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# Sheep worm control: summer vs winter drenching in southern NSW

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DrenchPlan, the recommended sheep worm control program for central and southern NSW, was first launched in 1985 as a joint venture of CSIRO, NSW Agriculture (now NSW DPI) and Rural Lands Protection Boards (RLPBs), with support also from the private sector. It has undergone various refinements since then and recent versions (from the late 1990s) have increasingly emphasised integrated parasite management (IPM).

Among other things, DrenchPlan recommends that the second summer drench should not be automatic. Instead, drenching at this time is only done if worm egg counts (WEC, WormTesting) indicate it is needed. This avoids unnecessary drenching and selection for resistance.

In very dry years, and for the reasons outlined above, the first summer drench, as well as the second, should only be given if a WEC indicates it is necessary, particularly in adult sheep.

## The root of all evil?

Not everyone, however, sees summer drenching as the best option. Some proponents of winter drenching in southern NSW say that summer drenching is a major cause of drench resistance.

The Western Australian experience is often cited as proof of this. The West Australians practice summer drenching and they have amongst the worst resistance problems in Australia – with around 75% of farms having resistance to the macrocyclic lactone (ML, 'mectin') family of drenches.

At first glance this argument seems plausible. It is true that a drench in summer – when there are few worms in refugia* – may select more for resistance than a drench in winter, when there are normally more worms in refugia.

The aim of strategic drenching (for example, summer drenching in southern NSW) is generally to treat sheep when worms on pasture are relatively low in number or in decline due to hot, dry weather, cropping, or alternate grazing.

- The advantage is that you need to drench less often, because re-infection rates are low.
- The disadvantage is that each time you drench, you may get more selection for resistance, because there are fewer worms 'in refugia'. There are fewer worms on pasture to dilute the progeny of the genetically resistant worms that survive the drench, and these resistant worms more quickly became a sizeable proportion of the total worm population on a farm.

Drenching during a prolonged dry spell, whether in summer or winter, carries the risk of increased selection for drench resistance.

*_Refugia:_* the proportion of the worm population that escapes exposure to a drench. This generally means the worms (eggs and larvae) that are on pasture.

## Best bet options

All worm control practices have advantages as well as disadvantages; even the soundest recommendations are 'best bet options' based on carefully weighing the pros and cons of various alternatives.

The designers of DrenchPlan – some of Australia's best research and 'hands-on' parasitologists (notably RLPB District Vets) – opted for the summer drenching approach, which requires less drenching, in preference to the then prevailing practice of winter drenching, which involves more frequent drenching, from autumn to spring.

So, does the WA situation prove that summer drenching is the cause of all our resistance problems? As Dr John Evers (Young RLPB) notes, if winter drenching is so good, why did we have so

much resistance to the 'white' (BZ) and 'clear' (LEV) drenches before DrenchPlan was introduced?

A 'modified strategic' approach is now being used in WA, where not all sheep – especially adults – are given a summer drench if WECs are low. This is similar to the DrenchPlan approach (from the late 1990s) outlined above.

## Apples and oranges …

Comparing summer drenching in southern NSW with that in WA is like comparing apples with oranges – there are similarities, but there are also significant differences. They are similar in that they reduce the frequency of drenching by treating strategically when worms on pasture are in decline.

But what about the differences? Most of the DrenchPlan region of NSW has non-seasonal / winter effective rainfall, with many areas having a fairly even spread of rain throughout the year. Compare this with south-western WA. They have a Mediterranean climate – a clear-cut winter rainfall climate, with rain in winter (autumn to spring) and a very hot, very dry summer (see graph below). Many more worm larvae survive on pasture in southern NSW than on a sheep farm in south-western WA.

Lets return again briefly to history. Ivermectin, the first of the MLs, was released as a sheep drench in Australia in 1988, followed by moxidectin in 1995, and the ivermectin capsule in 1997. Resistance to the MLs in WA was first reported in 1994; however the first report of resistance to MLs in sheep in southern NSW was in 2000-01. While this should *not* be cause for complacency, it also should warn us about making simple comparisons between southern NSW and WA.

## The golden rule

So, it is all a matter of degree. A winter drench probably selects less than a summer drench in southern NSW (unless winter is dry), which in turn probably selects a lot less than a similar drench in WA. This brings us to another rule of thumb regarding worm control:

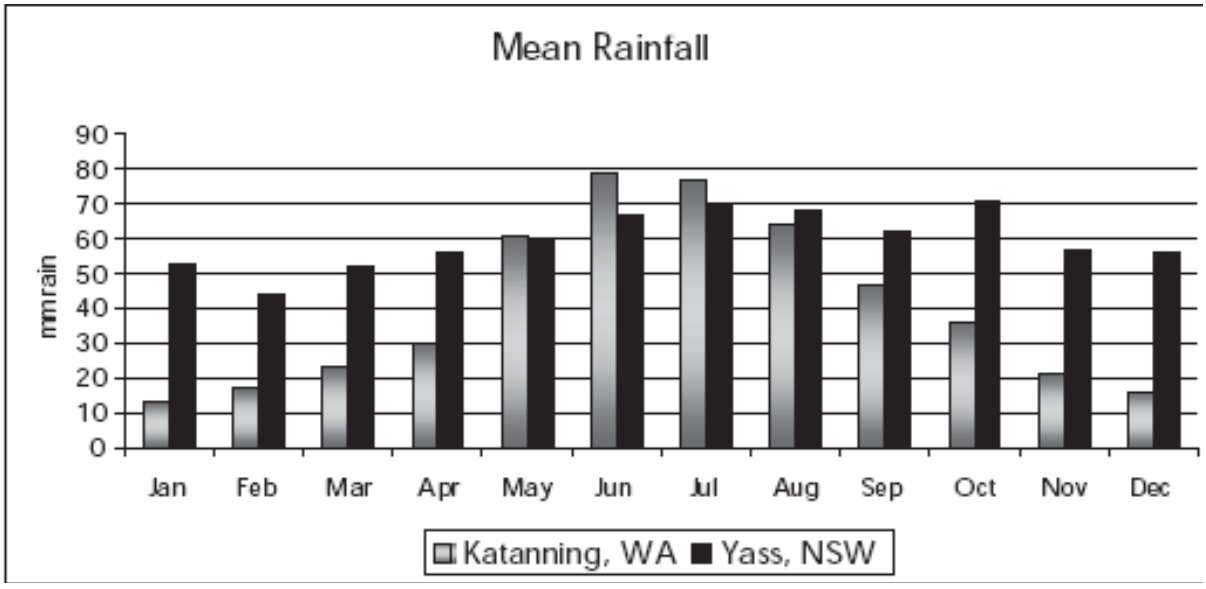
**In a given farming system, the better the worm control using a particular drench, the greater the selection for resistance to that drench**

This 'golden rule' is an important generalisation to keep in mind when thinking about worm control. Related to this, it may also be *generally* true that – regardless of what route you take to achieve a certain level of worm control – in the long term you will probably end up applying similar levels of selection for resistance along the way. A possible exception is the farmer who elects to use mixtures of highly effective drenches – but more on that later.

To achieve DrenchPlan's level of worm control with one to three drenches a year, a program based on winter drench may require around double the number of drenches. In the end there may be a similar level of drench resistance, but with substantially higher drench and labour costs. Also, although DrenchPlan has long advocated regular egg count monitoring (WormTesting), the winter drenching option will probably require a lot more WormTesting.

## Consider combinations

If you are willing to spend more money on drenches, a better option may be to stick with fewer drenches – as with DrenchPlan – but using highly effective drenches simultaneously. This is instead of drenching twice as often (winter drenching), using a single drench each time.



Using mixtures of effective drugs is neither a new idea nor one confined to the control of worms. The generally accepted thinking is that populations of pests will take *much* longer to develop resistance to drugs when they are used in combination, than when they are used singly. For example, Dobson and others (2001) strongly advocate the use of mixtures of highly effective drenches.

For more information see Primefact 474 *Sheep drench combinations, resistance and refugia*. However, there are a number of issues to consider, for example, choices of drenches, cost, compatibility, safety, efficacy etc. This is something you should discuss with your veterinarian before implementing.

## More than just drenching

Sustainable worm control involves more than just drench resistance, important though it is, and DrenchPlan is more than just a drenching program. As mentioned earlier, DrenchPlan adopts IPM principles – the integration of 'chemical' and 'non-chemical' control options. These include grazing management, flock management, using rams genetically resistant to worms, nutrition, regular drench testing, regular monitoring (WormTesting), and fine-tuning with the help of sound professional advice.


## Reference

RJ Dobson, RB Besier, EH Barnes, SCJ Love, A Vizard, K Bell and LF Le Jambre (2001). Principles for the use of macrocylic lactones to minimize selection for resistance. *Aust Vet J* 79 (11):759-761

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