



Copris elphenor



beetle holes in manure pad

The information in this fact sheet describes the benefits of introducing dung beetles to the farm environment, provides a brief description of their appearance and life cycle, and suggests relevant beetle species and where to find more information.

Dung beetles enhance both agricultural and ecosystem function

1. Improved soil fertility

Most species of dung beetles create tunnels (some up to two metres deep) within the soil profile. Beetles transfer dung from the surface to deeper within the soil profile where the larvae consume it, before they emerge as adults. The tunnels within the soil profile benefit soil structure, porosity, water permeability, soil biota, levels of carbon and plant nutrients and decrease the bulk density of soil.

2. Increased pasture productivity

Dung beetles disperse and bury animal waste, incorporating nutrients such as nitrogen and phosphate into the soil.

3. Reduced pollutants

By dispersing and burying animal dung, the beetles reduce accumulated animal waste that might contaminate water ways. Rainwater is also absorbed into the soil more easily.

4. Reduced parasite burden

By desiccating and burying fresh animal faeces, dung beetles reduce the breeding source of livestock pests and parasites.

5. Secondary seed dispersal

By burying seed-containing dung, beetles can disperse desirable plant seed.

Native versus exotic dung beetles

With approximately five hundred species of native dung beetles in Australia why are we using imported species? Native dung beetles co-evolved with Australian marsupials, whose dung is typically a dehydrated pellet. Native dung beetles are not adapted to burying the large moist pats of ruminants and horses which were introduced to Australia in the late 18th century. Consequently, a significant problem developed in the livestock industry, with large amounts of unburied dung and increasing numbers of flies compromising the health of animals and the landscape. Of the 53 non-native species of dung beetle imported to tackle the problem, 23 have been successfully established across diverse climatic and environmental conditions. The establishment of dung beetles on the north coast of NSW was not initially a success, possibly due to residual insecticides in the landscape following tick control practices.

It is therefore important to minimise the use of synthetic pyrethroids and macrocyclic lactone chemicals (especially avermectins) which can be harmful to dung beetles throughout their lifecycle, and especially in spring as the dung beetles emerge.

What do dung beetles look like?

The adult dung beetle has three body sections (head, thorax, and abdomen), three pairs of legs and hard wing covers which protect folded and transparent/or white wings underneath. The beetles are usually brown or black. Male and female beetles often have similar characteristics. A magnifying glass is important when trying to identify species and gender. Depending on the species the length of a dung beetle can be between 7-9 mm and 20-25 mm.

A brief life cycle

Unlike other beetle species, only adult and larval dung beetles consume dung. Dung beetles break up fresh dung pats and most species or 'tunnellers' bury the dung under the soil for feeding and nesting. 'Rollers' transfer dung into a ball or irregular mass that is moved away to a nesting site. The nests are home for one to several eggs.

Males and females often work together building a nest. The eggs hatch and larvae emerge, grow through three stages into pupae. Eventually pupae develop into adult beetles which dig through soil to emerge at the surface. The new adult moves to a fresh animal pat to begin the cycle again. Some dung beetles produce several generations within one year.

Species vary in their activity throughout the year, so it is important to have a mixture of species to ensure activity across different seasons. Most introduced species feed and breed when the weather is warmer in late spring, summer and autumn.

How to determine which species is suited to your landscape

Dung beetles are environment-specific, and it is important to research the species that suit your landscape. When introducing dung beetles to your property, include a diverse mix of species to ensure activity across different seasons.

Involve your neighbours, as dung beetles are not contained within boundary lines. According to John Feehan (*pers. comm.* July 2022), species potentially suited to the NSW Bellinger River area include:

- *Copris elphenor*
- *Euoniticellus fulvus*, *E. intermedius*
- *Liatongus militaris*
- *Onitis aygulus*, *O. alexis*, *O. caffer*, *O. viridulus*
- *Onthophagus binodis*, *O. gazelle*, *O. nigriventris*
- *Sisyphus spinipes*

Images and more information on these can be found at dungbeetles.com.au/species which reports *Digitonthophagus gazella*, *E. intermedius*, *O. alexis*, *O. viridulus*, and *Onthophagus saggitarius* as being present on the north coast.

Of these species, *O. caffer* is a winter active species showing some promise, currently being trialled by Border Ranges Richmond Valley Landcare. <https://www.brrvln.org.au/dung-beetles>

Monitoring your beetles

Monitor the dung beetle population once a month if possible.

Rate dung beetle activity as 'nil', 'low', 'medium' or 'high' (i.e. most pads are rapidly dispersed).

To estimate the number present*:

- Find 1-2 day old dung pads with disturbed soil at the edge of the pad or other evidence of beetles. Tread gently to avoid scaring the beetles down into their tunnels.
- Collect two pads, plus 20-30mm of soil from underneath into a bucket, fill with water and stir well.
- Skim the beetles off the surface with a sieve.
- Keep stirring and skimming until no more beetles appear
- Count the number of each species of dung beetle present

*This method is taken from *Dung beetles - working for you* <https://www.dpi.nsw.gov.au/>

Useful resources and facts

The Dung Beetle Ecosystem Engineers Project includes a comprehensive list of images and information to identify dung beetles

<https://www.dungbeetles.com.au/>

A free identification service is also available from John Feehan <https://dungbeetleexpert.com.au/dung-beetle-information/identifying-dung-beetles/>

Dung Beetles of the North Coast of NSW <https://www.brrvln.org.au/dung-beetles>

Left image: *Copris elphenor* scienceimage.csiro.au

Right image: Debra Murphy, realagriculture.com

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For more information visit bellingerlandcare.org.au



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