

October 2000

Funded by

in 1997

Contractor: AgResearch



## The effect of drench capsules on selection for drug resistance

- Do capsules provide safe pastures for stock?

### Aim

This Meat New Zealand-funded project (1997) aimed to test the effects of controlled-release drench capsules (CRC) on selection for parasites resistant to anthelmintics. It has become common for farmers to give a pre-lamb capsule to ewes, with the aim of improving lamb growth rates and reducing parasite contamination of pasture.

#### Key findings

The project findings suggest that using capsules can result in higher levels of drug resistant parasites, not only during drug release (about 100 days) but for several weeks after capsule exhaustion. This can be detrimental to production. Integrated parasite management is recommended.

### Key experiments

64 seven month Romney hoggets were divided into 4 treatment groups.

- All sheep were given a 'quarantine' combination drench then moved indoors.
- Two of the groups were given 1 albendazole capsule each (Extender Junior 100™ capsules specifically for younger sheep)
- All animals were given 6000 larvae per week (a moderate level compared to on-farm reality). While the capsule was active, half the larvae given were resistant to albendazole and half were susceptible.
- From day 100 onwards, the ram hoggets were given only drug-susceptible larvae.

#### Treatment Groups: Capsules and parasite type

Group 1	Capsule and <i>Ostertagia circumcincta</i>
Group 2	No capsule and <i>Ostertagia circumcincta</i>
Group 3	Capsule and <i>Trichostrongylus colubriformis</i>
Group 4	No capsule and <i>Trichostrongylus colubriformis</i>

Ram hoggets were used because they are easier to handle than ewes with lambs at foot and they are old enough to express immunity to parasites.

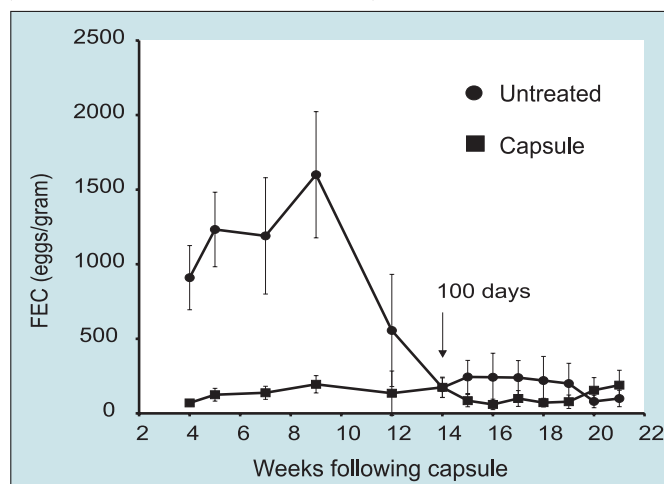
Measurements taken-

- FEC tests each week to assess the number of eggs produced by the parasites.
- Faecal egg-hatch assay test to determine the level of drug resistant eggs being shed.
- Six sheep from each treatment group were slaughtered while capsules were active, to estimate the worm burden.

### Results –select for resistance

As expected, capsules did decrease the number of eggs produced by each parasite species, e.g. see Figure 1.

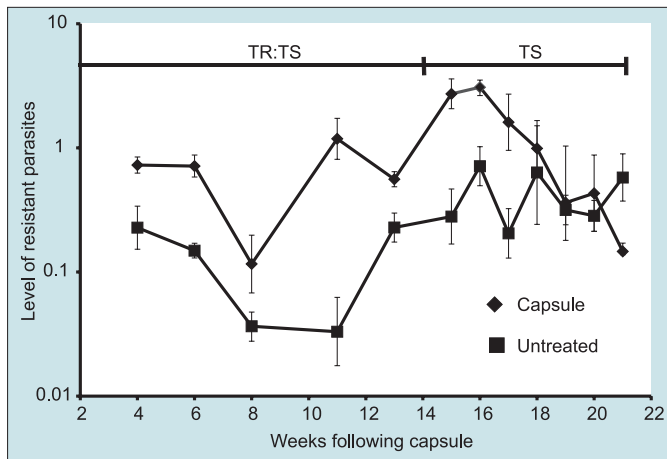
Figure 1: FEC of sheep challenged with *Trichostrongylus* (untreated vs treated with capsule).



However, drench resistant parasites successfully established viable infections in the sheep. The eggs that were produced were highly resistant to albendazole (see Figure 2 overleaf).

Resistance occurs when susceptible worms are removed with an anthelmintic but worms resistant to the anthelmintic remain. They interbreed and increase in numbers. The drench then fails to have the desired effect. Even if resistance has not been detected on your farm, anthelmintics will still select for resistant parasites.

**Figure 2: Number of resistant *Trichostrongylus* parasites produced by untreated group and capsule treated group over 22 weeks.** Note: TR = resistant parasites given, TS = susceptible parasites given.



After 100 days the hoggets were given only drug-susceptible parasites. Results showed that most sheep continued to pass only highly resistant eggs for up to 6 weeks following exhaustion of the drug.

## Conclusions

In this trial, capsules were effective in reducing FEC levels but some larvae were still being shed. These larvae were drench-resistant.

### How quickly are resistant worm populations in the sheep diluted by susceptible larval challenge, following exhaustion of capsules?

The assay and FEC results show that the greater proportion of the remaining parasites was resistant. This suggests that capsules select for a high level of drug resistance, not only during drug release (about 100 days) but for several weeks afterwards. Susceptible parasites were prevented from becoming established by immunity built up during release.

### Do capsules provide 'safe' pasture?

The results suggest that using capsules will not necessarily provide 'safe' pastures for stock. In fact, it is likely that there will be a higher proportion of resistant parasites on the pasture than if no capsules were used. As lambs pick up these parasites, using capsules in lactating ewes to provide safe pastures for lambs will rapidly result in drench failure. There is widespread resistance to BZ anthelmintics (including albendazole) in NZ and increasing reports of Ivomec resistance. Both of these drenches are used in capsules.

### What is the effect of capsules on adult worm fecundity (ability to reproduce)?

If using FEC tests to assess capsule effectiveness it is important to remember that you may get a false reading. This is because capsules may temporarily reduce egg output from resistant parasites (i.e. the worms are still there but they are not laying eggs).

Resident drug-resistant worm burden limits sheep production.

## Implications for farmers

Farmers should be aware that capsules can provide production benefits but they are not guaranteed to do this. Short-term production benefits may not outweigh the costs of the capsule and long term resistance problems. Oral drenches tend to allow susceptible parasites to re-establish more quickly (2-4 days) so they put less selection pressure on resistant parasites.

Research by the AgResearch Parasitology Group is investigating the effects in the field.

## Tips for farmers

Use an integrated parasite management approach. For example –

- select rams from breeders who select for resilience or resistance to parasites. Ask ram breeders about their use of capsules.
- prepare pastures for young stock that are as free of parasites as possible. Do this by grazing with cattle, spelling or growing forage crops and not by drenching.
- Feed sheep well to increase their ability to resist parasite attack.
- The first drench to try and eliminate is the pre-lamb treatment to ewes.
- With your vet, design a basic programme of lamb drenches. Outside this give further drenches only when required.

## Resources

The on-farm FITT project *98FT18* on anthelmintic effects on parasites and production, by Angela Molloy is available free from Meat New Zealand, phone 0800 696 328. Also see R&D Brief 33, 34 and 67 on breeding and feeding for improved parasite control. A Canterbury FITT project (*99FT56*) is looking at nematode species and burdens in different types of stock at different times.



## Points to Remember

- This research is funded by Meat NZ, an independent producer-funded body.
- The project results were presented at the September 2000 Parasitology conference.

## Contacts for more information

- For a free copy of the Final Report, FITT report *98FT18*, and the relevant R&D Briefs, phone Meat New Zealand on 0800 696 328, free-fax 0800 187 781, visit [www.meatnz.co.nz](http://www.meatnz.co.nz) or email [help@meatnz.co.nz](mailto:help@meatnz.co.nz) and quote R&D Brief 76.
- Scientific contact: Ian Sutherland, AgResearch, phone (06) 356 8019 or email [sutherlandi@agresearch.cri.nz](mailto:sutherlandi@agresearch.cri.nz)
- Contractor: AgResearch.
- Funded by Meat New Zealand and AgResearch.
- Meat New Zealand contact: Mark Aspin, phone 0800 696 328 or direct dial (04) 474 0836.