

# AgResearch scientists looking to soil bioengineering for pastoral farmers

A team led by Dr Alec Mackay, Senior Scientist, AgResearch, New Zealand's largest Crown Research Institute is looking to add soil bioengineering to the list of technologies that are used by pastoral farmers. Towards this the team has been looking at creatures, such as earthworms, mites, springtails and nematodes in the soil, and soil services management.

"Our farming sector has spent a lot of time and effort on the above-ground aspects of our pastoral systems, these are now highly engineered, with attention paid to livestock breeds, crop and grass choice, fertiliser and irrigation. In comparison the size and composition of life below the ground is often given little consideration," said Dr Alec Mackay.

"People would be surprised to find that on an average sheep paddock the life under the ground weighs more than the livestock. For example, in fields we have investigated, earthworms alone weigh nearly four times that of the live weight of the ewes grazing on top," said Dr Alec Mackay.

Earthworms consume dead plants and manure and mix organic material with the soil. This increases fertility and plant growth and prevents plant nutrients accumulating on the soil surface and then washing away. Worms also create burrows that assist with air and water movement in the soil.

Dr Alec Mackay says tests have shown improvements in pasture production of 10-30% from earthworm introductions to soils with little or no activity.

Soil communities also include mites, springtails nematodes, and various insect larvae. These invertebrates are also important for decomposition, incorporation of litter and nutrient cycling. AgResearch, in partnership with Massey University, is developing a soil invertebrate index that describes and quantifies invertebrates living below ground with an aim to link these invertebrates to the services that our soils provide.

This work is being undertaken by AGMARDT PhD student Nicole Schon under the supervision of Dr Maria Minor, Dr Alec Mackay, Dr Gregor Yeates and Dr Mike Hedley. The index will provide, for the first time, a basis for farmers to quantify their soils biology, including their earthworms, nematodes, springtails, mites, and assess the extent to which the soils biology is contributing to farm performance.

"What we hope to achieve is to add soil bioengineering to the list of technologies that are used by pastoral farmers to deliver greater agricultural output and enhancing farm profitability," said Dr Alec Mackay.