For more information:

Handbook for the Control of Internal Parasites of Sheep and Goats

This handbook from the University of Guelph is available as a free download:

http://www.uoguelph.ca/~pmenzies/Handbook_Home.html

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Reduce the risk of resistance: some steps to take

- Do not guess weights: weigh the animals, or at least the heaviest and dose for the heaviest weights
- Use the correct wormer; do not use pour-on. Do not use past the expiry date, and store according to the label
- Calibrate the drenching gun: empty into a large volume syringe to check the dose will be correct
- Quarantine and treat new purchases, then turn onto contaminated pasture to dilute any eggs they may still have
- Do not dose the whole group before moving to clean grazing. Put them back on the wormy pasture for a few days to pick up susceptible worms to breed with resistant ones
- Do not dose the whole flock in winter or before turnout. Leave some untreated. Mature ewes in good condition may not need worming

Monitor lambs on pasture and ewes for several weeks after lambing:
Check the colour inside the lower eyelid for signs of anaemia
Watch for swelling under the jaw (bottle jaw)

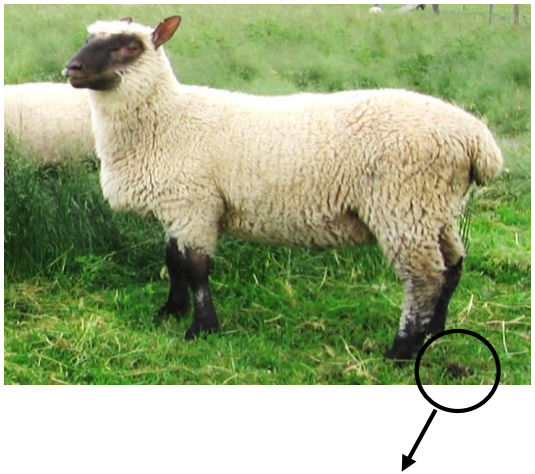
Frequent monitoring saves lives

ANTHELMINTIC RESISTANCE

How does it happen?

How can we address it?

Resistant worms survive the normal dose of a wormer and pass this ability to their offspring



- Susceptible worms are killed
- Partly resistant worms are killed by a normal dose but not a low dose
- Resistant worms survive

What selects for resistance?

<u>Underdosing and incorrect dosing</u>
Allows partly resistant worms to survive and breed.

<u>Frequent dosing</u>
Every time the whole flock is dosed, some resistant worms will survive – resistance gradually increases

<u>Buying in resistance</u>
Buying animals risks introducing any resistant worms they are carrying

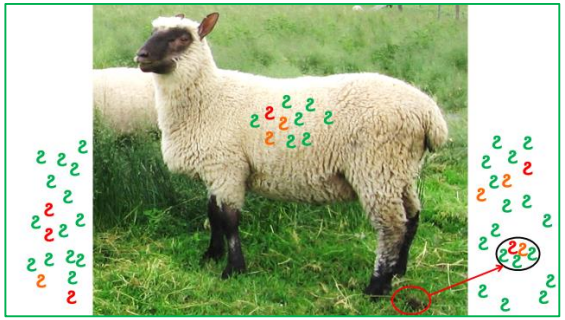
<u>Dosing when sheep cannot pick up more worms</u>
Dosing in winter, or before moving to clean pasture, means that resistant worms will have no competition from susceptible worms

Worms *in refugia*

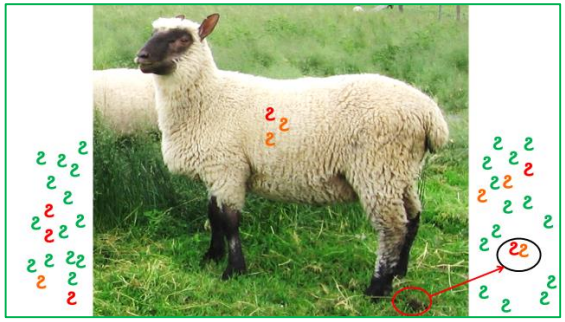
Worms NOT EXPOSED to the wormer are said to be in refugia – they have a refuge. MOST WORMS ARE *IN REFUGIA*
These include all worms in untreated sheep and all larvae on the pasture

After dosing,

- If sheep go back to the same field they will pick up more worms
- If sheep move to a clean field they cannot pick up worms
- In winter they cannot pick up more worms

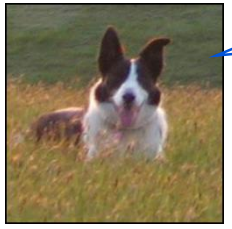


Before dosing: a few worms are resistant

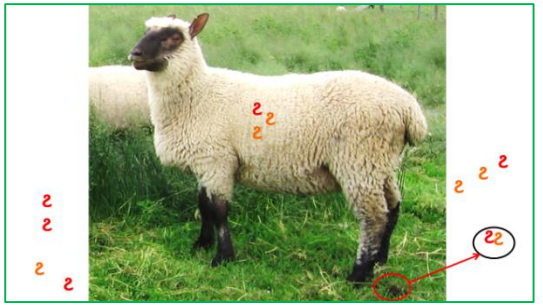


After dosing: only resistant worms survive but many more susceptible worms remain on pasture to breed with the resistant worms

Susceptible worms will dilute the genes for resistance with genes for susceptibility

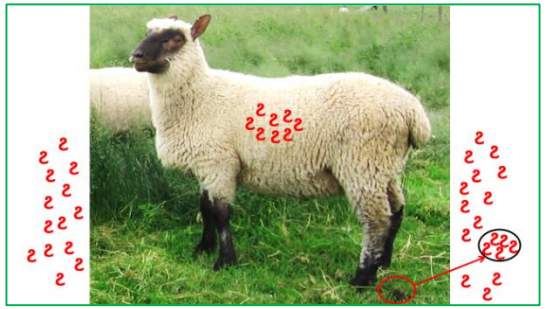


Dilution is the solution!



Dosing when there are no worms to pick up: only resistant worms are left in the sheep AND on pasture

And it can only get worse…



There are several different worms that can cause problems. Most survive over winter BOTH on pasture and in the sheep.
Barberpole worms survive ONLY in the sheep. There will be no susceptible larvae on pasture in the spring.

<u>Treating the whole flock in winter or before turnout risks rapid development of resistance</u>