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RE-THINKING THE SUMMER DRENCHING PROGRAM

The summer drenching program has provided highly effective sheep worm control in Western Australia for many years – but recent research challenges its long term sustainability.

Trial results suggest that in large parts of the State, summer drenching is the main factor leading to the development of drench-resistant worms. Alternative programs less likely to lead to drench resistance will require greater monitoring of worm burdens and planning of pasture moves. Dr Brown Besier reports.

Drench resistance in sheep worms has been increasing in Western Australia for many years, and on many farms. Only the newest drench group, the 'MLs' (ivermectin, abamectin and moxidectin), remains fully effective on most farms.

However, ML resistance in one major sheep parasite, *Ostertagia* (brown stomach worm), is becoming common in Western Australia. Figures from 1999/00 indicate that approximately 40 per cent of farms are experiencing the problem to some degree, representing a rapid increase from previous years.

Identifying the factors leading to the rapid development of resistance will be necessary to develop alternative worm control programs before ML resistance develops in other worms.

With no new drench types known to be in the pipeline, worm control on affected farms is expected to be increasingly difficult.

**Clues to the causes of drench resistance**

Investigation of cases of ML resistance indicates a strong link between the time of year that sheep are drenched and the environment.

In almost all cases, the usual factors leading to drench resistance do not apply. For instance,
excessive drenching is rare and the correct dose rates are used. Despite this, ML resistance is developing on some farms in Western Australia after only 4 to 5 years of ML use.

Intriguingly, the problems of drench resistance appear to be especially severe in Western Australia. In other States and most overseas countries, ML resistance in Ostertagia is rare or has not been detected, despite ML drenches being used far more frequently than in Western Australia. The critical factor appears to be the use of the summer drenching program in the State’s unique Mediterranean-style environment.

Summer drenching involves drenching sheep in early summer, when few or no worm larvae survive on hot, dry pastures to re-infect the sheep after treatment. However, it would appear that the absence of worms in summer to dilute the few resistant worms remaining in sheep after drenching is in fact causing the problem. Resistant worms are becoming the main source for future worm populations.

Where resistant worm populations in sheep continue to remain undiluted year after year, the proportion of resistant worms remaining after each summer is growing – thereby increasing drench resistance.

**Experimental confirmation**

Recent field experiments have confirmed the link between summer drenching and drench resistance. On-farm trials in the Great Southern, Esperance and Wongan Hills areas compared weaner sheep given normal summer drenches with groups in which some of the sheep were deliberately not drenched.

The intent of this treatment was to ensure that sufficient non-resistant worms survived over summer to dilute any resistant worms surviving in drenched sheep. In each trial, sheep were drenched in summer with ivermectin and moved to crop stubbles, and worm burdens and sheep body weights were monitored until the following spring. On one farm, sensitive assays for drench resistance were also conducted.

Two consistent patterns arose from trials on the Great Southern farms.

- Worm control was far better in summer drenched flocks (see Figure 1). There was severe scouring and a reduction in sheep weight gains of 5 to 10 per cent in the part-drenched flocks, but few problems occurred with the summer drenched sheep.

- ML resistance increased significantly after just one summer drench, but where some sheep were not drenched, there was no increase in resistance (see Figure 2).

In the Wongan Hills and Esperance trials, there were fewer ill-effects in part-drenched flocks. This may reflect the better immunity to worms which is usual in the older lambs used in these trials, and needs further testing.

**A worm control dilemma**

The trial confirmed that in environments typical of most Western Australian sheep farms, summer drenching has a powerful effect in increasing the development of drench resistance. It is therefore not sustainable in the long term.

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**Figure 1. Worm egg counts in summer drenching trial. The effectiveness of worm control (shown as worm eggs in sheep faeces) in the summer drenched flock compared with the part-flock drenched group, in an experiment conducted near Williams. The worm egg counts of the summer-drenched sheep were always lower than in the flock in which some sheep were left undrenched.**
Figure 2. Dose response and total worm counts. In the experiment near Williams, differences in drench resistance levels due to summer drenching were measured on worms collected before drenches were given ('pre-treatment'), and those collected from both treatment groups in the following spring. There is a significant reduction in the effectiveness of drenches at each dose rate of ivermectin in the summer drenched group compared with the pre-treatment level, but no reduction in effectiveness in the flock in which some sheep were not drenched.

Department of Agriculture Senior Veterinary Parasitologist, Brown Besier, is working towards the development of strategies that can achieve good worm control without promoting drench resistance. However, sheep producers cannot abandon the highly effective summer drenching program without an adequate replacement program. Such a program would need to ensure that contamination with worm larvae in autumn was kept to low levels, so that worm burdens picked up at this time would not lead to significant winter problems.

It would also be important to match any worm control strategy to the environment. For example, where worm larvae can survive on pasture over summer (such as along the South Coast), summer drenching is likely to contribute less to drench resistance.

New worm control strategies

New recommendations under development aim to achieve good worm control, without promoting drench resistance. The new strategies will allow the survival of some non-resistant worms over summer, in some or all sheep flocks, to dilute resistant worms.

These strategies require the monitoring of worm burdens to enable timely decisions regarding treatments, and where possible, the provision of worm-safe pastures for flocks at risk.

A 'low resistance' worm control program would involve a number of decision points:

- **Late spring/early summer:** Worm egg counts before pastures dry off or crop stubbles are available will ensure that sheep do not suffer production loss from worms in summer. Summer drenches may be necessary where counts are high, but not required for sheep with few worms. In flocks with moderate burdens, allowing some to remain undrenched will ensure that some non-resistant worms survive into the following year.

- **Early autumn:** Worm egg counts will indicate the need for a worm-reduction drench, which will avoid excessive pasture contamination with worm larvae and consequent winter problems.

- **Winter:** Monitoring worm counts at intervals is essential to avoid rapid increases in worm numbers when cool and moist pasture conditions favour worms.

The most effective action to prevent winter worm problems, especially in young sheep, is to move them to pastures planned to carry few worms. Pastures grazed by cattle or older sheep...
with low worm burdens are good options, providing nutrition is adequate. Both the monitoring schedule and pasture moves require forward planning, which is best done in conjunction with a consultant or animal health adviser.

The long-term answer
While new strategies can reduce the on-going development of drench resistance, they will not return drenches back to an effective level. The best long-term solution is to breed sheep with more tolerance to worms. Worm resistant sheep have a better immunity to worms, and fortunately this is highly heritable. Therefore, a growing number of ram breeders are incorporating worm resistance into their selection indices.

A sustainable program considers chemicals as one element, but not the main factor in sheep worm control. Elements of a low chemical-use program would include:

- the introduction of worm resistant sheep;
- flock and pasture management to avoid excessive worm burdens in sheep at risk;
- targeted treatments based on monitoring of worm burdens rather than routine drenching.

References