

Earthworms

Earthworms improve pasture production throughout the year. Earthworms feed on plant litter and dung and move this organic matter through the soil, **increasing fertility and helping soil structure**. The burrowing and casting activity of earthworms through soils helps soil porosity and improves available moisture and water infiltration.

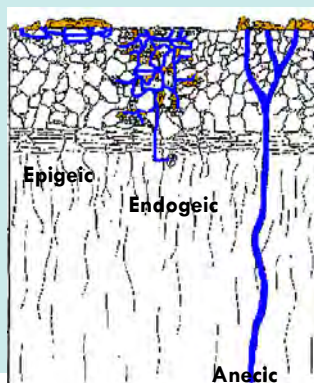
New Zealand's pasture earthworms arrived accidentally with the first European settlers. These earthworms still have a patchy distribution in New Zealand and many pastures could benefit from the introduction of earthworms.

There are three different types of earthworms and all types should be present in pastoral systems.

Epigeic earthworms feed on organic matter on the soil surface and do not form permanent burrows.

Endogeic earthworms burrow through the topsoil, feeding on the organic matter within the topsoil while also eating large amounts of soil, forming semi permanent burrows.

Anecic earthworms are larger and draw organic matter from the soil surface into their deep (up to 1m), permanent burrows to feed on.



Do I have healthy earthworm populations?

Earthworms are most active in autumn and spring – this is the time of year to find out what earthworms are present in the soil.

Take five to ten earthworm samples from a site using a spade (20x20 cm and 30 cm deep). Samples need to be hand-sorted by crumbling the soil onto plastic and removing all earthworms. Earthworms tend to concentrate near the soil surface so care needs to be taken in sorting the earthworms among the roots. All earthworms collected should be placed in water overnight before counting, weighing and identification.

After the earthworms have been counted the Earthworm Threshold Indicator can be used to determine if you have the right earthworm community for the desired soil services. If a type of earthworm is absent, it can be introduced. Earthworms may be stimulated by increased food supply and by avoiding pugging events. The optimum pH range for earthworms is 6–7.

Earthworm Threshold Indicator		
Earthworm numbers (per spade) at which they may be limiting their contribution to soil services		
Type	Soil services	Limiting
Epigeic	Organic matter incorporation, Carbon storage	<1
Endogeic	Creation of soil pores, Aggregate size and strength, Nitrous oxide production, Water infiltration	<14
Anecic	Creation of soil pores, Aggregate size and strength, Organic matter incorporation, Carbon storage, Nitrous oxide production, Water infiltration	<1

Nicole Schon

Phone: +64 3 325 9974

E-mail: nicole.schon@agresearch.co.nz

AgResearch Limited
Private Bag 4749
Christchurch 8140
New Zealand

agresearch
Farming, Food and Health. First™
Te Ahiwhenua, Te Kaitiaki me te Whaiora. Tūāwhiri

Earthworms

The liveweight found belowground is similar to the liveweight aboveground



Identifying common earthworms

Is the worm dark or pale? (Check this at the head end)
Dark worms have a paler underside. In pale worms the upper and undersides are the same colour.



Dark worms

Is the worm a red-brown colour with a purple sheen and iridescent in bright light?

YES

Is the worm very large with a flattened tail?

NO



Anecic: *Lumbricus terrestris* 'nightcrawler' (90-300 mm). It lives in a deep burrow marked by a large worm cast with leaves pulled into it.

OR... Is it an active worm with a reddish saddle?



Epigeic: *Lumbricus rubellus* 'dung worm' (25-150 mm)

Is the worm bright red with yellow ?

YES

Was it found in a rich organic matter and has yellow bands (when worm stretches)?



Epigeic: *Eisenia fetida* 'tiger worm' (30-130 mm)

OR... Is it a short worm with yellow colouring concentrated at the tail end?



Epigeic: *Dendrodrilus rubidus* 'bark worm' (20-100 mm)

NO

Is the worm a dark grey-brown colour?

YES

Is the worm large?



Anecic: *Aporrectodea longa* 'blackhead worm' (90-120 mm)

OR... Is it smaller?



Endogeic: *Aporrectodea trapezoides* 'southern worm' (40-90 mm)

NO

Is the worm a green-brown colour?

YES

Is it a long slender worm which writhes like a snake when disturbed?



Epigeic: *Amyntas corticis* 'snake worm' (70-180 mm)

OR... Is the worm pale greenish brown, coiling stiffly when disturbed?



Endogeic: *Allobophora chlorotica* 'green worm' (40-70 mm)

NO

You have probably found a rare worm which is not in this key. Record it as unidentified.

Pale worms

Is the worm pale grey with a distinct yellow tip at the tail?

YES



Endogeic: *Octolasion cyaneum* 'yellow tail' (65-180 mm)

NO

Is the worm pink or grey with a pink head and raised bumps on the underside between the head and the saddle?

YES

Is it very common in your sample with a dark pink head?

NO



Endogeic: *Aporrectodea caliginosa* 'grey worm' (40-100 mm)

OR... Does it have a pale pink head and tail with a dark pink-orange saddle?



Endogeic: *Aporrectodea rosea* 'pink worm' (25-85 mm)

Is the worm pink or grey with the saddle quite close to the head end? (saddle starting at segments <22, compared to >22 in many non-native earthworms)

YES



There are about 200 native species (i.e. *Octochaetus multiporus*) which vary considerably in size and colour. They tend to be found in forests but some are found in low fertility hill country.

NO