Forage legumes for a cool climate

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Legumes Translated

This note considers the yield and quality of a range of alternative legume-based forages grown under cool wet temperate climate conditions in Scotland.

Changing consumer expectations of farming is providing opportunities for more local and sustainable protein sourcing for livestock feed, especially in the dairy industry. We have demonstrated that crimson clover (*Trifolium incarnatum*), red clover (*Trifolium pratens*), pea (*Pisum sativum*), lupin (*Lupinus angustifolius*), pea/barley, and lupin/barley mixtures can be successfully grown in a cool wet temperate climate. Red clover was highest yielding with a similar protein content compared to the other legume options and grass-clover mixtures.

Alternative forages can be grown in a cool wet climate and produce similar yield and forage protein quality, including as silage, as a typical grass white clover mixture.

Protein from alternative forages

Increasing on-farm plant protein production addresses emerging consumer expectations. Producing more high-protein forage reduces reliance on imported protein sources. This reduces the carbon footprint of the feed and reduces the impact of fluctuations in the price of imported feeds, e.g., soya from South America.

- Demonstration plots of alternative forages were grown and harvested in a cool wet temperate climate in Scotland to support discussion with farmers and industry stakeholders.
- Plots were sown in early May and harvested in early August.
- Red clover, a red clover/grass mixture, lupin and a lupin/barley mixture, forage pea, a forage pea/barley mixture and crimson clover were grown in plots (3 m x 10 m) and compared with a perennial ryegrass/white clover mixture.

Pea and barley mixture. Photograph: Jennifer Flockhart

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- Initial measurements of dry matter (DM) showed that the pea/barley mixture produced 8 t/ha, the lupin/barley mixture provided 7.3 t/ha, compared to the ryegrass/white clover at 3.8 t/ha.
- The red clover mixture had the highest crude protein content (17.7%) compared to the grass/white clover (16.9%) and pea (16.1%).
- Metabolisable energy (ME) level was highest for the pea and the grass white clover (10.5 MJ/kg DM) while the red clover (10.3 g/kg DM), crimson clover (10.2 MJ/kg DM) and lupin (10.2 MJ/kg DM) were very similar.

Silage quality

Sub-samples of the fresh cut material were compressed into 3 litre plastic air-tight containers and ensiled for 5 weeks. These were then analysed for feed quality.

- The silage analysis showed the pea, pea/barley and the lupin/barley mixtures gave the greater DM contents (g/kg).
- The crude protein content of the lupin (19.2%) and red clover mixture (19.6%) were most similar to ryegrass/white clover (20.8%).
- The protein content of the crimson and red clover, at 18%, were close to the lupin (19.2%) and red clover mixture (19.6%).
- The ME content of the lupin provided just over 10 MJ of ME/kg DM compared to the grass and white clover that provided 11 MJ of ME/kg DM.
- The barley in pea/barley and the lupin/barley mixtures increased the metabolisable energy of the silages.

Blue lupin. Photograph: Jennifer Flockhart

Table 1. Dry matter (DM), crude protein and metabolisable energy contents of the silages

	Dry matter (g/kg)	Crude protein (%)	ME (MJ/kg DM)
Grass and white clover mix	115	20.8	11.2
Red clover	116	17.9	10.8
Red clover mix	121	19.6	10.8
Crimson clover	122	18.1	9.1
Pea	148	12.3	10.0
Pea and barley	173	12.9	9.0
Lupin	117	19.2	10.2
Lupin and barley	158	12.7	9.1

Key practice points

- Alternative forage crops can be grown successfully in a cool wet temperate climate.
- Forage yield, protein content and metabolisable energy levels can be maintained with most of the alternative crops.
- The grass/clover and clover swards are harvested several times through the growing season.
- The legumes fix nitrogen that is available to subsequent crops. This has been estimated to be 150 to 250 kg N/ha for red clover compared to 80 to 100 kg N/ha for white clover.

The demonstration plots. Photograph: Jennifer Flockhart

Sources

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