

The Puggometer: a new tool for quantifying and spatially recording pugging damage in grazed pastures

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The growth of the dairy industry in New Zealand (NZ) has seen the increased use by dairying of soils that have a high susceptibility to treading damage, such as Pallic soils. Treading damage degrades soil physical quality and increases the losses of nutrients and pathogen to surface waters. Intensive pugging events can also cause considerable pasture damage.

Previous research has largely focused on quantifying the magnitude of pugging on soil properties and pasture growth. However, no quick, simple and reliable method has been developed that is capable of assessing the variability in the extent of pugging damage, in a quantitative manner, from the small to whole-farm scale. Any such method will need to be sensitive enough to discern the spatial variability in pugging damage that can occur within paddocks. Quantifying this variation is important because pugging can be highly variable. Without spatial information, it is difficult to assess the extent to which pugging damage occurs on a farm and locate where it is most severe.

In order to quantify the magnitude and variability of pugging, a new tool called the Puggometer has been developed at Massey University. The Puggometer uses 10 stainless steel pins, which are spaced 5 cm apart along a single row. Each pin can extend up to a distance of 10 cm into soil deformations created by the hoof of a grazing animal. The depth of each pin is measured automatically, using individual infrared sensors, and is recorded along with GPS location. This allows a measure of soil roughness, an indicator of pugging damage, to be mapped for individual paddocks. This information can then be compared with spatial pasture growth information, using tools like the C-Dax rapid pasture meter. This paper describes the Puggometer and demonstrates examples of its use.