Working hard: Livestock producers are being encouraged to learn how to monitor and maintain highly beneficial introduced dung beetle species. Photo: Matt Beaver, DBEE

Keeping an eye on beneficial beetles

After prolonged drought and a summer of bushfires, livestock producers may be wondering how dung beetles are faring. **Pamela Lawson** discovers that they are soldiering on, with a five-year national project helping to boost their numbers and distribution, so more graziers can benefit from these eco-warriors.

AT A GLANCE

- Dung beetles provide significant environmental and economic benefits to Australian graziers.
- The DBEE project is establishing new species in Australia to increase the geographical and seasonal range of dung beetles.
- Producers can get involved in the project and learn how to best establish, monitor and maintain dung beetle colonies on their properties.

While there are hundreds of native dung beetles in Australia active year-round, they prefer native animal dung. Therefore, dung beetles that specialise in burying cattle, horse and sheep manure have been imported and released in Australia by CSIRO since the mid-1960s.

Introduced dung beetles play a remarkable role in Australian agriculture. By burying and consuming dung, they recycle nutrients and improve soil structure. Some of the environmental and economic benefits dung beetles provide to graziers include:

- Helping soil retain moisture and nutrients,
- Providing a readily available source of biological soil carbon for plant growth,
- Increasing nitrogen availability while minimising losses to the atmosphere and surrounding environment through run-off,
- Recycling phosphorous contained in animal dung directly into the soil.
- Reducing the requirement of N and P for pasture plants thereby reducing inputs and associated costs.
- Aerating the soil and enhances rainfall infiltration.

FLY FIGHTERS

The Meat & Livestock Australia (MLA) and Department of Agriculture, Water and the Environment-supported Dung Beetle Ecosystem Engineers (DBEE) project is expanding the range of dung beetles in Australia, aiming to fill the current seasonal and geographical gaps. This is especially good news for those who have been impacted by the significant numbers of bush and little house flies around recently. Dung beetles not only play a vital role in soil health and carbon storage, but they also help control flies by rapidly burying dung and disrupting the fly breeding cycle.

There is currently a lack of spring-active dung beetles in Australia that can bury livestock dung. This means that when conditions become favourable for flies as the weather warms in spring, there is little activity recycling dung and pest numbers build quickly.

Drought conditions can also hamper the development and activity of the summer-active dung beetles as they have a hard time digging out of their deep reproductive chambers when the ground is very hard for long periods of time.

Another factor that impacts dung beetle success is that during drought, livestock numbers decrease so there less dung around, resulting in reduced dung beetle numbers. This can cause increased fly activity once dung does become available again because flies can respond immediately and complete their life cycle in just weeks, whereas many dung beetles take much longer to complete a generation.

In addition to helping to control flies by disrupting their life cycles, dung beetles also help to control livestock parasites like nematodes and stomach worms. The dung of affected animals is packed full of worm eggs. When larvae hatch, they crawl up nearby pasture plants and are soon consumed by livestock which in turn become infected.

Active dung beetles in well-established colonies can quickly destroy worm-ridden pats. As the dung beetles bury dung, egg numbers are reduced, giving producers a natural control strategy.

NEW RELEASES

To help fill seasonal and geographical gaps in current dung beetle activity in southern Australia, the DBEE project is focused on mass rearing and releasing three new dung beetle species introduced from North Africa (Morocco) and southern Europe (France). It is hoped they will complement the species that are already established in Australia, and that the Mediterranean beetles will be well-adapted to similarly dry conditions.

During the late summer and autumn of 2020, the DBEE team have successfully distributed over 24,000 spring- and summer-active dung beetles across 50 farms across southern Australia, including some in Western Australia. These releases have included the first of the newly imported species, *Onthophagus vacca*, into nurseries on farms where producers have been trained to carefully rear and monitor the beetles. The DBEE team will now work to successfully import, mass rear and release an additional two species before the project wraps up in 2022.

Overall, the project plans to distribute tens of thousands of adult beetles of new and existing species, in association with Landcare, farming systems or livestock groups aligned with the DBEE project. If releases are successful and thriving colonies establish, researchers can harvest a fraction of these beetles and release them onto new sites, with the scope for further releases growing exponentially over time.

New release: Thousands of spring- and summer-active dung beetles have been recently released on Australian farms, including the newly imported species, *Onthophagus vacca*. Photo: Matt Beaver, DBEE

BUSHFIRE FEARS

The existing colonies of summer-active dung beetles in Australia were dealt another blow this past summer when, in addition to prolonged drought, bushfires swept through many regions. But recent surveys by the DBEE team along the NSW south coast and in South Australia's Adelaide Hills have shown a moderately abundant and diverse population of summer-active dung beetles have survived in these fire-ravaged areas.

According to DBEE and Charles Sturt University Field Technical Coordinator, Dr Russ Barrow, as long as the burnt farmland is restocked within 3-6 months of the fire, the beetles will likely be unaffected for future generations.

"This is good news for farmers, as once they get stock back onto the properties, the beetles should be there providing their economic benefits," Dr Barrow says.

"We call the dung beetles 'mini-livestock' and producers hopefully won't have to re-stock them. But for those that do, we can help re-distribute beetles around fire-affected farms through the DBEE project.

"Luckily, most of the winter-active beetles were underground when the fires came through, so we are hopeful these beetles have not been affected."

BEETLE CARE

To encourage and maintain healthy dung beetle populations, producers need to be aware of the chemicals they use on their livestock to control parasites. The residues of some parasiticides excreted in animal dung can be harmful to adults, juveniles, larvae, eggs or multiple life stages of dung beetles.

The main factors to consider when deciding on the best practice use of parasiticides and when developing or modifying a parasite control program include:

1. Choosing chemicals that are lower risk to dung beetles, based on available research information.
2. Being aware of the *'danger period'* (beetle activity season) when certain chemicals are most hazardous to various life stages of beetles.
3. Reducing the frequency of treating livestock with parasiticides and doing worm egg counts and tests to see if treatment is necessary and economically worthwhile.
4. Selectively using chemicals to target specific groups of animals and specific parasites, rather than treating all animals every time.
5. Considering different application methods and the length of time the dung is likely to remain toxic, especially when using sustained release products.
6. Ensuring the recommended dose rates are used.

A detailed report covering the effect of various types of chemicals and active ingredients on dung beetles, and the seasonal activity of various dung beetle species can be found in *Farming Ahead* August 2008 No. 199 pages 61-64. FA

Soldiering on: Despite recent bushfires and prolonged drought, dung beetles have survived and become active again in the cooler months. Photo: Pamela Lawson

More information:
Producers wishing to become involved in the DBEE project, purchase dung beetles or learn how to assess dung beetle activity on their property should visit the website www.dungbeetles.com.au