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Thank-you for your interest in **The Dung Beetle Release Strategy Group**,

We believe that this project will bring about one of the biggest changes in New Zealand farming this century. Our economy is largely based on livestock that came to this country without any means of waste disposal. This project will rebalance the system.

1. The issue

New Zealand lacks native pastoral dung-burying beetles. A tropical species *Copris incertus* was introduced in 1956 but only established at Whangarei, probably due to poor climate matching. Two accidentally introduced Australian *Onthophagus* species are widespread, but have little impact because they are not abundant enough, too small to move large volumes of dung, and are poorly adapted to feed on pastoral dung.

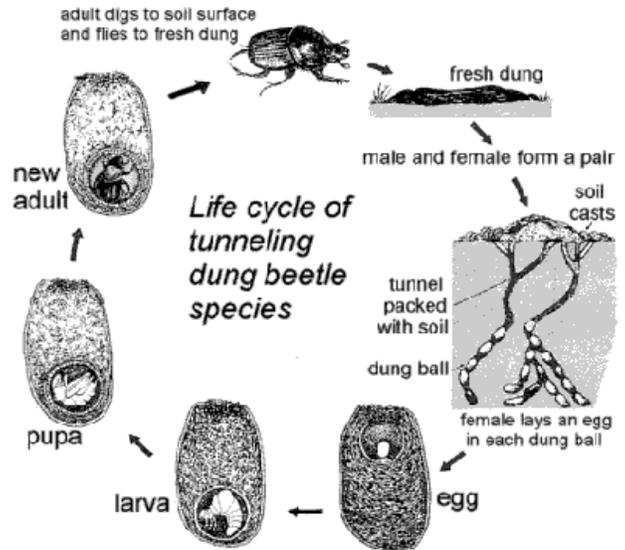
Services provided by dung beetles that remove cattle dung alone were worth an estimated US\$380 million per year to the US economy (USA has almost 100 million cattle; NZ has approximately 10 million dairy and beef cattle, plus 1 million deer, and 33 million sheep).

In the establishment of New Zealand's pastures little thought was given to the significance of biodiversity in creating a sustainable system. A prime example is the beetles that naturally process the dung of herbivores have not been considered seriously for introduction until now. There is little doubt the waste products of cattle and sheep have negative impacts on the New Zealand environment and that this impact is a result of the low biodiversity of our pastures. Having to deal with the dung on the ground and the consequences of its run-off is a cost to both farmers and the wider community.

To address this problem an application was made to ERMA and approved in February 2011 to import and release eleven species of dung beetle that rely on herbivore dung for their survival. All eleven species were chosen because of their preferences for the different climate and soil variables found in New Zealand and their activity at different times of the year. All are known to utilise large herbivore dung and live specifically in open pasture.

2. Why are dung beetles so useful?

Dung beetles feed and breed in dung only! These beetles are so adapted to a diet of dung that the adult mouth parts have evolved to be able to feed on dung and nothing else. It is because they spend their adult lives burying dung in tunnels beneath all types of fresh animal dung, feeding and laying eggs in dung (see life cycle diagram) that they are considered an essential part of pastoral farming everywhere in the world. Without them, dung sits around on pasture surfaces and accumulates to the point where worms and other insects cannot deal with it. As a result, less forage is available for livestock grazing and long term pastoral productivity is reduced significantly.



3. The benefits

Potential environmental and economic benefits of introducing specialist ruminant dung-feeding beetles into **BOTH conventional and organic farms** in New Zealand include:

- i) *Improved soil health and reduced run-off.* Increased aeration and water penetration into the soil, through beetle tunnels. Beetles reduce urine and liquid dung run-off, reducing microbial contamination, and pollution of waterways;
- ii) *Greater pasture productivity.* Stock will not graze around dung pats, reducing pasture productivity. Dung burial by dung beetles enhances grass growth, reducing reliance on fertiliser inputs. Fertiliser is often the single biggest item of working expenses on most sheep and beef farms and the third highest on dairy farms (behind labour and feed);
- iii) *Reduced fly pests and human disease.* Nuisance flies breed in dung. New Zealand has a very high rate of seasonal, sporadic campylobacteriosis compared to other OECD countries (up to 14,000 cases reported each year). Cattle dung and flies are believed to be the main source and vector of this disease. In Hawaii, introduced dung beetles reduced fly emergence from dung by 95%;
- iv) *Reduced infection by parasitic worms of livestock.* Dung burial significantly decreases the infective stages of parasitic worms of livestock when dung containing eggs and free living stages of parasites are buried greater than 10-15cm beneath the pasture surface;
- v) *Reduced greenhouse gas emission.* Reduced volatilisation of nitrous oxide;
- vi) *Increased soil biomass and activity of earthworms;*
- vii) *Improved sustainability of pastoral production.*

4. Impacts on native dung beetles

New Zealand has approximately 17 species of native dung beetle. None of them have wings and are therefore flightless. Virtually all of them live in native forests but a few species are known to exist in high country tussock regions of the South Island. None have been recovered from the dung of non-native domesticated livestock. Equally, none have been found in un-natural (i.e., modified) pastoral environments. Native dung beetles often occur in great number in native forests, mostly living on the nutrient rich hummus layer of leaf litter, and it is thought they once utilised the dung of long extinct moa.

All exotic species that we have targeted are specific to open pastoral environments. Most dung beetle species are very specific to the types of habitat they prefer to occupy. For instance, species found in open pastoral environments will not be found in bush or forest environments and vice versa. They have adapted over millions of years to live in the habitats they have evolved in. Thus we are not expecting exotic dung beetles to impact on native dung beetle fauna.

5. Economic benefits of dung beetles

Conservative estimates from the US state that dung beetles alone are worth approximately US\$380 million annually to the US economy. This value is based on an estimated 32 million head of cattle out of a total of 100 million head in production each year. The dung from these 32 million cattle is not treated with drenches and is therefore available to dung beetles year round.

In contrast, New Zealand has nearly 10 million head of cattle of which 5.9 million are dairy cows. Of these 10 million more than 90% are treated with drenches. If we assume the benefits to NZ are the same as those for the US, dung beetles could be worth NZ\$7.2 million per year to the NZ economy. However, with reduced dependency on drenches following a nationwide establishment of dung beetle populations, their value could reach as much as NZ\$55 million annually. Dung beetles would also provide the same services to sheep, horses, deer, goats, and pigs.

It is estimated that the cost of cattle parasitism in NZ is about \$300,000,000 per year.

6. Brief description of the NZ Dung Beetle Project:

- i)* We have drawn together a community of interested farmers to collectively apply to the Environmental Risk Management Authority (ERMA) for the importation and full release of a suite of 11 species of exotic dung burying beetles.
- ii)* Having received ERMA permission in yearly 2011, we have now begun importing breeding stocks of several dung beetle species from Australia (these beetles are native to Europe, Middle East, and Africa). These beetles are being put through quarantine, mass rearing, and monitored release at selected sites.

- iii) The currently funded project runs for three years until June 2012. The following project will be a combination of mass rearing, beetle sales, post release monitoring and research. Farmer (through beetle sales), industry organisations, council and central government funding partners are currently being approached for this second project.

7. ERMA NZ's decision

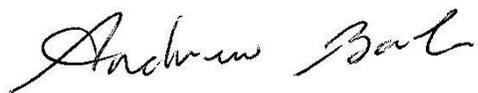
The hurdle to import new organisms is necessarily high. ERMA NZ concluded that the various risks that they assessed were **very unlikely, minimal, negligible** or **non-existent**. On that basis the DBRSG has commenced importing and mass rearing dung beetles. The full ERMA decision along with their Evaluation and Review Report can be obtained from their website or by contacting the DBRSG Project Manager.

The first releases of dung beetles on New Zealand farms will happen in early 2012. After that beetles will be available for purchase by all NZ farmers.

We are extremely grateful to our major financial sponsors, without whom the project would not be possible. These sponsors are: **MAF SFF, Landcare Research, Dairy NZ, and Environment Southland.**

We also have a number of terrific farmer sponsors who were amongst the first to have generously donated money to the project from the outset.

Yours sincerely,



Andrew Barber
Project Manager
Dung Beetle Release Strategy Group

Major Financial Sponsors:



Ministry of Agriculture and Forestry
Te Manatū Ahuwhenua, Ngāherehere



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