Farm Net Zero:
Grazed winter cover crops

Overview

Outwintering livestock is one potential option for livestock producers. The challenge involves selection of suitable animal genetics with the environment. The environment needs to incorporate the type of soil and grazing management in addition to forage yield and quality.

Paddock grazing with frequent movement of stock reduces the impact of the animals on soil quality. The land however must lend itself to outwintering, very heavy land is unsuitable.

Forage may be in the form of deferred grazing, where leys are shut up in late summer and forage 'stored' until required in the winter. Alternatively, specific crops may be grown for outwintering, with stubble turnips and rape/kale common choices. However, based on the principles of increasing farm diversity, there may be opportunities to increase the number of species in forage mixtures. A greater diversity may provide a better ration, increase resilience to pests, disease and climate variability, and can support soil and livestock health, thereby reducing on-farm greenhouse gas emissions.

Key criteria to assess on farm are livestock growth rate, forage yield, and seed costs. This fact sheet focuses on seed selection and cost.

Mixture selection

The seed mixtures were selected by Mike Roberts at Blable Farm in consultation with seed suppliers. Four mixtures were chosen, to span simple to complex mixtures, and variable in price.

	Mix1		Mix 2		Mix 3		Mix 4
1.30kg	Berseem clover	*1.8kg*	Berseem clover	*1.0kg*	Berseem clover	*1.0kg*	Berseem clover
4.2kg	Beta- Vetch-Pannonic	*5.5kg*	Beta-Vetches-Pannonic	*1.25kg*	Crimson clover	*1.25kg*	Crimson clover
0.3kg	Inka Kale	*13.7kg*	Forage Rye	*1.0kg*	Fodder radish	*1.0kg*	Fodder radish
0.8kg	Bale Phacelia			*1.0kg*	Daikon radish	*1.0kg*	Daikon radish
10.5kg	Forage Rye			*5.0kg*	Winter vetch	*5.0kg*	Winter vetch
0.4kg	Forage Rape			*5.0kg*	Common vetch	*5.0kg*	Common vetch
				0.6kg	Forage rape	*0.6kg*	Forage rape
				0.4kg	Kale Blend	*0.4kg*	Kale Blend
				7.0kg	Oats	*7.0kg*	Oats
				1.0kg	Sunflower blend	*1.0kg*	Sunflower blend
						7.0kg	Forage Rye
						4.0kg	Linseed
						0.5kg	Quinoa
	20 kg/acre 49 kg/ha £50/acre		13 kg/acre 32 kg/ha £57/acre		20 kg/acre 49 kg/ha £44/acre		29 kg/acre 72 kg/ha £59/acre

Trial design

The four mixtures were grown in one field (*Lower Henry's*) in strips, and also grown separately in an additional one field each.

Methods of establishment varied:

Lower Henry's Field: Direct drilled on the 24th August, previously whole crop, all mixes trialled in strips

Outer Down Field: Grass disced three times in June, Mix 3 sown with a power harrow and drill combination on the 22nd August

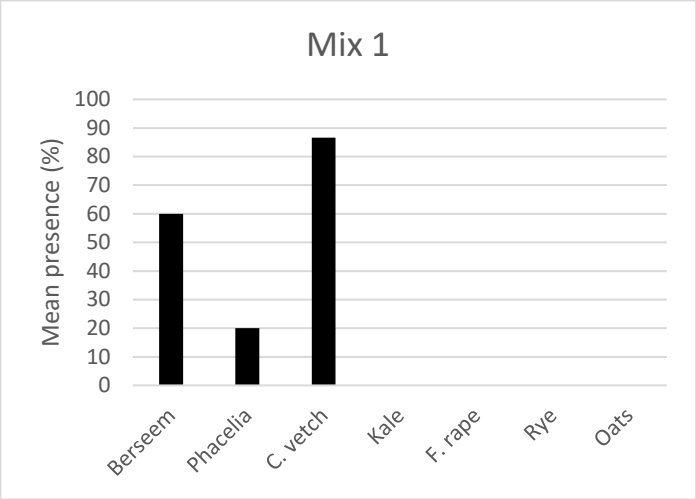
Falmouth Park & Barn Park Fields: Grass disced three times in June, Mix 4 sown with a power harrow and drill combination on the 22nd August

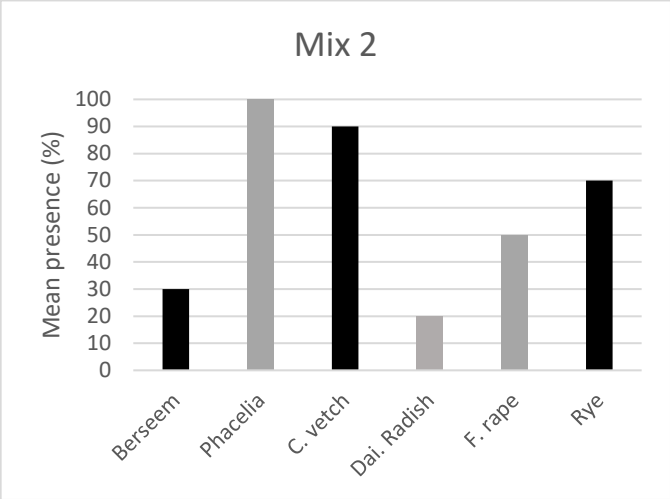
Well Park Field: Mix 2 direct drilled on the 22nd August, previously whole crop.

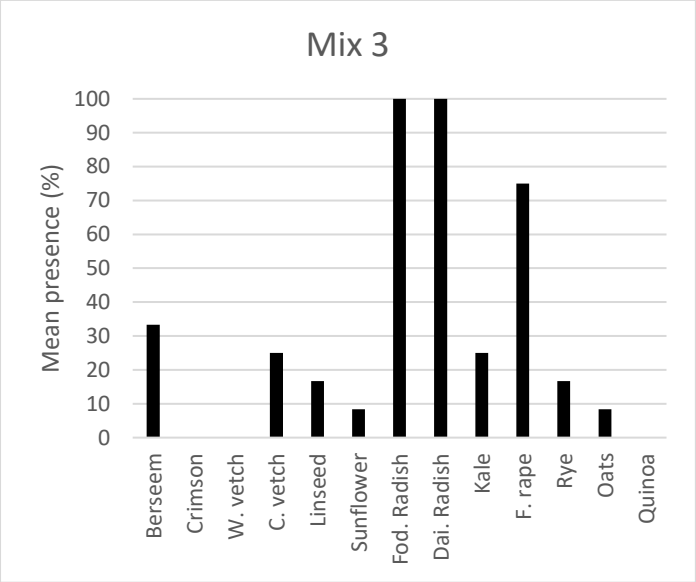
Above Sue's Field: Mix 1 direct drilled on the 22nd August, previously grass

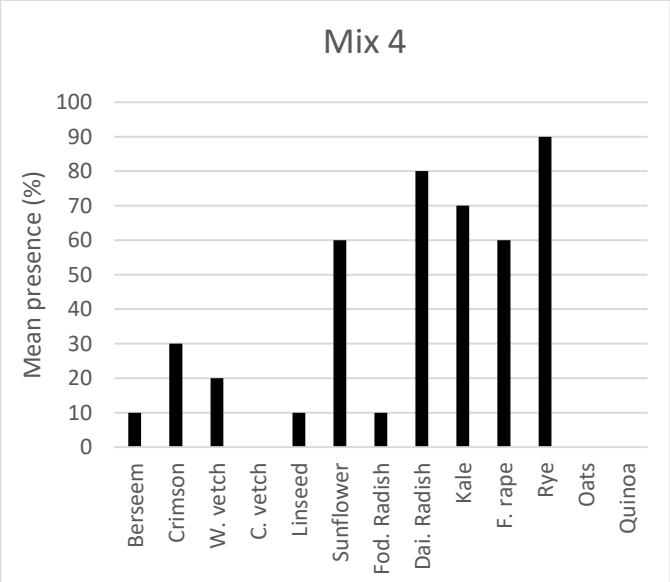
Backdoor Field: Mix 1 direct drilled on the 22nd August, previously whole crop

Species Presence









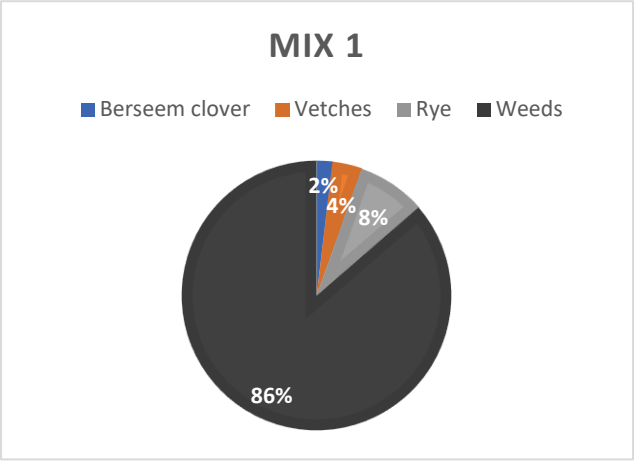
The four mixes were grown in two fields each. The species presence in 5 quadrats per field was recorded: a 100% presence indicates that the species was in all 5 quadrats for both fields. The bars in grey highlight species that were recorded but were not bought in the seed mix. Key findings:

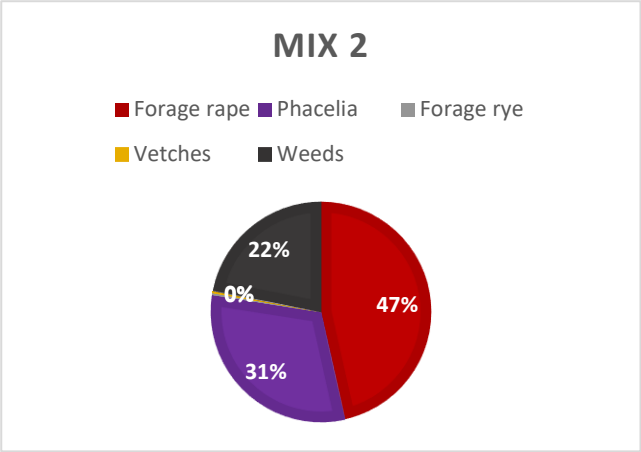
- Daikon radish was the most reliable species in terms of presence
- Fodder radish was reliable in simpler Mix 3 compared to Mix 4
- Kale had a variable performance: in Mix 1 it was not recorded, but it was present in Mixes 3 and 4
- Forage rape was reliable in Mixes 3 and 4
- Vetches (winter and/or common) were present in all mixes in which they were sown
- Berseem, linseed and sunflowers were reliably present when sown
- Species which were commonly absent were: oats, crimson clover, and quinoa

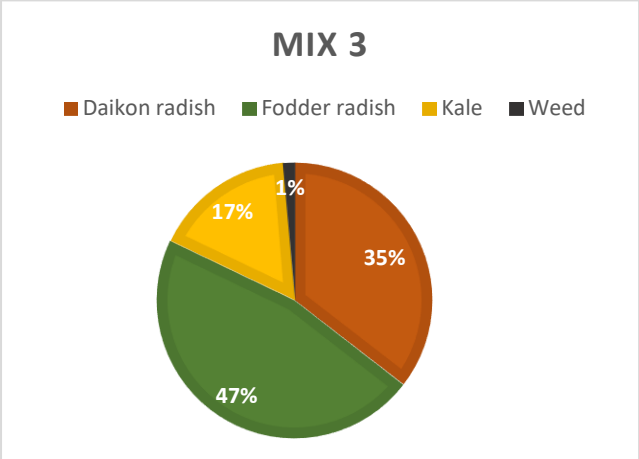
Fresh Weight Biomass

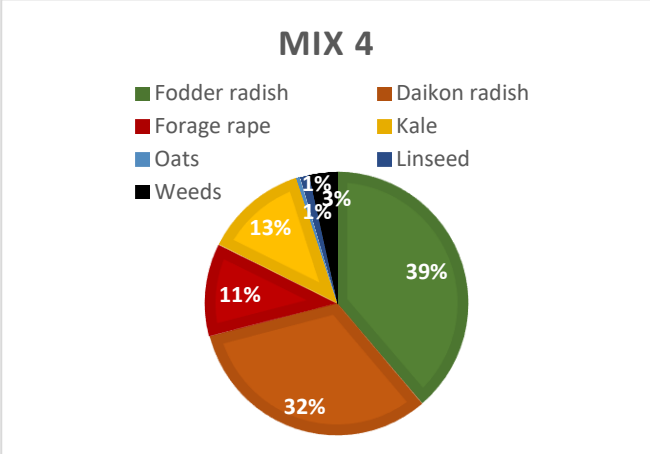
Total fresh weight for each species in each mix was recorded from a 0.25m^2 quadrat

- Mixtures containing brassica species (kale, forage rape, daikon and fodder radish) tended to be more competitive against the weeds.
- Daikon radish, and fodder radish had the greatest fresh weight contributions when sown (Mix 3: 83%; Mix 4: 71%).
- Forage rape and kale provided 24% of the fresh weight biomass in Mix 4
- Phacelia comprised 31% of the fresh weight biomass in Mix 2.









Dry Weight Biomass

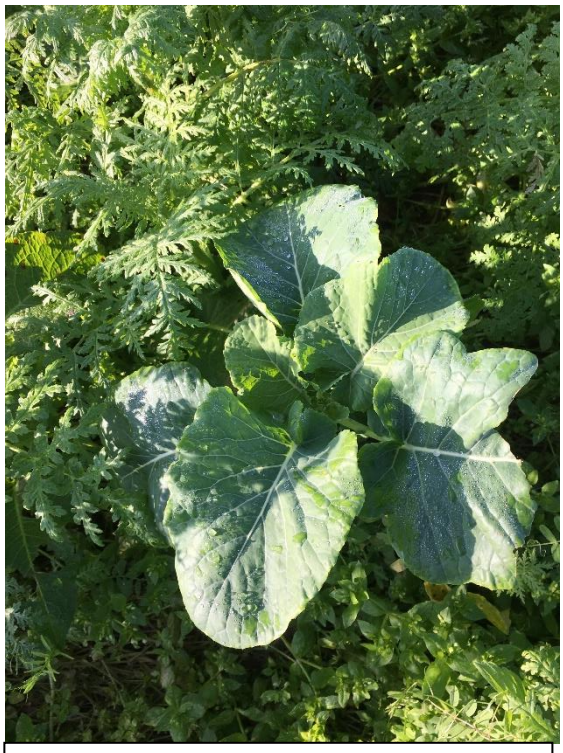
Species	Fresh weight (g)	Dry weight (g)
Linseed	109.7	29.0
Fodder radish	379.5	37.9
Daikon radish	614.9	37.7
Sunflower	261.8	28.2
Vetch	162.1	23.3
Forage rape	360.5	42.9
Phacelia	297.0	26.7
Rye	246.9	45.9
Kale	203.6	25.9
Berseem clover	142.9	18.5

Influence on carbon footprint

Outwintering cattle saves money for the farm business, mainly through reductions in fuel and livestock feed use. These savings also benefit the farm's carbon footprint.
The following table outlines a comparison of housing versus outwintering for 94 weaned calves at Blable.

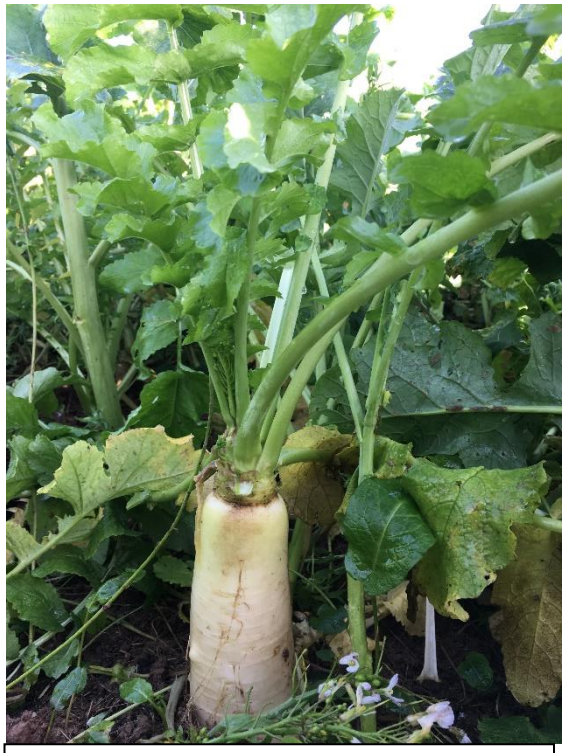
	Outwintered		**Housed**	
Activity	**Quantity**	**tCO_2e***	**Quantity**	**tCO_2e***
Crop establishment	30 hectares direct drilled	2.03	N/A	N/A
Bales	18 tonnes hay (60 bales)	4.50	173 tonnes silage (346 bales)	43.25
Bedding	N/A	N/A	200 tonnes greenwaste compost	4.98
Yardwork (feeding/bdding/scraping/eventual muckout)	N/A	N/A	1000 litres red diesel	3.39
Total	**N/A**	**6.53**	**N/A**	**51.62**

*Based on data from the Farm Carbon Calculator.

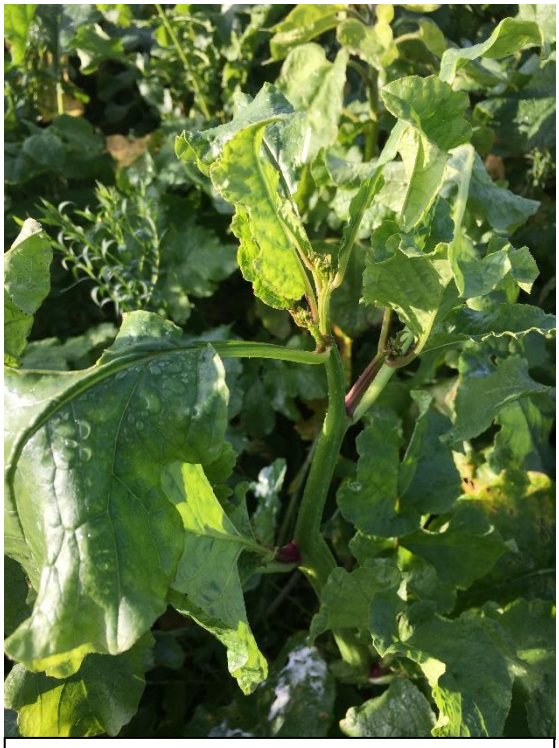


Kale: Smooth leaf edges, particularly on young leaves.

Forage rape: Wavy, toothed leaf edges with possible division mid-leaf.



Daikon radish: Multiple leaflets along the stem, large white 'bulb'.

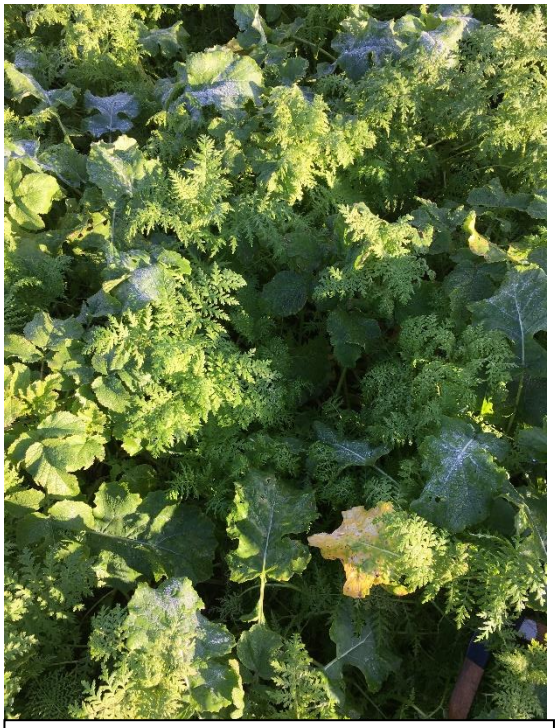


Fodder radish: Wavy, rough, hairy leaves sometimes with a very small 'bulb'.

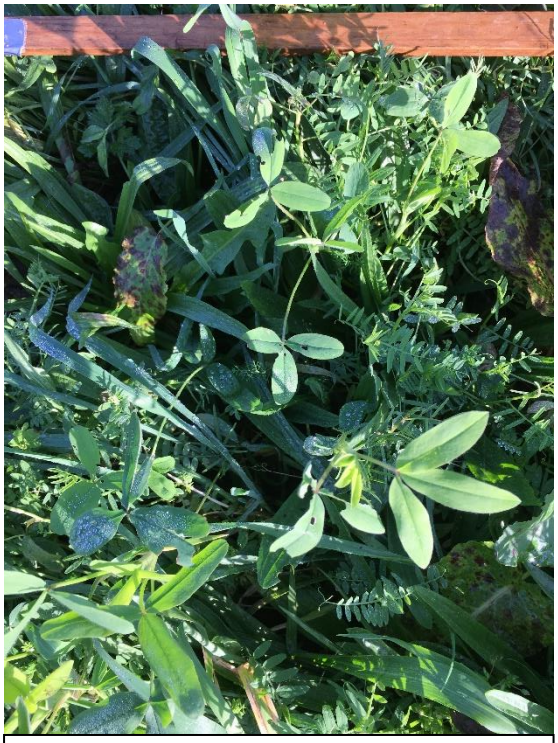
Sunflower: Rough leaves, no leaflets

Winter vetch (left): Small leaves.
Common vetch (right): Large leaf and tendrils

Linseed: Small leaves, wiry stemmed



Phacelia: Soft feathery leaves



Berseem clover: Soft upright growth, elongated leaflets

Rye: Cereal with awns

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