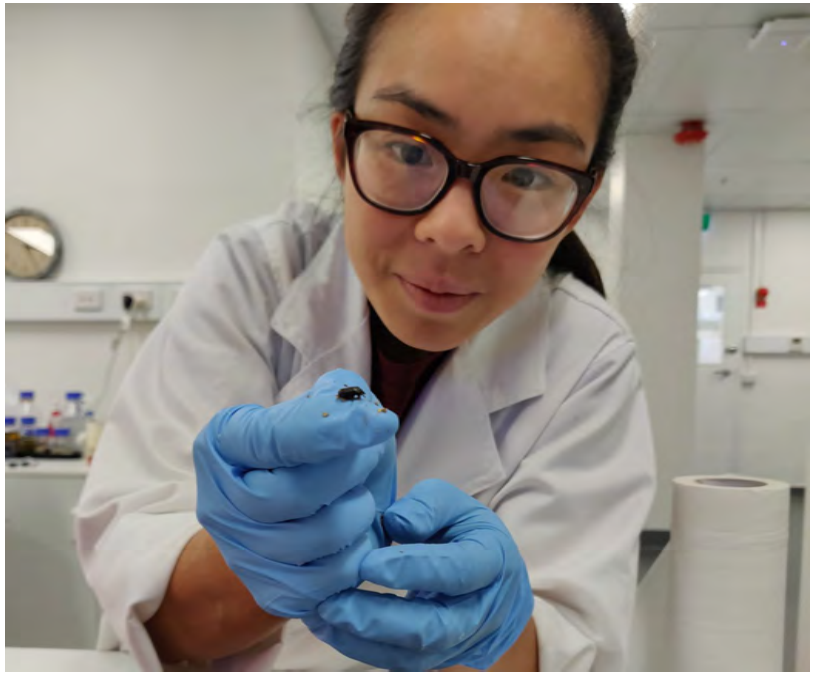
A POSITIVE FEEDBACK LOOP

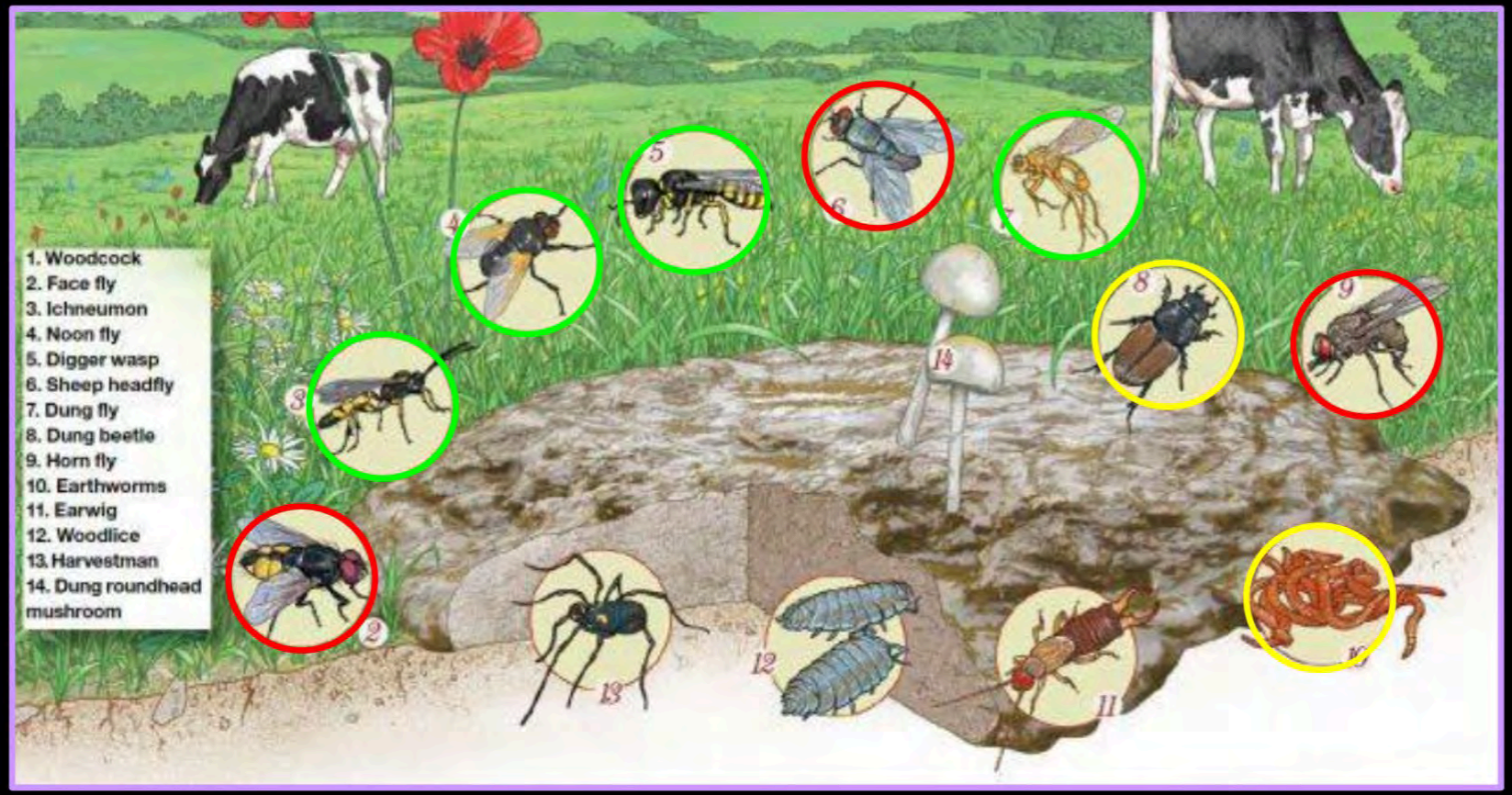
DUNG BEETLES

SOUTH AFRICAN “ROLLER” PUSHING ELEPHANT POO”UNDERTURD”

NUFFIELD IRELAND



Manure

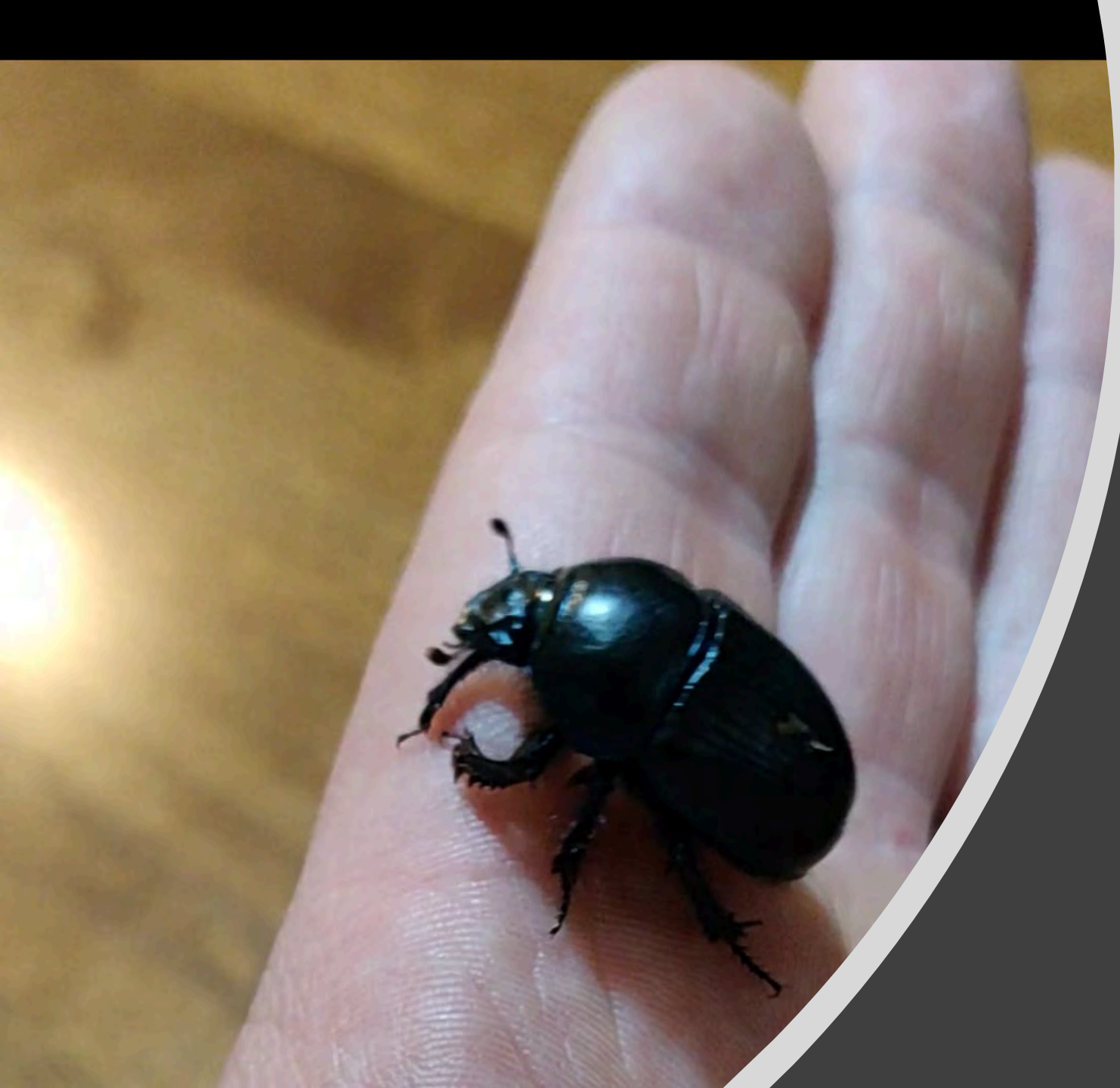


Nuisance
- Flies
- Parasitic nematodes

Beneficial
- Coprophagous
- Predatory

Ecosystem engineers
- Earthworms
- Dung beetles

Source, Bryony Sands



- # Dung Beetles

2 general types in Ireland, Dwellers and Tunnellers.

Beneficial insect to agriculture

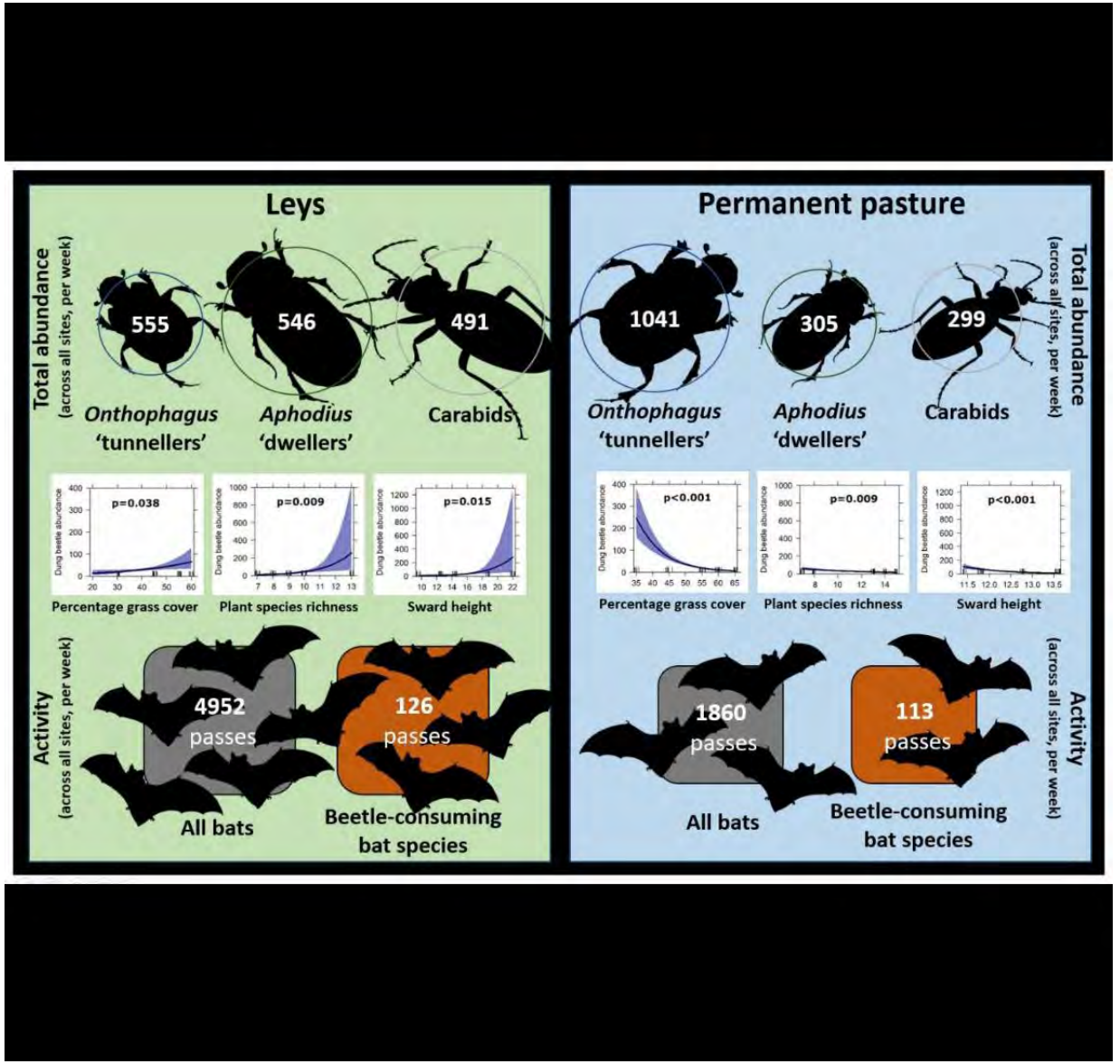
Benefits to farmers

- Parasite and fly reductions
- Better nutrient recycling
- Soil aeration with tunnellers
- Reduced pasture fouling
- Prepare the pat for encroachment by earthworms
- Transport service for beneficial mites and fungi

Benefits to environment

1. Reduced risk of nutrient run-off to waterways
2. Important food source for predators
3. Are a species that deserve recognition

More Beetles means more bats!!



Biological control

Journal of Applied Ecology

Journal of Applied Ecology 2017, **54**, 1180–1189 doi: 10.1111/1365-2664.12821

Dung beetles reduce livestock gastrointestinal parasite availability on pasture

Bryony Sands* and Richard Wall

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Summary

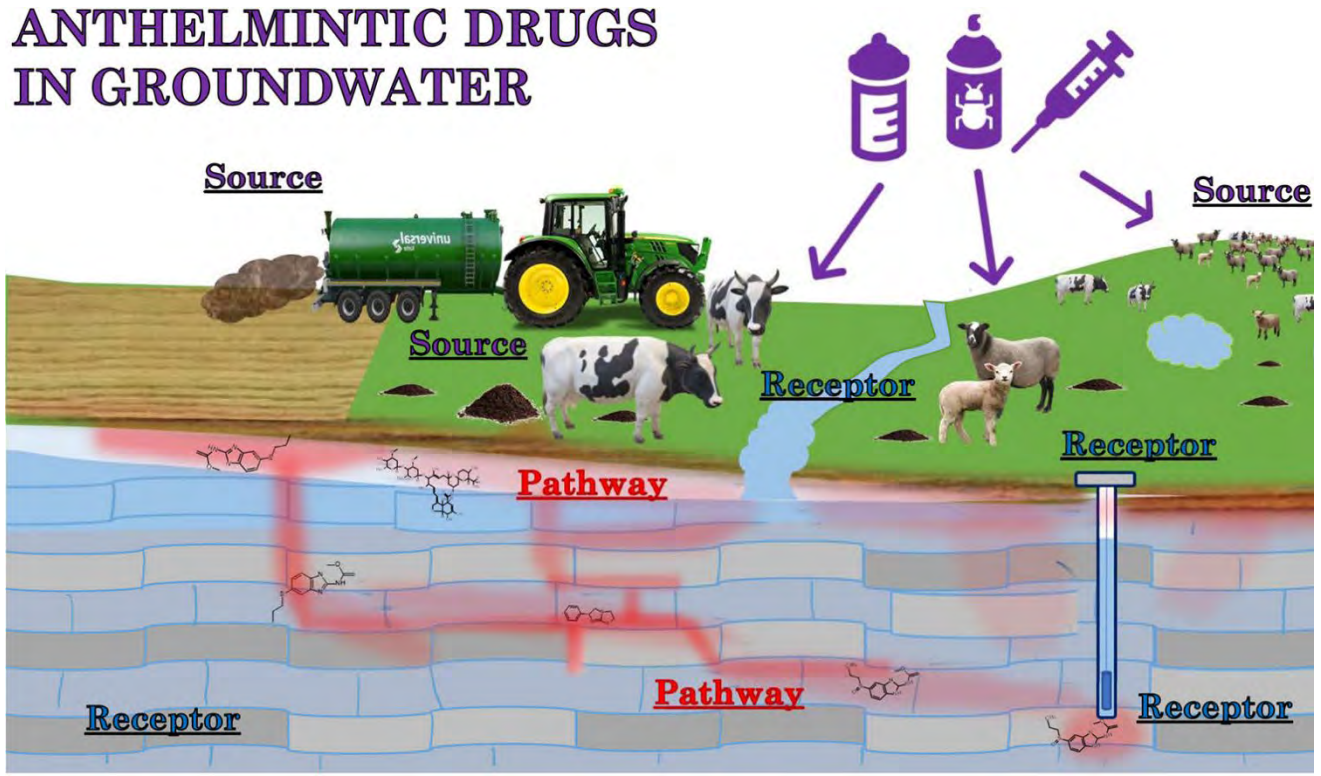
1. Anthelmintics are widely used to control gastrointestinal parasites of livestock. However, the residues of these compounds, particularly the macrocyclic lactones, are excreted largely unmetabolised in faeces, where they may have toxic effects on dung-colonising insects. Impoverishment of the coprophagous beetle community impairs the process of dung recycling and, as a result, may enhance the persistence of dung-dwelling helminth parasitic stages.
2. To test this possibility, a large-scale field trial was conducted in south-west England. The availability of infective parasite helminth larvae (L_3) was investigated on the herbage around 240 artificial 1-kg dung pats that had been constructed from the faeces of beef cattle with naturally acquired strongyle infections. Herbage up to 15 cm surrounding each pat was sampled at 2, 4, 6, 8 and 10 weeks after deposition. Pats were subject to enhanced, natural or no dung beetle colonisation and uncontrolled or enhanced rainfall.
3. Under uncontrolled rainfall conditions, 2 weeks after pat deposition, significantly more L_3 were recovered from around pats that were exposed to beetle colonisation than from pats that were not colonised. However, by week 8, significantly fewer L_3 were recovered from around pats that were exposed to beetle colonisation compared to uncolonised pats.

A declining population

Overall numbers declining. Some species already extinct. Modern farming practices to blame, but which ones?

- Anthelmintic and Synthetic pyrethoid usage. Both are proven toxic and sub-lethal to beetles for weeks after administration. Considered the main factor.
- Animals removed from pasture in Autumn until Spring
- High grain diets
- Liqueous dung pats from leafy, perennial ryegrass swards.
- Pasture harrowing and tilling.

Recent Findings Disturbing



- Anthelmintics present in 18% of samples on a wide scale Irish Trial on 88 sites
- “An analysis of the spatio-temporal occurrence of anthelmintic veterinary drug residuals in groundwater”

Effects of Anthelmintics on bird populations

SCIENTIFIC REPORTS

OPEN

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Adverse effects of routine bovine health treatments containing triclabendazole and synthetic pyrethroids on the abundance of dipteran larvae in bovine faeces

Gillian Gilbert[1], Fiona S. MacGillivray[2], Helen L. Robertson[1] & Nicholas N. Jonsson[3]

Macrocyclic lactone treatments for livestock can have detrimental effects on the arthropod populations in livestock faeces. For the last twenty years, avoidance of these products has been a standard recommendation on livestock farms that are managed for wildlife by the Royal Society for Protection of Birds (RSPB). However, the continued decline in the populations of birds (in particular the red-billed chough *Pyrrhocorax pyrrhocorax*) that are dependent on dung invertebrates on islands in the Inner Hebrides of Scotland prompted us to investigate the effects of livestock treatments that are commonly used on these islands. We conducted a replicated field plot study over two years to quantify the effects of livestock treatments containing copper, deltamethrin and triclabendazole on invertebrate density in pooled, artificial faecal pats on the island of Islay. We found that the density of arthropod larvae was significantly reduced by the triclabendazole and deltamethrin treatments in both years and by as much as 86% when the treatments were combined. Copper-containing boluses did not consistently affect abundance of arthropod larvae. These results suggest that veterinary treatment of livestock might contribute to a reduction in the food supply of chough.

Islay, Oronsay and Colonsay are the southernmost islands of the archipelago known as the Inner Hebrides of Scotland. They provide habitat for many permanent and migratory species of birds and are the sites of the only remaining breeding colonies of red-billed chough (chough, *Pyrrhocorax pyrrhocorax*) in Scotland. The islands are characterised by very heterogeneous geology, soil, habitat and land-use patterns. Much of the land is grazed by sheep and cattle in low-intensity, 'high nature value' farming systems[1]. This system of grazing, which fosters a combination of short grassland vegetation and a rich soil, dung and epigeic invertebrate fauna, is ideal for chough. However, in recent years the population of chough on Islay, Oronsay and Colonsay has been in severe decline, considered likely to be due to declining feed resources[2,3].

More than twenty years ago, the macrocyclic lactone (ML) cattle treatments, avermectins were found to have lethal and sub-lethal effects on arthropods[4–6], which can persist[7] for up to a month after administration as inject-

‘Anthelmintic resistance is more common on cattle farms than previously thought’

Michael Geary

Jul 6, 2020, 9:19pm

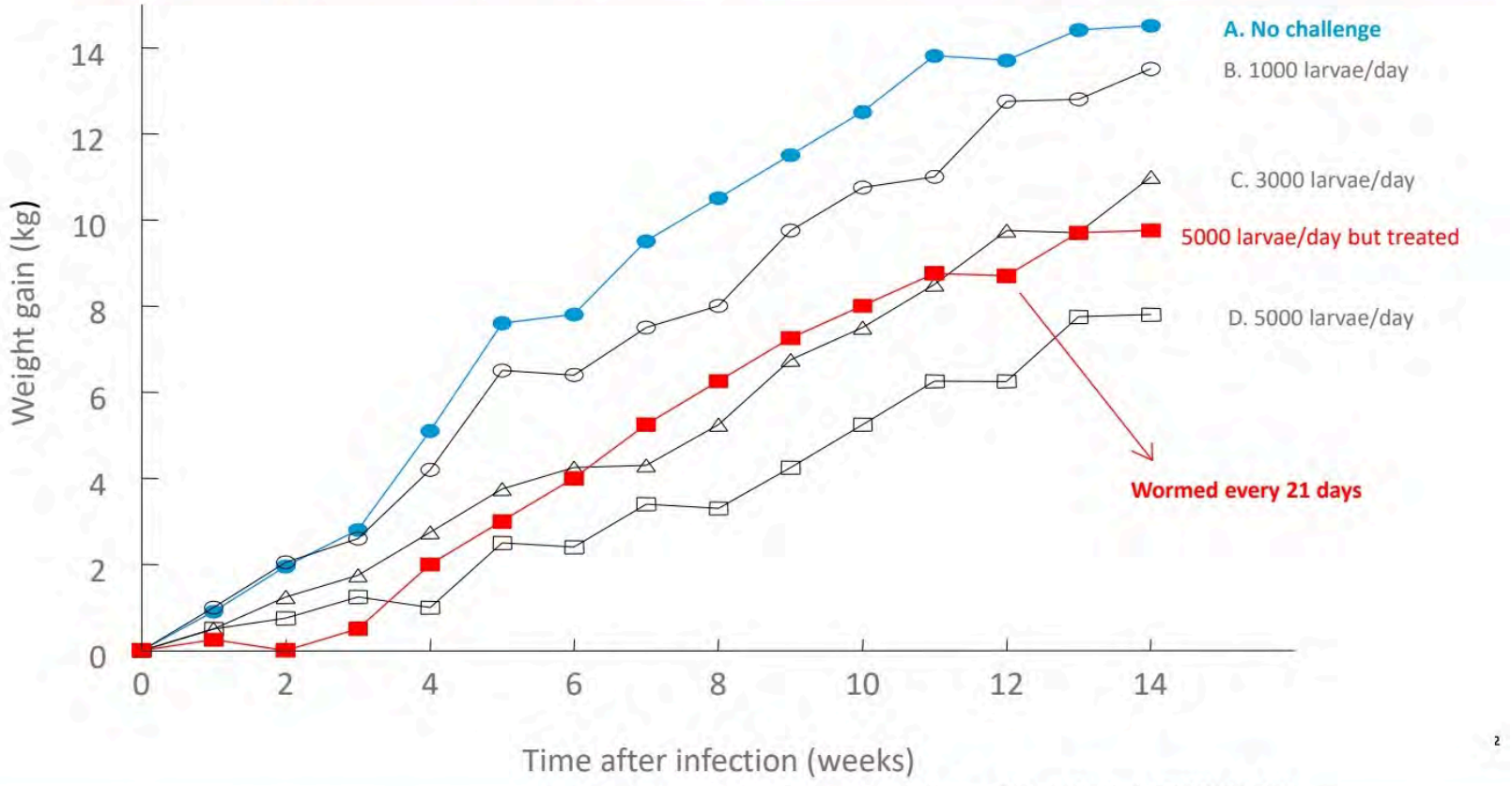
“Anthelmintic resistance is more common on cattle farms than what was previously thought,” according to Orla Keane of Teagasc.

Source, Agriland

- Reality Check. Anthelmintics are vital.
- Anthelmintics are also under threat

IS WORMING THE BEST ANSWER ANYWAY?

Avoiding larvae challenge is more beneficial than grazing animals on high challenge area and treating with wormers.



Coop et al: J. Agric. Sci. Camb. 98(1982); 247-255

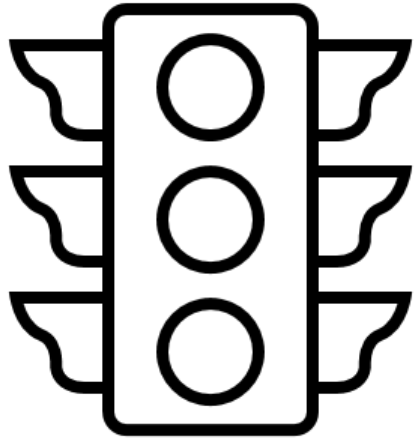
Rob Howe LLM Vets

Every cow once a calf

- Exposure vs immunity, need to have both
- 2 types of immunity, innate and adaptive
- Calves need to build their immunity to prevent disease and pasture build up
- Calves most at risk
- We consider calves as being parasite "factories"

Traffic Light Grazing

- Mapping the risk with each grazing event
- Noting identified parasite



Keep them "mooved"

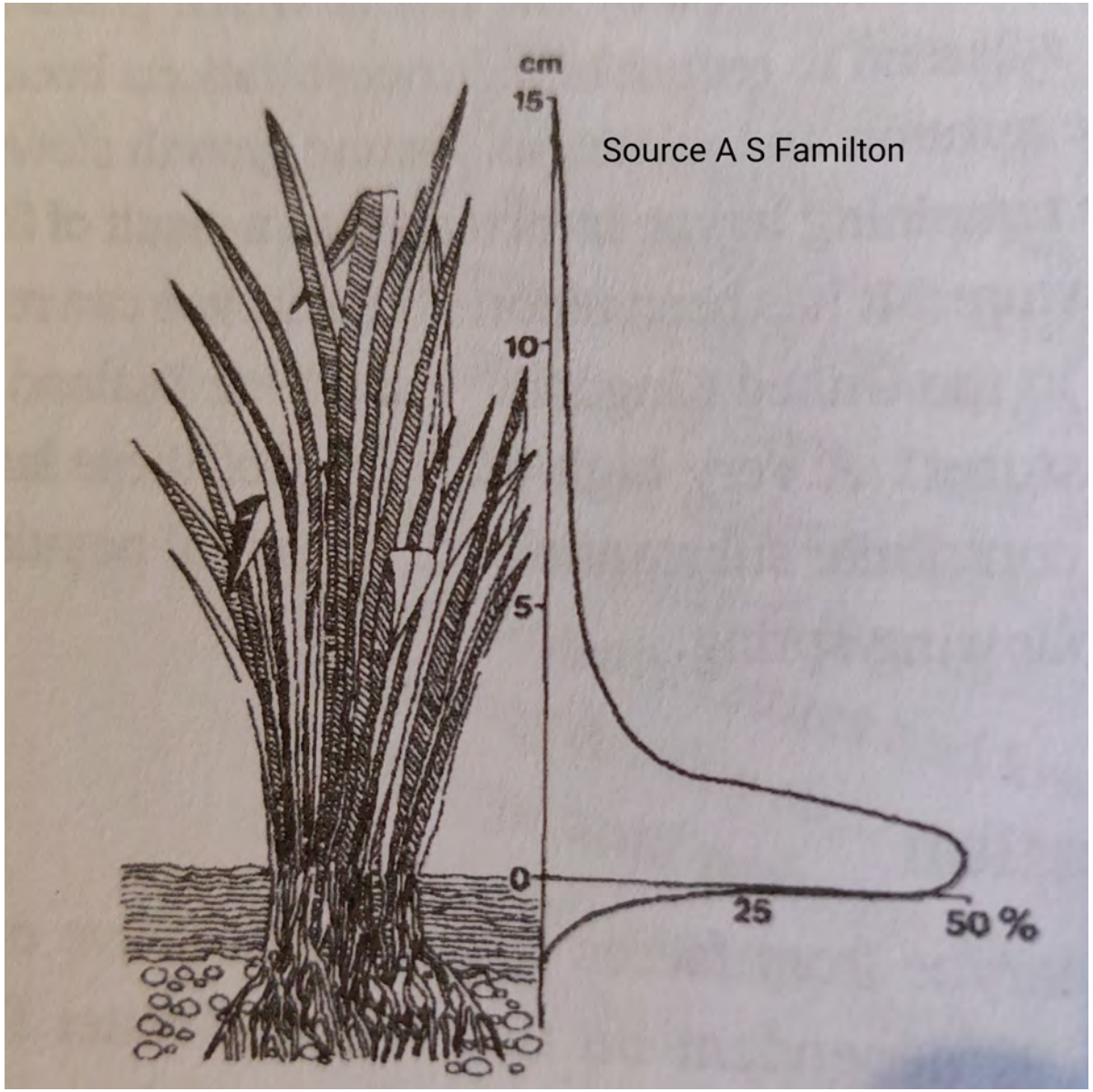
Portable equipment allows easy moving. Fresh grass after 3 days max. Back fenced.

No designated “Calf paddock”

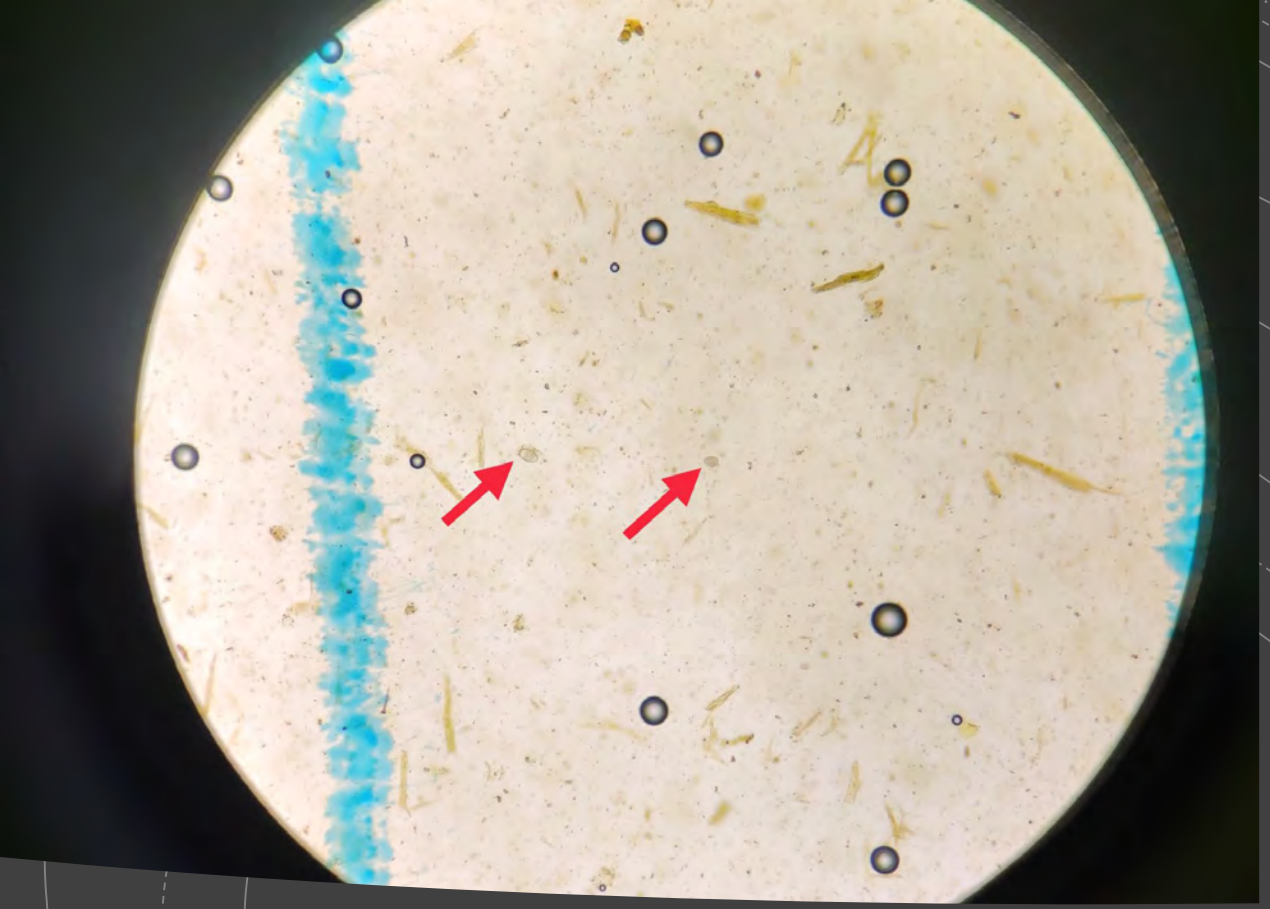

M1800 II D
ADVANTAGE
FEEDERS


Moving water troughs

Pasture Contamination



Grazing Height for calves



- Regular diagnostics in lieu of regular treatment

When we do dose....

- The right product
- The right time
- The right amount
- Refugia
- Dump paddock
- Where do they go??

The "Dump" paddock


Battles
Stockholm
Tar
A TRADITIONAL
ANTIBACTERIAL PREPARATION
FOR USE ON LIVESTOCK
5kg

Milking herd performance

- No anthelmintic usage in cows since 2017, milk elisa not rising.
- Young expanding herd
- 300 cows calved in a 9 week block this Spring
- Milk solids sold increasing from 432kgs in 2017 to 458 in 2020 in line with genetic improvement.
- Will definitely use anthelmintics if needed


THE
BEETLES

DUNG BEETLES FOR FARMERS

Our New Website

- www.dungbeetlesforfarmers.com