

# Soil carbon stocks related to grazing pressure, pasture heterogeneity and environmental factors

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Although considerable national and international research effort has gone into identifying grazing methods to improve sequestration of soil carbon, conclusive results remain elusive. Most of the variation in soil carbon levels is explained by environmental factors such as climate and soil type, with few studies being able to separate a grazing management effect from high natural variability. Of the studies which identified grazing method as a driver of soil carbon, some found larger stocks under continuous than rotational grazing, while others found the opposite. Results on different stocking rates were also inconclusive.

We measured total SOC and its component fractions to 60 cm at different spatial scales on grazed permanent pasture on the Southern Tablelands of New South Wales; a region typical of much of south-eastern Australia. Preferential grazing by livestock resulted in different grazing pressure within a grazing method. Heavy grazing resulted in a pasture dominated by annual grasses, some perennials persisted with moderate grazing, and both light grazing pressure and intensive grazing with rest resulted in a pasture dominated by established perennial grass swards. We show that pasture heterogeneity induced by grazing pressure is a driver of SOC variability, and that grazing pressure has a greater effect on SOC than grazing method. Grazing pressure and pasture composition affect inputs of carbon to soil and its subsequent turnover, and helps explain the previously inconclusive relationship between grazing management and SOC sequestration.