

TREATMENT DETAILS

Sulphate of potash was applied across the whole trial site prior to tillage at 125 kg/ha supplying 50K and 20S kg/ha (\$220/ha).

Aged piggery manure + bedding was surface applied prior to tillage @ 10 t/ha supplying 322N, 80P, 202K, 49S and 134Ca kg/ha (sourced at no cost).

Inversion: a John Shearer one-way plough fitted with 9 'Plozza Plow' discs was used to invert the surface 30 cm of sand. Approx. \$50/ha.

Chisel plough: a Bednar Terraland Chisel Plough was configured with 15 tines on 43cm spacings (6.2m working width) and fitted with Active-Mix tines for the 'mix' treatments; the shape of these tines provides easy soil penetration with optimised loosening to 55cm with some bottom-up and top-down mixing. 'Deep rip' treatments were applied using a narrower shank tine and tip, with no plates. De-compaction and levelling is achieved in one pass using hydraulic spiked roller packers. Approx. \$150-165/ha contactor rate.

Image credit: Google Earth



Image 2. Trial map (10 treatments x 0.4ha).

AGED MANURE



INVERSION



CHISEL PLOUGH



ACTIVE MIX



DEEP RIP



Sowing details: A ribbed roller was used to firm the surface of all tillage plots prior to planting a mixed species pasture on 27th May, comprised of 30kg/ha cereal rye, 30 kg/ha vetch, 2 kg/ha grazing brassica and 1 kg/ha of Balansa clover.

Measurements: Normalised difference vegetation index was measured with a Trimble Greenseeker by recording 5 transects across the dune crest in each plot on 19 July. Dry matter was assessed on 8 September by harvesting 2x0.25m² quadrats to ground level in 12 locations per treatment. A second biomass assessment was conducted on 2 November (following recovery after grazing) by harvesting 12 x 0.5m² quadrats. Subsamples were retained for moisture and quality assessment.

YEAR 1 RESULTS

Penetration resistance (PR) is a measure of soil strength, indicating the presence of compacted or hard set soils. Plant root growth is restricted in soils with high strength, particularly when the PR exceeds 2,500 kilopascals (kPa; black dotted line, Figure 1).

- PR in the No tillage control showed soil strength increasing down the profile from moderate to severe, exceeding 2,500 kPa below 35cm (grey line, Figure 1).
- Inverting the soil with the one-way plough reduced the PR in the profile to 40cm.
- Chisel ploughing the soil with the Bednar Terraland reduced the PR throughout the top 50 cm of soil; both tines had the same impact on reducing PR.

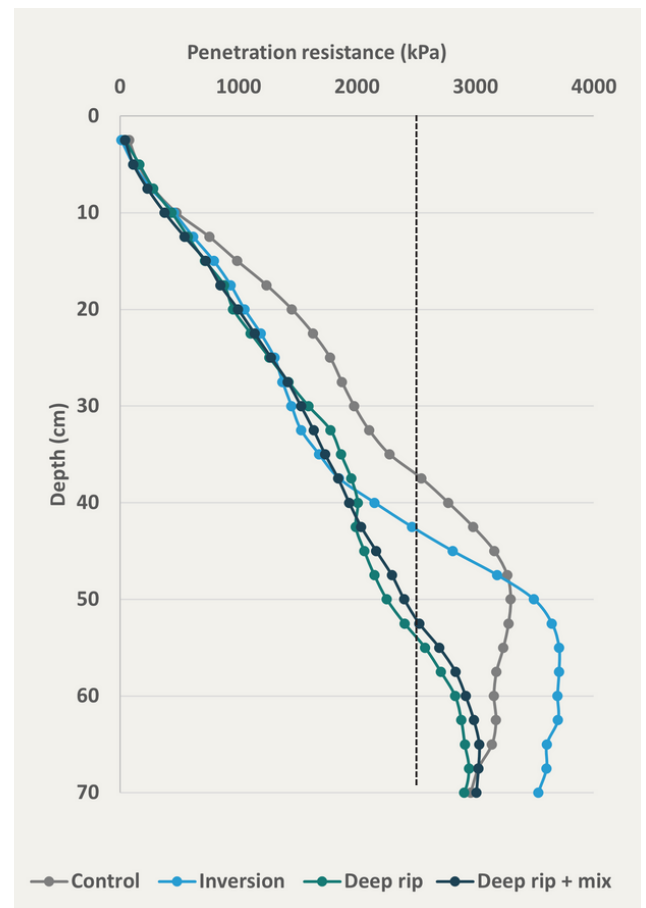


Figure 1. Penetration resistance (kPa) measured in 2022 for each deep tillage type.

Table 1. 2022 production measures: Normalised Difference Vegetation Index (NDVI); dry matter (DM; t/ha) in September; DM in November, following recovery from grazing; dry matter digestibility (DMD); crude protein (CP); metabolisable energy (ME). Treatments with the same letter are not significantly different.

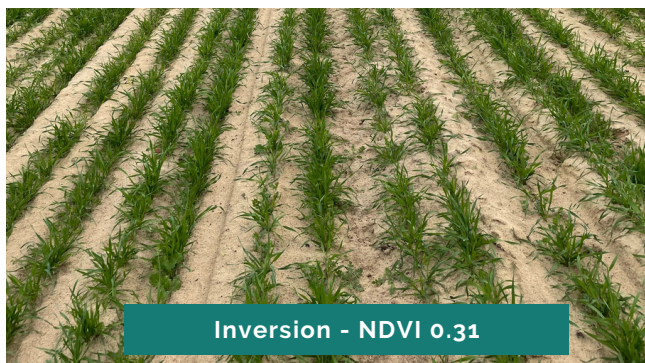
Treatment	NDVI July	DM t/ha September	DM t/ha November	DMD %	CP %	ME MJ/kg
No tillage	0.37 b	1.48 f	4.19 cd	52.6	8.7	7.4
Deep rip + mix	0.31 b	1.36 f	6.55 a	51.4	9.0	7.2
Deep rip + mix + manure	0.49 a	3.66 b	7.23 a	58.1	11.1	8.4
No tillage + manure	0.36 b	1.66 ef	3.63 de	54.5	9.8	7.8
No tillage (control)	0.31 b	1.40 f	3.19 e	62.9	11.3	9.2
Inversion	0.31 b	2.16 de	4.56 bc	63.6	13.0	9.3
Inversion + manure	0.46 a	4.09 ab	6.59 a	53.9	10.6	7.7
Deep rip + manure	0.49 a	4.35 a	5.34 b	59.6	12.5	8.6
Deep rip	0.44 a	2.98 c	3.47 de	61.0	12.5	8.9
No tillage	0.30 b	2.56 cd	3.14 e	61.8	12.2	9.0
LSD (p=0.05)	0.065	0.47	0.34	-	-	-

YEAR 1 RESULTS

Normalised difference vegetation index (NDVI) results indicated enhanced growth in all of the manure treatments in July, but only when combined with deep tillage (Table 1 and photos at right). Deep rip was the only deep tillage treatment that performed better than the three controls in the absence of manure.

Dry matter (DM) measured in September also showed the three deep tillage + manure treatments to be the highest yielding, adding between 1.8 and 2.5 t/ha of additional DM above the average of the three controls (1.8 t/ha; Table 1).

The pasture recovered well from grazing, owing to high spring rainfall. The cereal rye was at early grain fill when DM was assessed in early November. The Deep rip + mix +/- manure treatments were the highest producing at this sampling time, yielding >6.5 t/ha of DM (3 t/ha more than the average of the three controls = 3.5 t/ha). This additional yield often came at the expense of dry matter digestibility, but there were no consistent trends in crude protein or metabolisable energy (Table 1).



WHERE TO NEXT?

- The cereal rye will be harvested for seed and the stubble will be slashed and possibly grazed over the summer.
- The paddock will likely be sown to an annual fodder crop in 2023; soil and pasture monitoring will continue.

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