# SHORT-TERM EFFECTS OF DEEP PLOUGHING ON SOIL C STOCKS FOLLOWING RENEWAL OF A DAIRY PASTURE IN NEW ZEALAND

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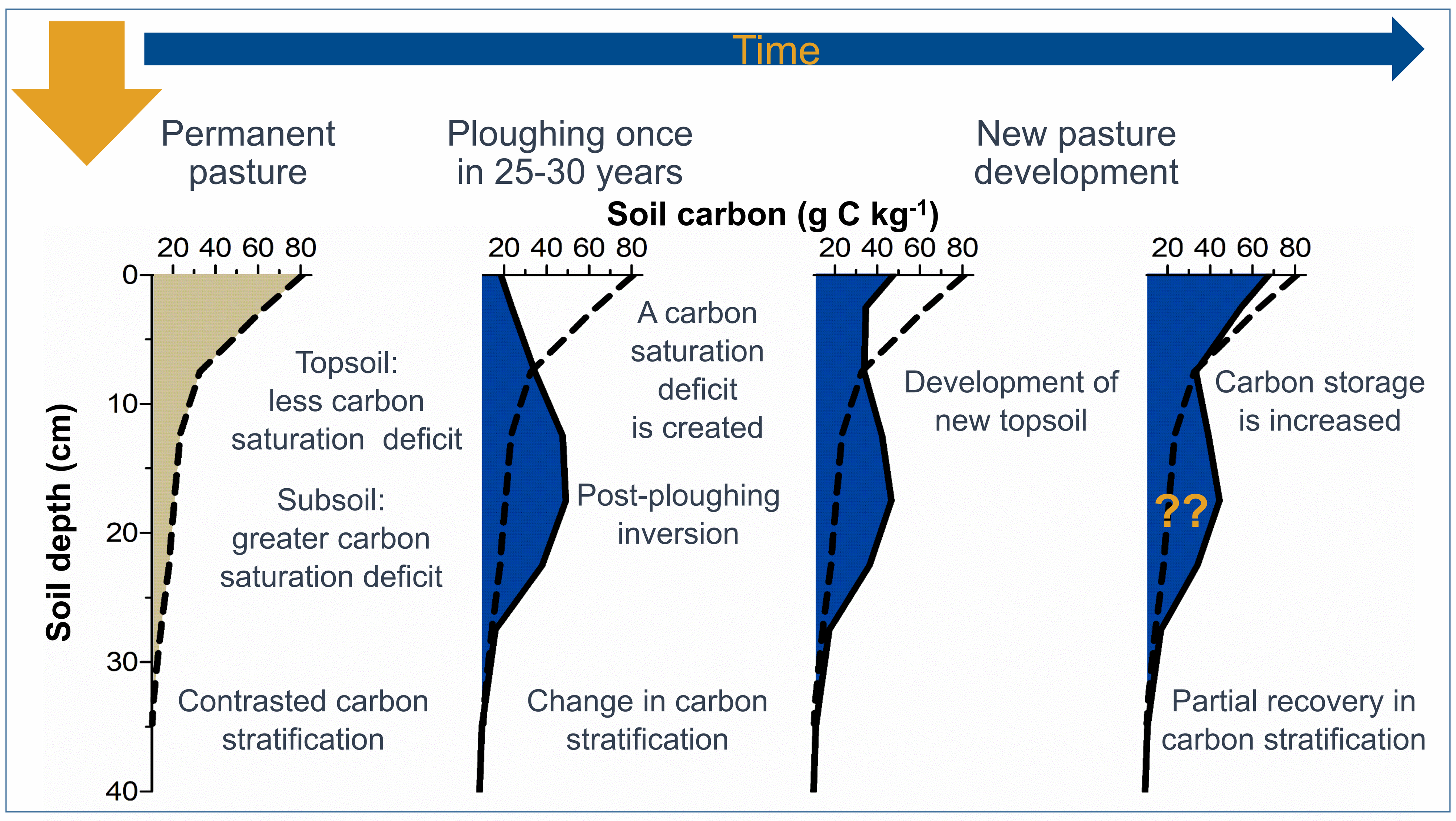
## Hypothesis

Infrequent inversion tillage of long-term pastoral-based soils may increase soil carbon storage.

## Material and methods

Renewal practices (no till, shallow till or full cultivation by deep –25 cm– ploughing) followed by summer forage cropping and autumn re-grassing (Fig. 1) were studied on an imperfectly drained Typic Fragiaqualf under dairy grazing. Site was core sampled (0-40 cm; Fig 1a,●) and monitored (plant growth, leaching) during 2016-2017 (Fig. 1; Fig. 2).



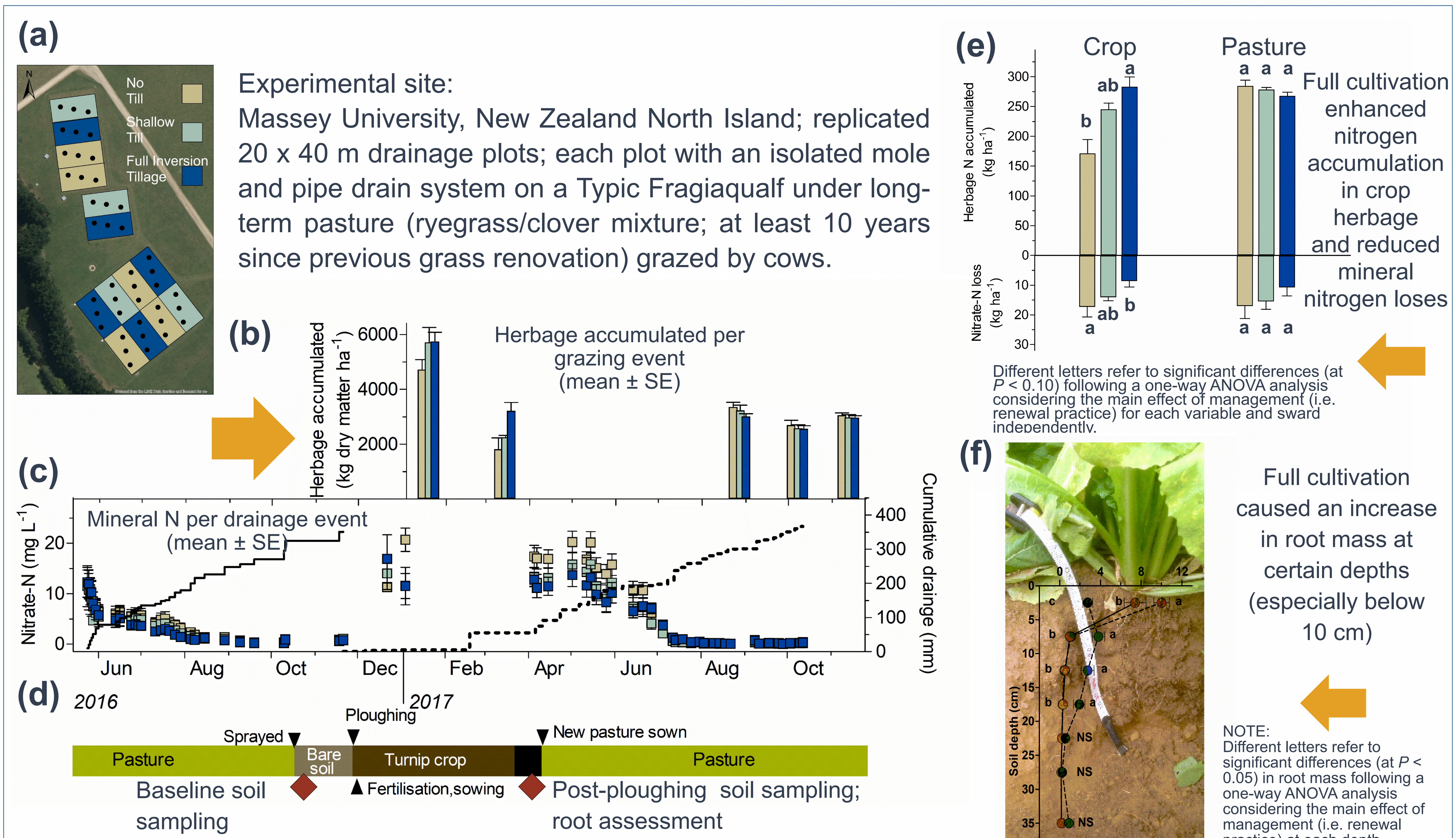




**Figure 1**
(a) Experimental site and experimental design; (b) herbage accumulation; (c) nitrogen (as nitrate-N) leaching and cumulative drainage; (d) crop and sampling calendar; (e) nitrogen (N) accumulation in herbage and N losses as nitrate; (f) changes in root mass assessed at the end of the crop phase.

## Results

Full cultivation:
(i) favoured crop herbage production (Fig 1b);
(ii) enhanced crop herbage nitrogen accumulation and root development (Fig 1e,f);
(iii) transferred soil carbon below 10 cm depth (Fig. 2; *)

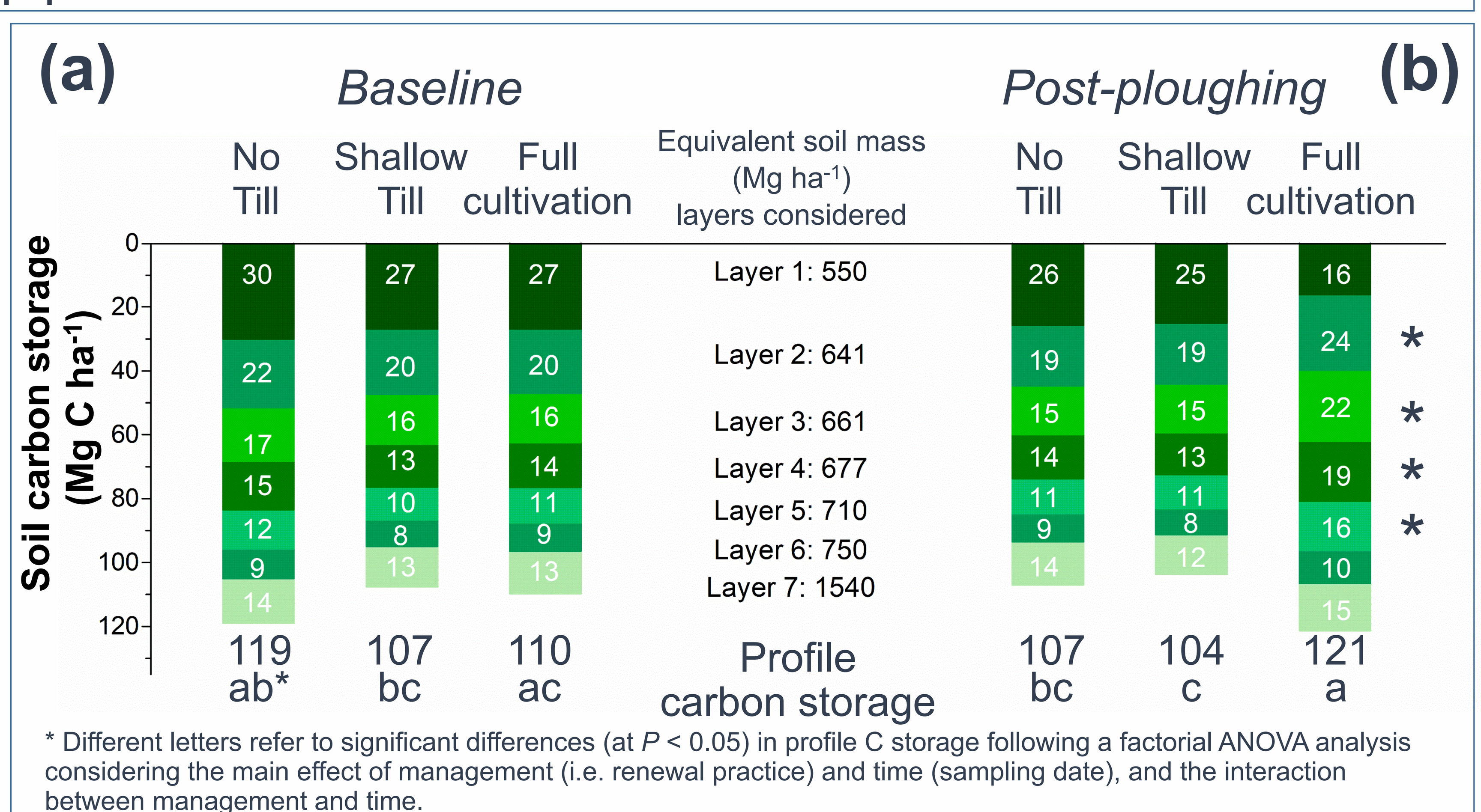



**Figure 2**
Changes in soil carbon stocks: (a) baseline (pre-ploughing); (b) 5 months after ploughing and summer crop growth.

## Final consideration

The potential for infrequent inversion tillage increasing soil carbon sequestration as a greenhouse gas (GHG) mitigation tool is currently being tested at other sites in New Zealand.

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# Short-term effects of deep ploughing on soil C stocks following renewal of a dairy pasture in New Zealand

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