

Honours Project: Dung Beetles, Parasitic Nematodes and Climate Change

University of New England: Southcott Honours Scholarship in Parasitology (\$5000)

Dung beetles, both native and introduced, are essential for nutrient cycling on sheep and cattle farms on the Northern Tablelands of NSW. Dung beetles eat, shred and bury mammal dung, and so enhance productivity and soil health by:

- increasing soil carbon levels
- recycling many nutrients (nitrogen, phosphorus, sulphur) that would otherwise either be lost to the atmosphere or be locked up in dried out pads left on the surface
- increasing the water infiltration rate of soils
- improving the water quality of runoff
- increasing earthworm numbers, as they move in to use the abandoned dung beetle tunnels
- destroying larvae of nuisance bush flies and damaging buffalo flies
- removing dung from the surface of paddocks - pads significantly reduce the amount of surface area available for pasture production and also cause rank growth around the pads that is not palatable to livestock
- reducing the need for artificial fertilisers and other farm chemicals

However, we still know very little about dung beetle ecology and most research has been done on cattle dung.

In processing the dung, the dung beetles also kill many livestock parasite eggs. A recent study, conducted by the Northern Tablelands Dung Beetle Express and CSIRO at Chiswick, has shown that native and introduced dung beetles process sheep dung and reduce survival of the parasitic nematode, Barber's Pole Worm (*Haemonchus contortus*), to varying degrees. *H. contortus* is the main parasite of sheep in the region and presently requires frequent drenching for its control.

Data collected over the last 35 years suggest that the life cycle of *H. contortus* has changed as the climate has warmed. Larvae no longer go into a diapause-like inhibition of development during winter. Instead they continue to develop to egg laying adults and so affect sheep health all year round.

Much more work needs to be done to determine:

- which species of beetle will process sheep dung, under what conditions, and how fast;
- how temperature and rainfall influence beetle activity;
- how beetle activity influences nematode egg and larval development and survival;
- to what extent healthy dung beetle populations might reduce the need for drenching; and
- whether dung beetles act as transport vectors for nematode larvae.

Southcott Honours Scholarships in Parasitology of \$5000 per Honours student, to go towards living expenses, are available. Projects would need to include work on parasitic nematodes and be conducted at Chiswick Research Station (10km south of Armidale).

This would be a great opportunity for students to gain broad experience working with UNE, CSIRO and the Northern Tablelands Dung Beetle Express (NTDBE) and to contribute to the development of sustainable agriculture in the region in the face of climate change. The NTDBE is a community group made up of landholders, Landcare and CMA staff and has over 10 years experience in establishing and monitoring dung beetles in the region.

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