



Dung Beetles

Identification Guide & General information

What is a dung beetle?

Beetles that are found in dung pads, that feed mostly on dung and bury dung in underground tunnels, are called dung beetles.

Dung beetles belong to the scarab family of beetles. There are 4,500 species worldwide, with most found in Africa where they have evolved with a wide range of herbivores, including large species such as buffalo and elephants. There are approximately 400 native dung beetle species in Australia, several species making a useful contribution to the burial of cow and horse manure.

In southern Australia most dung beetles dig tunnels under the pad to bury dung and lay eggs, where the beetle larvae then develop. This tunnelling and dung burial habit makes dung beetles among the most important insects in our grazing lands.

***Dung beetles are a necessary part
of our grazing lands***

Southern Australia has about 17 species of introduced dung beetle, though only a few are widespread; most districts have only one or two species. The Goulburn Broken Dung Beetle Project will assist farmers to introduce several hundred 'starter-colonies', of six to eight 'new' types of dung beetle, into our catchment over the next three years.

How can I tell if I have dung beetles?

For example:



Before



3 hrs later, completely shredded (Taurus & Fulvus)



Soil from tunnels around dung pad; \$1 coin (Bison)



Holes in the pad (Bison)



Tunnels under the pad; \$1 coin (Bison)



Pad tunnelling (Australis)

Dung Beetle Names

In this booklet we refer to dung beetles by the common names listed below:

<u>Common Name</u>	<u>Scientific Name</u>
Bison	<i>Bubas bison</i>
Africanus	<i>Euoniticellus africanus</i>
Fulvus	<i>E. fulvus</i>
Intermedius	<i>E. intermedius</i>
Pallipes	<i>E. pallipes</i>
Spiniger	<i>Geotrupes spiniger</i>
Alexis	<i>Onitis alexis</i>
Aygulus	<i>O. aygulus</i>
Australis	<i>Onthophagus australis</i>
Binodis	<i>O. binodis</i>
Taurus	<i>O. taurus</i>

Dung Beetles – Beneficial Insects

Dung beetle activity serves to:

Increase soil fertility by-

- burying dung (nutrients & organic matter) in the plant root zone
- creating tunnels in the soil both when burying dung and on emergence of new beetles
- increasing soil aeration and water infiltration

Reduce pasture fouling

- By removing pads from pasture

Reduce water contamination and algal blooms

- By reducing nutrient run off into dams, streams and waterways

Reduce bush fly numbers

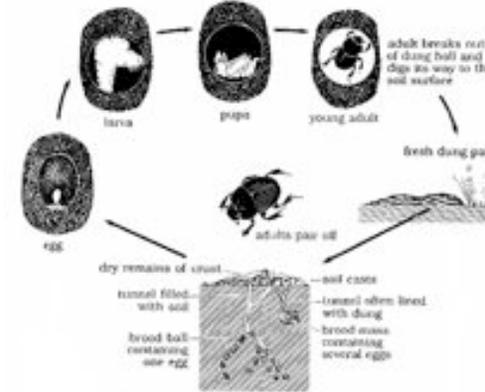
- By rapid burial of dung pads removing the fly breeding habitat or by reducing the water content of the dung so

that larval incubation does not occur

Reduce parasite loads

- By drying the dung pad out more quickly and interrupting the life cycle of the parasite.

Dung Beetle Life Cycle



Dung beetle activity

Each type of dung beetle is active for only part of the year. During this time males and females of the same species pair-up, dig tunnels, bury dung and the female lays eggs. Most species are active during the warmer months, from November to March, though Bison is an important winter-active species. There are a number of things that property managers can do to increase dung beetle activity.

1. Strategic use of chemicals. If possible, try to use chemicals which have low impact on beetle populations (see below) and use only as necessary and at times of the year when dung beetle numbers are low.
2. Avoid feeding large amounts of grain to cattle. Dung from grain-fed cattle is very attractive to cockatoos. Their foraging breaks up the pad, spreading the dung and allowing it to dry out more quickly in summer.

3. Good quality pasture produces good quality dung (higher moisture and nitrogen content). Manage pastures to improve dung quality - if your cattle are on high quality feed, it will generally result in higher rates of egg production by dung beetles and higher population levels.
4. Increase the number of dung beetle species on your farm, so that their activity is spread over more of the year.

Dung Beetle Activity Periods

Dung Beetle	Activity period – approximate*
Africanus	Summer-active (Sept-Apr) little info available.
Alexis	Summer-active, little known.
Australis	Sept-Nov & April-May.
Aygulus	Summer-active, little known.
Binodis	Summer-active, may be active from early Spring to early winter.
Bison	May-Sept may become temporarily inactive during extended dry/mild winter weather.
Fulvus	Summer-active: Nov-March finishes earlier if very hot and dry.
Gazella	Summer-active, may be active from early Spring to early winter.
Intermedius	Summer-active (Oct-Apr), but can work into autumn if conditions are mild.
Pallipes	Summer-active.
Spiniger	Dec-April (occasionally to June).
Taurus	Oct-March finishes earlier if very hot and dry.

*Information courtesy of Soilcam/John Feehan

Are Drenches Harmful to Dung Beetles?

*Many are, some aren't – **CHOOSE CAREFULLY!***

The Natural Heritage Trust and AGFORCE (Qld) have produced two useful guides to the use of parasiticides:

‘Consider your dung beetles when using parasiticides’ and ‘Strategic use of parasiticides can help your dung beetles’. These pamphlets are available from the Goulburn Broken Dung Beetle Project on request.

There is one drench product on the market, Cydectin*, that makes the legal claim (on the product label) that it “has no adverse impact on dung beetles or dung beetle populations”. Farmers wanting to minimize the negative effects of drenches on dung beetles and other dung fauna should consult a technical expert on this subject.

* Registered trademark of Fort Dodge

What about fertilizers & mineral additives?

Mineral fertilizers are not toxic to dung beetles. Dung beetles are plentiful on many farms that regularly spread superphosphate and lime. Dung beetles spend most of their time in dung, or underground, and are unlikely to come into direct contact with such inputs. Over time, increased tunnelling and dung burial will improve soil health and quality, reducing the need for off-farm inputs.

What about beetle predators?

Many predators will eat dung beetles, given the chance, eg. ibis, ravens, magpies and foxes. Generally, predation is only a concern immediately after release of starter colonies, so you might want to discourage flocks of insectivorous birds from feeding in your paddocks in the first day or two following releases. Once dung beetles are established and present in their thousands and millions, predation is unlikely to have a major impact on beetle numbers.

Dung Beetles of the Goulburn Broken Catchment

Widespread species



Australis (Genus Onthophagus) is a widespread native species, most active in spring and autumn. Several generations per season. Black with greenish metallic tinge, 11-13 mm.

(Below) Autumn dung pad riddled with *Australis* tunnels.



(Left) **Taurus** (Genus Onthophagus) is the most numerous & widespread introduced dung beetle in the Goulburn Broken Catchment.

Shiny black body 8 – 10 mm. Day flier. Summer-active, from Nov to April, peak numbers in Jan/Feb. Several generations per season.

Photo © CSIRO

(Below) *Taurus* devouring dog dung.



(Above) Some males have large horns. Females lack horns.



Fulvus (Genus *Euoniticellus*) is also widespread in the Goulburn Broken, but not as numerous as *Taurus*. A brown-gold colour 8-12 mm. Day flier. Summer-active, from Nov to April, peak numbers in Jan/Feb. Several generations per season. Photo © CSIRO



Bison. (Genus *Bubus*)

Shiny black beetle, males with prominent horns. Length- 15mm. Winter-active – late April to September. Well-established and widespread in the catchment. One generation per season..

Released at multiple sites in the GB Catchment in 2006-8: Yarck, Yea, Strath Creek, Ruffy, Glenburn, Fawcett, Murrindindi, Limestone, Strathbogie, Nathalia, Mooroopna, Mansfield, Thornton, Kilmore.



Avgulus (Genus *Onitis*)

Widespread in the catchment, especially north of the Goulburn River. Active in summer from December to April. Dark brown above, sometimes with a green sheen. Length- 20-25mm. Summer-active. One generation per season.

Two colonies released in the Mansfield district, where it has yet to become established.

Species with restricted distributions

Alexis (Genus Onitis)

Recorded from three localities south of Benalla (around Whitegate and Molyullah). Active in summer from December to April. Dark brown above, sometimes with a green sheen. Easily confused with *Onitis aygulus*. Length- 20-25mm. Summer-active. One generation per season.



Three colonies released in the Euroa-Longwool district.

Photo © CSIRO

Pallipes (Genus Euoniticellus)

Recorded from several localities in the centre of the catchment between Benalla and Seymour, but likely to be more widespread. A small brownish beetle with three pairs of dark, shiny patches along the centre of the pronotum. Easily confused with other *Euoniticellus* species. Length- 9-12mm. Summer-active. One generation per season.



Recently released dung beetle species

Africanus (Genus Euoniticellus)

Similar to Fulvus, but dorsal surfaces speckled with dark markings.

Fourteen colonies released in Upper Goulburn 2006-8: Strath Creek, Fawcett, Tatong, Benalla, Warrenbayne, Creighton's Creek, Longwood. Summer-active. Several generations per season. Length- 8-13mm



Actual size
8-13mm



Spiniger (Genus Geotrupes)
A large species with black upper-body and metallic blue underside.

Released at several sites in the Goulburn Broken: Fawcett, Yarck, Yea, Trawool, Shepparton, Undera, Echuca. Length 20-25mm. Late summer-autumn active
Left-Photo © CSIRO



Actual size
20-25mm

Intermedius (Genus Euoniticellus)

Similar to Fulvus and Africanus. The male has a curved, blunt horn on the head. 7-9mm

Four colonies released in the Nathalia, Broadford, Longwood districts. Summer-active. Several generations per season.

Photo © CSIRO





Gazella. (Genus Onthophagus)
 Colour variable – light to dark brown. Males have short horns. Length- 10-13mm
 Six colonies released in Upper Goulburn: Strath Creek, Yea, Murrindindi, Euroa, Kilmore, Undera, Nathalia, Tatong, Strathbogie.
 Summer-active. Several generations per season.
 (Left) Photo © CSIRO



Native Dung Beetles

In addition to the introduced dung beetles, there are at least four widespread native dung beetles in our catchment. *Onthophagus australis* (p 5, above) is the only one of these that buries useful amounts of dung.

Other Beetles Found In Dung

Several other beetles may be found in dung, including **Fimetarius** (second from top). This cockchafer beetle doesn't bury dung, but helps to break up pads and can occur in large numbers.



Binodis. (Genus Onthophagus)
 Similar in appearance to Taurus, males have a prominent ridge above head.
 Colonies released in GB catchment at: Tatong, Seymour, Euroa, Molesworth, Merton, Stanhope, Tatura, Nathalia. Not yet well established.
 Length- 11-13mm.
 Night flier
 Summer active. Several generations per season.

Photo © CSIRO



Aphodius tasmaniae
 10-12mm Pasture cockchafer



Aphodius fimetarius
 7-9mm A beneficial, non-pest, cockchafer that spends its life eating and decomposing dung.



Aphodius pseudolividus
 4-6mm



Proctophanes sculptus 5-7mm



Heteronychus arator
 11-14mm
 African Black Beetle- not a dung beetle.

&] Photo © CSIRO

Further information on dung beetles

‘Consider your dung beetles when using Parasiticides’, a National Heritage Trust & Agforce publication, 2003.

‘Strategic use of parasiticides can help your dung beetles’, a National Heritage Trust & Agforce publication, 2003.

Introduced dung beetles in Australia 1967-2007 (Edwards, Penny):

<http://www.landcareonline.com/Edwards%20Penny%20BOOK%20ALL%20PAGES-final.pdf>

Websites:

Victorian dung beetles eForum:

<<http://mc2.vicnet.net.au/home/beetles/index.html>>

Dung Beetle Express website: <www.dungbeetles.com.au>

National Dung Beetle Website: <www.dungbeetle.com>

Landcare Farming website: <www.landcareonline.com.au/>.

‘Common Dung Beetles in pastures of south-eastern Australia’. Tyndale-Biscoe, M (2001) CSIRO publication.

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and additional photos provided by the Goulburn Broken Soil health & Dung Beetle Project.

Disclaimer

Whilst every effort has been made to provide accurate and useful information, the Goulburn Broken Dung Beetle Project cannot guarantee that the information presented in this booklet is definitive and does not accept liability for any loss or damage caused or arising from its use.

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Australian Government

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