches to contain a specific problem. eg. using moxidectin for Barbers Pole control, when Closantel would be more effective and not produce resistance development in scour worms. Levamisole and a shift is equally as effective.

**Timing of summer drenches/Drenching onto (totally) clean pastures**

This will be seen as controversial – you must understand the term and concept of REFUGIA.

- Delaying the first summer drench until pastures are totally dry, or drenching onto a clean pasture/stubble is the greatest/fastest way of producing resistance in your flock
- As described above, no drench is truly 100% effective – none.
- Drenching onto a truly clean pasture or stubble means the few resistant survivors in the sheep are the only worms left in the population.
- This means that while you may have good overall worm control, you have massively accelerated your resistance development.
- Any gains are temporary.

**Persistent compounds**

A number of compounds have some persistence of action. Unfortunately, most of these compounds have an extended tail, a period where the compound is still present in the body but below the lethal dose. This extended period gives the worm population exposure without killing, and this means resistance development.

- **Capsules** – capsules do not "pay out" at the full dose level of the same compound given used in an oral liquid. They have the potential of rapid resistance development and should only be considered in extreme situations. Yes – they can result in dramatic production benefits in the short term.

- **Moxidectin** – remains the most effective ML drench – but – it's performance is NOT 100%, and then it has a long tail, when larvae picked up will be exposed to sub-lethal levels.
- **Closantel** – has a long duration of action, which has resulted in resistance where it has been used frequently (New England tablelands). It is a narrow spectrum (Haemonchus only) compound so this will only affect Haemonchus resistance.

## 5. Refugia

**Definition**

- Refugia is the part of a worm population that is NOT exposed to the drenching compound at the time of a flock drench.
- The examples of refugia
- The worm population in the environment
- Worms present in undrenched sheep.

**What purpose does the "Refugia" serve?**

- The refugia contains genetics not affected by that last drench, as it was not exposed.
- The refugia genetics will dilute the resistant genes, slowing the progression of the resistance

**Won't the presence of such a Refugia compromise my overall worm control?**

- Yes
- The long term decrease of resistance development is far more important however.
- The trick is to achieve balance
- To use a drench effective for strategic control
- To have enough refugia to dilute the genetics of the survivors
- To have low enough refugia not to compromise the overall control.

**Some basics of refugia management.**

- Do not drench onto a totally clean pasture/stubble
- Suggestions
- Drench only if egg count indicates a need to do so.
- Drench one or two weeks before the shift (carry on a low number of newly picked up worms)
- Drench one or two weeks after the shift.
- Leave a small (5%) percentage of forward condition sheep undrenched. Not recommended for lambs.
- Do not delay the first summer drench.
- This has two potential and opposite consequences

- There may be such a contamination by the time of the drench that an early break or mild summer may render it ineffective – common in the SE.
- If there is a “profound” summer, the kill may be too good – no refugia.
- The first summer drench should be administered by mid December at the latest (mid Nov – mid Dec)
- In Winter “tactical” or “knockdown” drenching, the Refugia becomes the problem – only the worms in the sheep are exposed to the drench, but the environmental population will be massive. This is why there is little use in using a “big gun” drench in Winter – anything 75% or better efficiency will work.

**What does it take to produce a “totally clean” pasture?**

It is not easy to achieve a totally clean pasture. A pasture or stubble that has not had sheep on it for a year will do it. A long term cattle grazed pasture. 6 months through Winter and Spring will not.

A typical South East pasture will not achieve totally clean status, but a stubble clearly could do so.