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FarmLink Research Report 2019

Dung Beetle Ecosystem Engineers

Report Author

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Introduction

Australian livestock produce nearly 80 million tonnes of dung each year. This otherwise useful resource is mostly left undisturbed on the soil surface and can smother pasture and become a breeding ground for bush flies and other parasites. Dung beetles have the ability improve pasture productivity by burying dung and removing it from the soil surface. FarmLink is partnering with CSU and eight other partner organizations to enhance dung beetle populations in Australia by conducting surveys of existing dung beetle populations, followed by rearing and introducing several new strains of dung beetles across southern and western Australia.

FarmLink has been assisting in the monitoring of dung beetle populations throughout southern NSW which will help to validate a national database and improve the selection, release and distribution to fill gaps in dung beetle populations.

Project Partners



Charles Sturt
University



THE UNIVERSITY OF
WESTERN
AUSTRALIA



Department of
Primary Industries and
Regional Development



Manaki Whenua
Landcare Research

Dung Beetle Solutions
International



Funding Partners



MEAT & LIVESTOCK AUSTRALIA



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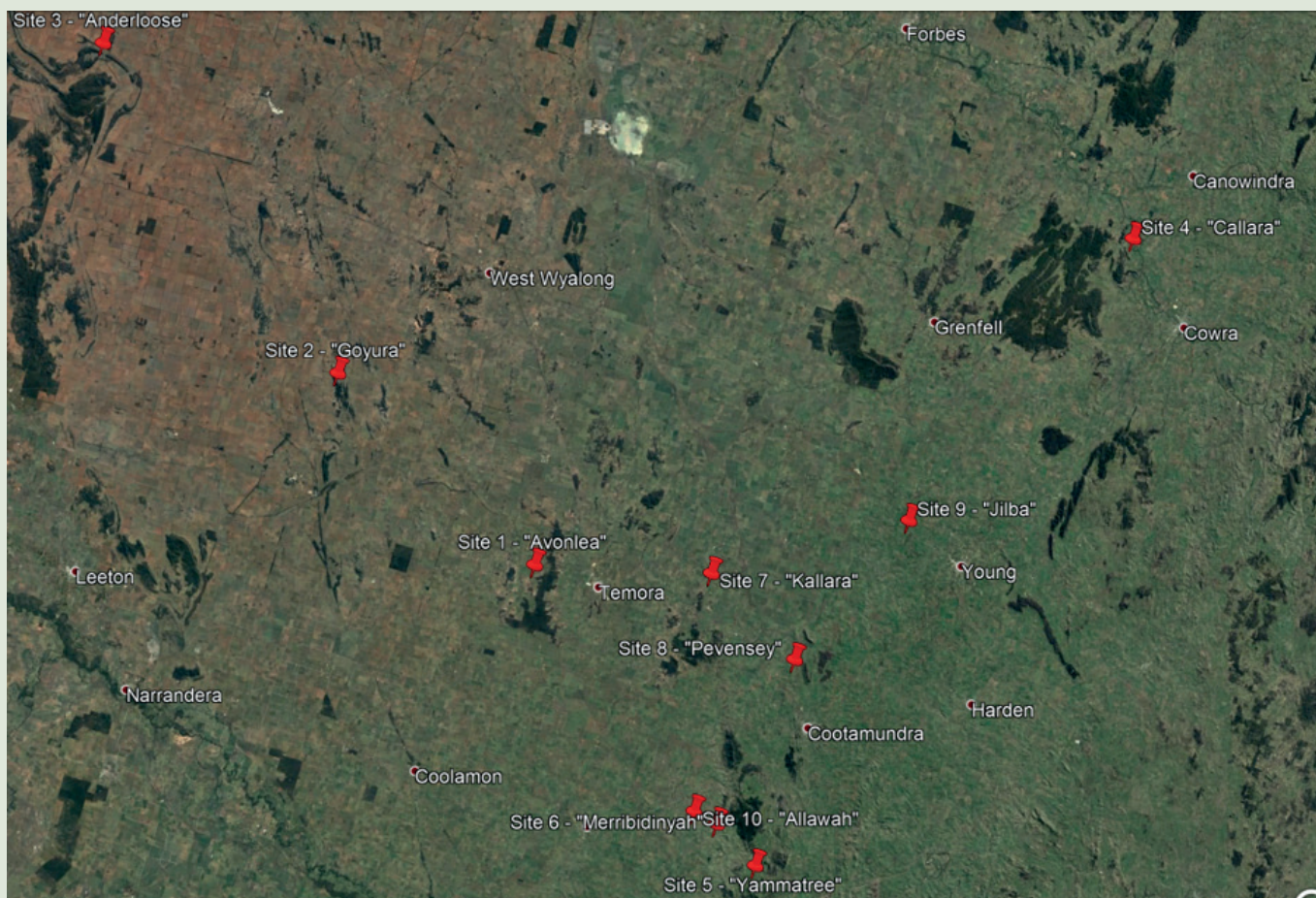


Figure 1 - Map of the FarmLink region and the 10 dung beetle monitoring sites

Australia has many species of native dung beetle. However, all native species have evolved specifically to deal with the manure of native animals. These species are not adapted to introduced European livestock and their larger type of dung produced. The importation of new dung beetle species into Australia dates back to the 1950's with work conducted by scientists from CSIRO to establish over 40 new species of dung beetles. This project aims to survey where the current species are established and to fill the gaps by introducing new species. The overall purpose is then to quantify the ecosystem services and economic benefits achieved through:

- Improving soil in grazing systems
- Reducing the spread of diseases and insect pests such as bush flies.
- Increasing pasture health
- Reducing nutrient run off into waterways

The specific role for FarmLink has been to assist in surveying across the southern NSW to find what beetles are established what areas and as a result, contribute to a nation-wide database. Having a

good understanding of what species are where allows us to study the agronomic and economic benefit of dung beetles which aids in selection and distribution of new species to suit different climates and environments.

Monitoring commenced in September 2019, with 10 farm sites set up across the northern half of the FarmLink region ranging from Bethungra in the south east, Rankin Springs in the west and Cowra in the north as shown in Figure 1. Each site is monitored monthly for dung beetle activity across a 24-hour period using a pitfall trap shown in Figure 2. Fresh dung from nearby cattle is placed on top of the trap which dung beetles are attracted to and fall into in the blue tray containing propylene glycol. Samples are taken from each trap so that dung beetle species can be identified and quantified. The process is repeated at the same location each month. This is because different species of dung beetles are active at different times of the year and by monitoring farms every month for two years a good understanding of what beetles are present and when they are active will be achieved.



Figure 2 - A pitfall trap used for monitoring

All 10 sites across the region have had a positive result with substantial dung beetle numbers at different times of the season. Some of the most common and beneficial beetles are pictured in Figures 4, 5 and 6. *Bubas bison* is a late winter and early spring active beetle. The bison beetles have a large distinctive horn which makes them easily recognizable. The bison are known to dig up holes into the soil up to 40-60 cm deep. They use these holes to take balls of dung into where their eggs are laid and larvae can feed on the dung. These holes can be found under any dung pad which bison have been active like what is pictured in Figure 3.



Figure 3 - Holes dug by *Bubas bison* underneath a dung pad.

PHOTO: RUSS BURROW (CSU)

Other common beetles are *Euonticellus fulvus* and *Onthophagus taurus* which are active during summer months and early autumn. Most beetles are identified by the shape or colour of the pronotum (middle section of the body) with features such as the horn on the pronotum of *B. bison*. When collecting dung beetles, a mobile phone app has been developed called 'My Dung Beetle Reporter' which is used to record information and send pictures to accompany samples that are sent to a laboratory for evaluation. This app is freely available on any android or apple device and all livestock producers are encouraged to use the app whenever they see dung beetles or evidence of their activity. All photos or dung beetles collected using the correct protocol outlined in the app will contribute to the national survey of dung beetle distribution throughout Australia.



Figure 4 - *Bubas bison*. PHOTO CREDIT RUSS BURROW (CSU)



Figure 5 - *Euonticellus fulvus*. PHOTO CREDIT RUSS BURROW (CSU)



Figure 6 - *Onthophagus Taurus*. PHOTO CREDIT RUSS BURROW (CSU)