Drench resistance and beef cattle in Australia: an overview

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Take home messages:

- Internal parasites in cattle are economically important.
- Resistance of round worms of cattle to broad-spectrum drenches seems to be on the increase in Australia.
- Resistance of liver fluke to drenches also occurs, but may be less common.
- Producers should consider testing efficacy of broad-spectrum drenches they use by doing worm egg counts on the day of treatment and again 14 days later.
- Checking efficacy of fluke drenches should also be done.
- The use of combination broad-spectrum drenches should also be considered as a resistance management tool.

Introduction

Economically, gastrointestinal parasitism in cattle is one of the most important causes of disease and production loss in cattle in Australia, especially in southern or temperate Australia (Sackett and others, 2006).

As with other grazing livestock, anthelmintics play an important role in worm control, although integrated parasite management, including nutrition and grazing management, is vigorously promoted, but variably adopted.

In this paper we consider the current situation with respect to resistance of gastrointestinal round worms and liver fluke (*Fasciola hepatica*) to drenches, and what practical steps producers can take to manage resistance.

Drench resistance – roundworms

Isolated cases of cattle worms resistant to drenches have been known to occur in Australia for 20-30 years or more (Eagleson and others, 1986 and 1992), but were mostly regarded as curiosities.

Resistance surveys in New Zealand, including that by Waghorn and others (2006), heightened interest in re-evaluating the situation in Australia.

The results reported by Waghorn and others (2006) are summarised in Figure 1.
Figure 1. Cattle worm resistance - North Island NZ, 2005*.

![Bar chart showing cattle worm resistance](image)


*Proportion (%) of farms with less than 95 percent reduction in worm egg counts following treatment. Sixty two farms surveyed. BZ=benzimidazole, LEV=levamisole.

A number of trials have been conducted in Australia and some results have been published. Figure 2 shows the results from Victorian (Rendell, 2006) and Western Australian trials (Cotter, 2012).

Figure 2. Summary of recent Western Australia and Victorian drench resistance trials (beef cattle)*.

*Proportion (%) of farms with less than 95% worm egg count reduction following treatment. Ost = Ostertagia (small brown stomach worm); Coo = Cooperia (small intestinal worm); BZ = benzimidazole (‘white’); LEV = levamisole; ML = macrocyclic lactone (‘ML’, ‘mectin’). Oral formulations used, except injectable ivermectin in WA trials.

Efficacy of drenches and route of administration

Leathwick and Miller (2013) found that the route of administration of anthelmintics in cattle can have a marked effect on efficacy, and possibly also selection for drench resistance.

Moxidectin administered by different routes, oral versus injectable (subcutaneous) versus topical (pour-on), was compared on 14 farms in New Zealand.

Overall, efficacy, as measured by reductions in faecal egg count, was significantly greater after treatment with moxidectin oral (91.1%) than following treatment with moxidectin injection (55.5%) or moxidectin pour-on (51.3%).

Low efficacies in these trials were invariably against Small intestinal worm (Cooperia oncophora). Efficacy against Small brown stomach worm (Ostertagia), which is more pathogenic than Cooperia spp, was generally high. The oral treatments were also significantly less variable in efficacy compared to injection and pour-on treatments.

Further work may elucidate how important and how often route of administration is regarding the efficacy of broad-spectrum drenches targeting gastrointestinal nematodes.

With respect to flukicides, Boray (2010) takes the view that, for higher efficacy, oral formulations of triclabendazole (TCBZ) are to be preferred over pour-on (topical) formulations.

Drench resistance – liver fluke

Liver fluke can infect a number of species, including livestock, humans and Australian native animals (Boray, 2007).

Resistance to salicylanilides (rafoxanide, closantel) and triclabendazole (TCBZ) has been detected in the field in various parts of the world (Fairweather and Boray, 1999). Boray (1990) stated that liver fluke isolates resistant to rafoxanide and closantel had been found on Australian farms, and strains resistant to luxabendazole and TCBZ had been selected in the laboratory.

Overend and Bowen (1995) reported a TCBZ-resistant field isolate, confirmed by slaughter studies, in sheep grazing irrigated pasture on a Victorian farm, and further stated that TCBZ resistance had not been reported in any other country in the world. The authors also reported that, in an extensive survey of sheep and cattle farms that was underway in an area
endemic for liver fluke (location not mentioned, but presumably south-eastern Australia), nearly 100 farms had been evaluated with no resistance being detected on any.

According to Boray (2010), TCBZ resistance in sheep and cattle is present in the Goulburn Valley irrigation area around Echuca, Pyramid Hill and Shepparton, northern Victoria.

In NSW there have been isolated unpublished reports of resistance of liver fluke in sheep to closantel (Boray, 1990), and resistance to TCBZ, for example, on a sheep farm in the Monaro region of southern NSW (Lloyd and Love, 2001) and in sheep on irrigated pasture at Berrigan, NSW (Gareth Kelly, pers comm, 2012). These reports have mostly been based on faecal egg count reduction tests.

More recently Brockwell and others (2012) at Charles Sturt University, Wagga Wagga, reported on investigations using a coproantigen (faecal antigen)-based ELISA (Mezo and others, 2004), in concert with faecal egg counts to evaluate the efficacy of TCBZ on several cattle properties in eastern Australia (NSW, Victoria), where there had been apparent treatment failures. Resistance (less than 95% reduction) was found on two out of six properties using the faecal egg count reduction test (FECRT) and three out of seven using the coproantigen reduction test (CRT). Animals from one farm were slaughtered following TCBZ treatment and live fluke were recovered, confirming the diagnosis of resistance. The authors concluded that CRT is suitable for the assessment of liver fluke treatment efficacy in cattle, and has certain advantages over the FECRT.

While resistance of liver fluke in sheep and cattle to flukicides is known to occur in south-eastern Australia, the prevalence is unknown.

What can producers do now?

Check drench efficacy: Producers should periodically check drench efficacy, by doing a (faecal) worm egg count reduction test when drenching cattle.

For roundworms and broad-spectrum drenches, this involves a worm egg count on 15-20 animals at the time of drenching a mob, followed by repeat worm testing 14 days later, ideally with larval cultures and differentiation also being done. If individual animals cannot be identified and sampled, bulk samples (collecting from many dung pats; more than 20) before and after testing is still worthwhile.

In the case of liver fluke, test flukicides as outlined above, and perform liver fluke egg counts, with a second lot of testing 21-28 days after treatment.

The liver fluke faecal antigen (coproantigen) ELISA (available through CSU Wagga) can be done instead of liver fluke egg counts.

Consider combinations: As with sheep, there is broad consensus among the experts that broad-spectrum drenches for cattle ideally should contain at least two unrelated broad-spectrum actives. At the time of writing there is one such product on the market in Australia, Eclipse® (Merial), that contains abamectin and levamisole.
**Route of administration:** The way drenches are given could be important. Watch out for further work in this area.

**A good worm control program:** A good program relies on giving the right drench at the right time, and integrating this with other control measures, such as good nutrition, and grazing management. This can involve alternately grazing pastures with sheep and cattle, if feasible.

Drenches, if and when they are needed, should be tested and shown to be effective. Timing will depend largely on proven, locally-relevant programs. Worm egg counts are useful in cattle, especially in young cattle, but there can be production losses and sometimes clinical disease even with low egg counts, hence the need for a good treatment strategy.

Further information:


**References**


