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Sheep worm control in Western Australia

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Introduction

The effective and sustainable control of gastro-intestinal sheep worms involves a combination of planned stock and farm management, monitoring worm burdens using faecal worm egg counts, the strategic timing of drenches and the genetic selection of worm resistant sheep.

Drench resistance of sheep worms in Western Australia is rapidly reaching a crisis point and unless current drenching practices are modified, drench resistance will continue to increase. With little hope of new sheep drench groups becoming available within at least the next few years, there is the real risk of running out of effective drench options. This would place profitable sheep production in some areas of Western Australia under serious threat as a result of being unable to economically control sheep worms by chemical means.

Important worms

There are two main groups of gastro-intestinal worms that affect sheep in Western Australia:

Scour worms – these include the black scour worm (*Trichostrongylus* spp), brown stomach worm (*Ostertagia* spp) and to a lesser extent, large mouthed bowel worm (*Chabertia ovina*) and large bowel worm (*Oesophagostomum* spp). These worms occur throughout the agricultural areas of Western Australia, and the larvae are abundant on pastures in winter and spring. Signs of infection include ill thrift, diarrhoea and, in severe cases, death. However, significant production losses (decreased liveweight gains and wool growth rates) usually occur before clinical signs become obvious.

Barber's pole worm (*Haemonchus contortus*) occurs mainly in areas that have significant rain during warm weather and pastures that have areas that remain green over summer. The larvae are most abundant on pasture in autumn and spring and after significant summer rainfall. This worm sucks blood from the sheep and can cause anaemia (visible as pale mucous membranes of the gums and around the eyes), subcutaneous oedema (bottle jaw) and sheep deaths with little warning, if environmental conditions are favourable.

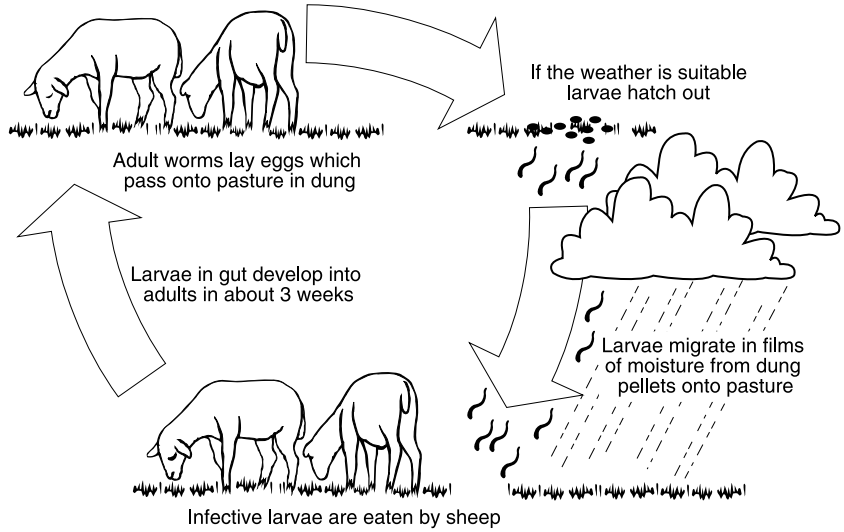
The thin-necked intestinal worm (*Nematodirus* spp) is common but typically causes only occasional problems in young sheep. Tapeworms (*Moniezia*) are also common in young sheep, but there is little scientific evidence that tapeworm infection significantly affects sheep production.

The worm life cycle

Adult worms of each of the species are found in a specific location within the sheep (for instance, black scour worm in the small intestine and barber's pole and brown stomach worms in the abomasum (fourth stomach)). Male and female adult worms at this location mate and the females lay their eggs, which then pass out of the sheep's gut and onto the paddock in the sheep's faeces.

To complete the life cycle, eggs in the faeces hatch to release first-stage larvae. These develop through two stages over several days to become infective third-stage

Life cycle of sheep worms



larvae or L3s. The infective larvae move from faecal pellets to pasture plants, with most located up to a height of about 25 mm above the ground. If grazing sheep ingest them, the infective larvae develop through further stages inside the sheep to become adult worms within about three weeks.

The development of the parasites on the paddock depends on the environmental conditions and the type of worm. For example, barber's pole worm thrives in warm, wet conditions, and so occurs in areas where there is some summer rainfall. Black scour worms and brown stomach worms are generally present in largest numbers in the autumn, winter and spring in a typical Mediterranean climate, and occur throughout Western Australia.

Larvae will survive on pasture for long periods when temperature and moisture conditions are right. In winter, some larvae may survive upwards of six months, while in summer, with hot and dry conditions, most larvae are destroyed within a couple of months. However, in areas with relatively mild summers, small numbers of larvae will survive over summer, as they are protected in the dung pellets. These will emerge later to infect grazing sheep when conditions become favourable again, such as after autumn rains.

Worm control programs

Effective, sustainable worm control requires more than a drenching program. A total worm control program should be carefully planned, and incorporate the latest advice from local veterinarians or sheep advisers.

Key components include:

- planned drenching – for example, timing drenches to maintain worm control but also minimise selection pressure for drench resistance on worm populations;
- regular drench resistance testing;
- planned monitoring of worm burdens using faecal worm egg counts (WEC);
- breeding worm resistant sheep;
- paddock and grazing management – for example, planning paddock grazing rotation to reduce worm larval contamination of pastures and prevent exposure of young, susceptible stock to heavily contaminated paddocks. Good general nutrition will also help sheep to combat worms.

Drenches and drench resistance

There are several broad spectrum drench groups that are active against all of the important worm species. These are the **benzimidazoles** (white or BZ drenches such as *Valbazen, Panacur, Alben, Fenbendazole, Nemadet, Oxfen, Fencare*), **levamisole** (clear or LV drenches such as *Nilverm, Levamisole, Ripercol*), **BZ/LV combination drenches** (containing white and clear such as *Combi, Salvo, Scanda*) and the **macrocyclic lactones** (the MLs; ivermectin [*Ivomec, Paramax*], abamectin [*Virbamec, Rycomectin, Paramectin*] and moxidectin [*Cydectin*]).

Rametin (active ingredient is naphthalophos, an organophosphate) is highly effective against barber's pole worm, but can be less so against other worms. However, mixed with other drenches, it is often very useful against scour worms.

Closantel is a narrow spectrum drench used for barber's pole worm. It has prolonged action and is effective against incoming larvae for up to about five weeks after treatment.

Unfortunately, there are high levels of resistance in sheep worms to many of these drenches on most farms throughout Western Australia. There are sheep worms on virtually all farms that are resistant to white and clear drenches. Worms on about 70 per cent of farms show resistance to BZ/LV combination drenches and resistance testing during 1999 showed that up to about 40 per cent of tested properties had indications of resistance to the MLs in brown stomach worm (*Ostertagia*).

Because resistance is widespread, it cannot be assumed that all drenches will be fully effective. A fully effective drench is one that has been shown to be more than 95 per cent effective (and preferably 100 per cent effective) in a drench resistance test carried out within the last couple of years. Using less effective drenches can be a waste of time and money and can lead to severe problems with worm control and worsening drench resistance.

Drench resistance develops when a parasite population is exposed to any of the drenches. More frequent exposure increases the rate of development of resistance.

It is also possible to increase the rate of development of drench resistance or the so-called 'selection pressure for drench resistance' as a result of environmental effects. An example of this is the traditional summer drenching program in many parts of Western Australia.

Summer drenching – a two-edged sword!

Summer drenching provides extremely effective sheep worm control, but also places very high selection pressure on sheep worms for drench resistance. This is because the only worms left in the sheep after a summer drench are those that are resistant to the drench given. In areas with hot, dry conditions over summer, very few worm eggs and larvae remain on the pasture after summer, so most of the future worm population develops from eggs put out during the following autumn by the resistant worms surviving in the sheep. Consequently, there is increased resistance in the worm population in the next season.

This environmental effect can be quite severe and research has shown that even a single summer drench can make drench resistance worse in some locations.

However, this research also showed that if summer drenching of all sheep on a farm was simply abandoned without alternative worm control measures, major worm problems affecting sheep production and profitability could occur during the following winter and spring.

New recommendations to control worms but minimise drench resistance

The Department of Agriculture Western Australia is collecting data from more than 25 farms throughout the State to help investigate effective and sustainable sheep worm control programs, which maintain good worm control but which also reduce the selection pressure for drench resistance. The main aim is to minimise summer drenching, if possible. Detailed information on recommended drenching strategies for different classes of sheep is available in the Western Australian Department of Agriculture Factsheet 4/2002 *Sheep worms – 'summer-autumn' worm control*. This is updated annually to incorporate new information as it becomes available.

Pre-lambing and marking drenches

Monitoring ewes with a faecal WEC before lambing will indicate whether drenching is necessary. Ewes should also be monitored before lamb marking if high worm burdens are suspected. If the results are high, a drench can be given when they are in the yards at marking time.

Drenching lambs at marking is rarely justified as lambs seldom acquire significant worm burdens until around three months or more of age. However, when ewes and lambs are under nutritional stress, worm burdens may increase more rapidly than usual. Faecal WEC monitoring is the only way to be certain that drenching lambs is worthwhile.

Weaning drenches

The benefits of drenching ewes and lambs are reduced if lambs are returned to the lambing paddock after weaning. Weaning and drenching at 12 to 14 weeks of age removes the lamb's worm burden and removes the lamb from the contaminated lambing paddock as well as avoiding nutritional competition with the ewe. These gains are maximised if lambs are moved into a 'clean' paddock (one with low levels of infective worm larvae) that provides both nutritional and parasite control benefits.

Quarantine drenching

Purchased sheep or those returning from agistment should be given a quarantine treatment before loading or on arrival to prevent them introducing new strains of resistant worms onto a farm. Sheep should be drenched with moxidectin plus at least two other anthelmintic groups, then released into a wormy paddock to dilute any possible remaining super-resistant worms. More detailed information on quarantine treatment is available in the Western Australian Department of Agriculture Factsheet 3/2002 *Sheep worms – quarantine drench to combat resistance*.

General drenching tips

Correct administration is essential to ensure drenches are effective. The following guidelines will improve drenching technique:

- Under-dosing is a major cause of drench resistance so it is critical that sheep get the correct dose. A few of the larger animals should be weighed so that the dose for the heaviest sheep in the flock can be calculated. For products with a greater risk of toxicity (such as levamisole and *Rametin*), flocks with a wide range in liveweight may need to be drafted into smaller, more uniform groups and each group given its appropriate dose to prevent toxic effects through overdosing.
- Drench guns should be checked regularly to ensure they deliver the correct dose.
- During treatment, the drench gun should be placed over the sheep's tongue rather than in the front of the mouth. This helps to ensure that all of the drench is delivered to the rumen for maximum effect.
- To help improve the effectiveness of the white, ML and closantel drenches, feed can be withheld from sheep for up to 24 hours before treatment. This slows the flow of gut contents through the sheep, keeping the drench in the gut for a greater time, and increasing its uptake. Sheep should not be fasted before treatments with levamisole or Rametin as this could increase the risk of toxicity with these products. (Note: sheep kept off feed should have access to water.)

Faecal worm egg count monitoring

Faecal WECs are the most effective way of checking the burden of adult worms in sheep. At least 10 individual faecal samples from the mobs that are to be checked should be submitted to a worm egg count service provider (including veterinary practitioners, sheep consultants and other trained and experienced service providers). Contact the laboratory before sample collection to obtain specific requirements for submitting the samples. Faecal WEC monitoring can be used to indicate whether drenching is needed or not, whether drenching has been effective, and also the level of parasite contamination being deposited in a paddock. More detailed information about faecal worm egg count monitoring is available in the Western Australian Department of Agriculture Farmnote 54/2002 *Sheep worms - faecal worm egg counts.*

Breeding worm resistant sheep

Resistance to worms in sheep is an inherited trait, and breeding worm resistant sheep is one of the best long-term solutions to assist worm control and combat drench resistance.

As with all genetic improvement programs, selecting within a flock can take several years to achieve obvious improvements. However, growing numbers of farmers have been selecting sheep for worm resistance for some time and have achieved good results. An increasing number of ram breeders are also selecting for resistance to worms.

More detailed information about breeding worm resistant sheep is available in the Western Australian Department of Agriculture Farmnote 53/2002 *Sheep worms – breeding worm resistant sheep*, or contact a local veterinarian or sheep adviser for the latest advice.

Paddock and grazing management

Manipulation of paddocks and grazing strategies will assist worm control by managing worm contamination on paddocks, and ensuring good general sheep nutrition to maximise the immunity to worms.

Worm contamination

Preventing the exposure of sheep to high levels of parasite contamination on paddocks can reduce worm pick-up and therefore worm burdens. This can reduce the impact of worms on the sheep and reduce the frequency of treatments needed. Therefore 'clean' pastures that do not harbour a significant number of infective larvae are a valuable management asset in a worm control program.

In general, larvae survive on pasture for about two months in summer and six months or more in winter. The following list describes contamination level of paddocks in descending order starting with the cleanest (least contaminated):

- stubbles or crops;
- pasture that has been de-stocked (for more than six months in winter or two months in summer);
- pasture grazed only by cattle; and
- pasture grazed only by adult dry sheep.

Paddocks such as those grazed by pregnant or lactating ewes and those grazed by lambs or weaners are often highly contaminated. However, problem paddocks can be stocked with animals that have better immunity to worms such as older dry sheep or cattle (very few worm species will establish in both sheep and cattle) to minimise the impact of the contamination.

Sheep immunity

Sheep develop immunity to internal parasites after they have been exposed to worm larvae for some months, and are usually relatively immune to worms by the time they reach about 12 months of age.

Good immunity to worms can result in:

- fewer larvae establishing to develop into adult worms;
- adult worms being rejected and passed out of the sheep, and
- adult worms producing fewer eggs.

Once an immunity to scour worms develops, its strength may fluctuate but it remains throughout the animal's life. However, immunity to barber's pole worm is lost several months after exposure to the worms or larvae ceases.

Sheep in poor condition have a reduced ability to deal with the added stresses of a worm burden and thus good general sheep nutrition is an important component of an overall worm control program. To help to minimise worm impact, weaners should be well grown and reach target liveweights of at least 25 kg by the beginning of their first summer. Older sheep should also be maintained above condition score two. Mineral and trace element deficiencies can also add to the stresses on sheep and local advice on the need for supplements is recommended.

Immunity to internal parasites in ewes is reduced for up to two months after lambing, resulting in an increased egg output and more severe effects of the worms on the ewes. Lambing paddocks can therefore become heavily contaminated with worm larvae. Lambs should always be moved from the lambing paddock after weaning.

Further reading

Farmnote 53/2002 Sheep worms - breeding worm resistant sheep

Farmnote 54/2002 Sheep worms - faecal worm egg counts

Farmnote 55/2002 Sheep worms - testing drench resistance and effectiveness

Farmnote 57/2002 Sheep worms - Barber's pole worm

Factsheet 3/2002 Sheep worms - quarantine drench to combat resistance

Factsheet 4/2002 Sheep worms - 'summer-autumn' worm control

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