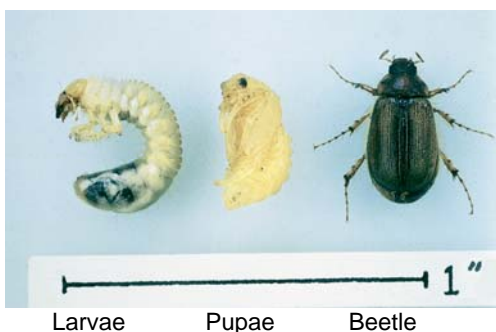


## Repairing Grass Grub Damaged Pastures

### What is Grass Grub

Grass Grub (*Costelytra zealandica*) are the larvae or immature stages of the common brown beetle that appears at dusk in spring and summer. While the beetle can cause economic problems the grub (larvae) is a serious pest of pastures especially those based on ryegrass/white clover.



Larvae Pupa Beetle

### Identification

Grass Grub is a member of the scarab family. The larvae are whitish/grey, C shaped, segmented, and with a darker head and three pairs of legs on the underside of the body located in the segment behind the head. Newly hatched larvae are about 5mm long and weigh only 2-3mg. When fully grown, third instar larvae are 20-25mm long and weigh 150-200mg. In the third instar the Grass Grub's black gut can be seen through the translucent body material. Grass Grubs which appear tinged green, purple and yellow are sometimes encountered and are diseased. Adult beetles are shiny, orange-brown in colour, about 10mm long and can be seen flying at dusk in November and December.

### Distribution

Grass Grubs are found throughout New Zealand, but are most likely to be found south of Hamilton at altitudes up to 1200m. Grass Grubs prefer lighter free-draining soils.

### Grass Grub Life Cycle

Under normal climatic conditions the Grass Grub life cycle typically takes one year to complete. In the one year cycle, adult beetles emerge from the soil in spring and they live for 4-6 weeks during which time they mate and lay eggs. In the North Island flights usually start in early October, but in the cooler regions of Otago and Southland beetles do not usually appear until November or even December. Female beetles are usually mated as soon as they appear on the surface of the pasture and lay most of their eggs close to the point of emergence, for this reason infestations tend to remain localised. However after laying most of her eggs the female may fly off to infest new sites.

The eggs hatch 2-3 weeks after being laid and the young grubs feed in the soil on fine roots of pasture plants. Through the summer young grubs moult into the second instar stage and by autumn they have usually reached the third instar which is the final stage of feeding (and the most detrimental to pasture).

During the late autumn and winter grubs stop feeding in the top 5cm of soil, and descend further down the soil profile. Colour of the grub changes from whitish/grey to a creamy yellow during this phase. In the soil profile, the gut of the grub empties and proceeds to make a smooth walled oval cell, which it pupates from in early spring. Following pupation the adult beetle remains in the ground for a few days, to allow the outer skin to harden, before digging its way up to the pasture above.

Populations typically grow over a 3-5 year cycle which is followed by a population crash caused by disease build-up in the soil. Within a single paddock however infestations can be at any stage in the cycle. In dry (drought) or cooler areas Grass Grub larvae grow more slowly and can take two years to become adults. In these areas larvae cease to feed over their first winter, and remain in the second instar stage before feeding resumes on pasture through spring, This can cause spring/summer pasture damage.

### One Year Life Cycle

	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov
Egg												
Grub												
Pupae												
Adult												

Photo supplied by novachem

## Effects of Grass Grub

A clear pattern of pasture damage occurs with Grass Grub infestations, with patchy areas of dead plants, often pulled out by stock damage, usually seen in February in the North Island and from March in the South Island. White clover is usually the first to disappear from the pasture, followed by the high-fertility grasses such as ryegrass as larvae graze plant roots. Young larvae tend to feed down at 15-20 cm in a pasture situation. As the grubs move through the second and third instar growth stages, the grubs move into the top 5cm of the soil profile where the larger diameter roots can be fed upon. These damaged areas can expand outward from year to year and become invaded with weeds (eg. Californian thistles), lower fertility grasses and annual grasses. Pasture damage by adult beetles is usually insignificant. However they may cause severe damage to seedling crops such as cereals and brassicas by chewing on young seedlings.



Grass Grub damage

## Monitoring

The key to Grass Grub control is monitoring grub numbers during late summer/early autumn. Early warning plots can be used to give an indication of when numbers of grub are approaching damaging levels. Spade sampling: taken randomly, 10 square spade samples to the depth of the spade, in a line across a paddock. After breaking up the soil, sift through and count the number of grubs. The threshold levels for economic control have been estimated by AgResearch in the following table:

Area	Grass Grub larvae	
	Per spade square	Per m <sup>2</sup>
Newly sown pasture	3	75
Southland, Otago and irrigated Canterbury regions	8	200
Dryland Canterbury	6	150
Other regions	4	100

## Prevention, Management & Control

If establishing a new pasture into a paddock with a history of Grass Grub problems, use of an insecticide or a seed treatment with insecticide such as ULTRASTRIKE™ is recommended for conventional cultivation methods and is essential in no-tillage due to increased insect pressure associated with this method.

Treated seed needs to be sown in rows at a rate of at least 15 kg/ha to ensure the concentration of the chemical is high enough to give sufficient protection.

Note: Grass Grub primarily feed in the autumn, but control may be required for spring sowings in areas where Grass Grub has a two year cycle.

Cultivation usually drastically reduces Grass Grub larval numbers (up to 70%), but also disrupts natural diseases allowing a rapid resurgence of the population over the next 2-3 years. Direct drilling techniques are often used in Grass Grub prone areas to maintain more stable populations and damage levels.

### Established pasture

Control of Grass Grub in established pasture with insecticide has mixed results, as soil dwelling insects are relatively difficult to kill. Best success is through early applications of chemical in February-March, when Grass Grub are smaller.

In situations where Grass Grub damage has occurred and repairs are required undersowing additional ryegrass into the existing sward is a viable option to boost spring grass growth and when total pasture renovation is unfeasible (\*See Grass Grub Renovator Mixes from Wrightson Seeds below).

Mob stocking and heavy rolling when soil is damp, and grubs are near the surface (during late autumn and winter) can reduce Grass Grub populations, but effects are variable.

A bio-pesticide is also available for Grass Grub control.

## Grass Grub Renovator Mixes

To assist farmers at a time when pressure from Grass Grub damaged pastures are exacerbated by downward pressure on farm incomes, PGG Wrightson Seeds have developed two specific 'Grass Grub Renovator Mixes' for farmers to undersow into existing pasture to help cover feed deficits as a result of Grass Grub damage. Seed should be sown into damaged pastures during April/May at a rate of 20kg/ha.

The two mixes (one for diploid pastures and one for tetraploid pastures) include market leading products treated with the recently released ULTRASTRIKE™ grass seed treatment to protect establishing seedlings against Grass Grub.

### Diploid Pasture Mix

EXTREME™ perennial ryegrass	15kg
Maverick Gold short rotation ryegrass	5kg

### Tetraploid Pasture Mix

Banquet II long rotation ryegrass	18kg
Delish short rotation ryegrass	7kg

**For more information on how best to identify and manage Grass Grub infected pastures contact PGG Wrightson Seeds on 0800 805 505.**

#### Reference

Barratt, B.I.P., van Toor, R.F., Ferguson, C.M., Stewart, K.M. 1990: In: *Grass Grub and Porina in Otago and Southland: A guide to management and control*. MAF technology, Invermay Agricultural Centre.