

Farm Net Zero: Over winter grazing at Ennis Barton, Blable and Tregooden Farms

Overview

Short term grazed cover crops are a valuable tool to provide additional forage for out-wintering stock. These covers are usually sown in late summer and are strip or paddock grazed mid-winter or early spring.

This additional forage increases the economic resilience of the livestock system but how can it be optimised in terms of reducing carbon emissions and maintaining soil health?

Three Farm Net Zero farmers have come together to design a grazing trial to test whether an increased species diversity can:

- Maintain soil structure
- Provide forage of high yield and quality
- Enable direct drilling post-grazing

On farm set-up

Two demonstration farms and one monitor farm have been supplied with 4 seed mixtures from South West Seeds, which will be compared to the farmers' 'control' mixture. The seed was sown in September 2021, with trials established in either of two possible layouts shown in Figure 1.

The trial plots were assessed for soil structure, worm numbers, aggregate stability, forage quality and grazing preference in January 2022. The results are outlined overleaf.

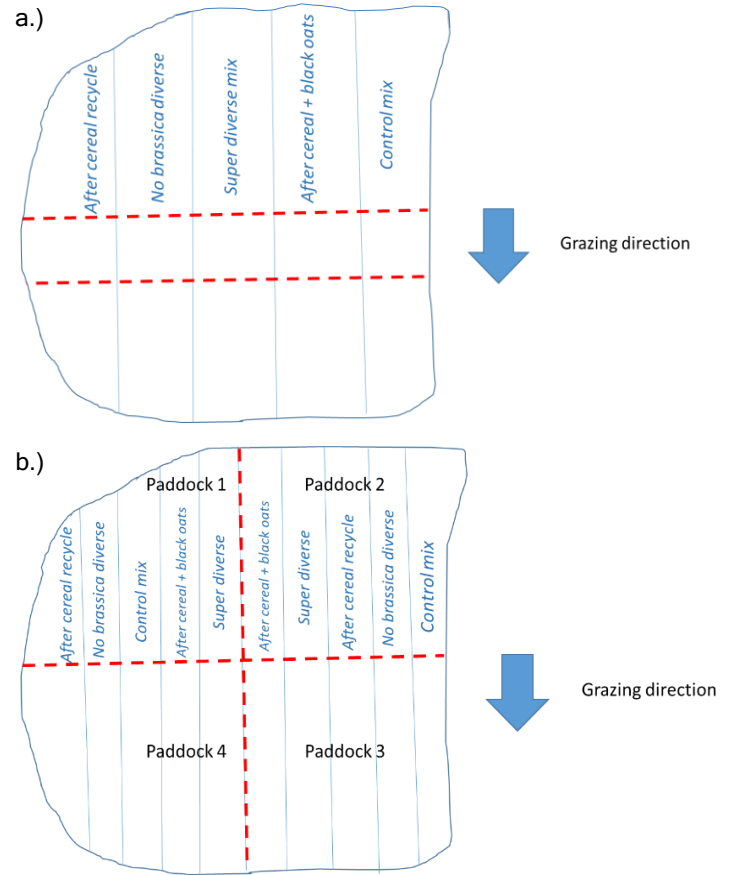


Figure 1: Trial design in a (a) strip system or a (b) paddock system. The red lines indicate the fencing at one particular time point to provide a grazing wedge. The grazing direction is shown by an arrow.

After cereal recycle	After cereal recycle + black oats	Super diverse	No brassica diverse
Winter vetch	Winter vetch	Winter vetch	Winter vetch
Rye	Rye	Rye	Forage rye
Phacelia	Phacelia	Phacelia	Phacelia
	Black oats	Black oats	Black oats
	Forage rape	Daikon radish	Italian ryegrass blend
	Stubble turnip	Brown mustard	Red clover
		Forage rape	
		Stubble turnip	
		Italian ryegrass blend	
		Red clover	

Table 1: The four trial seed mixtures provided by South West Seeds.

Results

Visual Evaluation of Soil Structure

The inclusion of brassicas had a significant and positive effect on the soil structure in the top 10 cm of soil.

No effect was detected at plough depth of about 30 cm.



Active root nodules in winter vetch

Worm Numbers

The super diverse and non-brassica diverse mixtures had significantly more worms compared to the cereal or the stubble turnip mixtures. This effect would be a consequence of worm movement, rather than a very short-term multiplication in worm numbers.



Aggregate Stability (slaking test)

There was no significant difference in aggregate stability across treatments. However, this should be repeated over more fields because early indications suggest diversity may be beneficial.

Black oats had a tendency to increase the yield of cereal recycle mixture over the farms, and was noted to provide a suitable 'nurse crop' for other species. However, the black oats had a tendency to dilute protein in the feed ration.



Cereal recycle mixture with (left) and without (right) black oats

Diverse mixtures compared to all other treatments did not indicate any clear trends in ration.



Diverse mixture with brassicas

Grazing preference was observed to be for the black oats, followed by stubble turnips. Sugars were higher when black oats were included, which may have influenced choice.



What will be the effect on the carbon footprint?

The trial plots had soil organic matter levels recorded at the beginning of the trials in 2021. The story does not end here because the three farmers involved will be looking at how to best establish the following crop, and some will be trialling more than one method for cultivation and drilling. By following the yield, fuel use, soil health and soil organic matter over multiple years, we will be able to model potential carbon savings, as well as changes to Key Performance Indicators for each cover crop option.

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Previous Crop	Seed mix	FW (t/ha)	Dry Matter (g/kg)	Crude Protein (g/kg)	NDF (g/kg)	Ash (g/kg)	M.E. (MJ/kg)	Oil-A (g/kg)	Sugar (g/kg)	Nitrate Nitrogen (%)	D Value (%)
Cereal	Super diverse mix	42.20	112	140	417	118	10.9	23	55	0.14	69.5
Cereal	After cereal recycle	22.54	114	157	198	115	10.8	27	55	0.22	68.7
Cereal	After cereal recycle + black oats	47.33	136	90	496	114	10.4	15	103	0.12	65.9
Cereal	No brassica diverse mix	21.45	132	197	481	92	10.4	28	82	0.12	66.5
Potatoes	After cereal recycle + black oats	44.48	112	150	215	118	11.4	27	114	0.27	72.6
Potatoes	Farmers' own: stubble turnips + berseem clover	54.99	132	251	350	91	10.8	32	65	0.15	68.6
Potatoes	After cereal recycle	33.50	148	232	386	92	10.7	28	67	0.15	67.8
Potatoes	Farmers' own: ryegrass mix	15.26	155	232	462	88	10.6	26	92	0.05	67.3
Potatoes	Farmers' own: drought-buster deep rooting grass	20.44	156	214	502	92	10.0	23	86	0.07	63.9