Alternative species

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Options, costs and benefits of pasture species alternative to perennial ryegrass-white clover

- Options have been widened to include possible crops
- Costs are not discussed in detail because they are so dependent on the farm system implemented
- Benefits have been calculated by a mainly subjective scoring system to allow a preliminary ranking of species

Subjective scoring system

Factor	Score = 1	Score = 2	Score = 3
Yield potential	0-9.9 t DM/ha/yr	10-19.9 t DM/ha/yr	20-29.9 t DM/ha/yr
Capacity to limit environmental damage	Worse than PRG-C	Similar to PRG-C	Better than PRG-C
Flexibility of use	Less flexible than PRG-C	Similar to PRG-C	Not applicable
Agronomic support	Less than for PGR-C	Similar to PRG-C	Not applicable

- To score a maximum of 10 a species (or combination of species) must: yield >20 t DM/ha/yr;
  have a greater capacity than PRG-C to limit environmental damage;
  and have the same flexibility of use and agronomic support as PRG-C
- In effect this means a species that can be grazed 12-20 times per year and has a significantly lower crude protein content than PRG-C

Grasses – subjective scores

Species (+clover)	Yield	Limit environmental impact	Flexibility	Agronomic support	TOTAL SCORE
Ryegrass	2	2	2	2	8
Tall fescue	2	2	2	2	8
Italian ryegrass (-clover)	2	2	1	2	7
Cocksfoot	2	2	2	1	7
Prairie grass	2	2	2	1	7
Timothy	2	2	2	1	7
Phalaris	2	2	2	1	7
Yorkshire fog	2	2	2	1	7

Legumes – subjective scores

Species	Yield	Limit environmental impact	Flexibility	Agronomic support	TOTAL SCORE
Lucerne	2	3	1	2	8
Red clover	2	2	1	1	6
Lotus corniculatus	1	3	1	1	6
Persian clover	1	2	1	1	5
Balansa clover	1	2	1	1	5

Herbs – subjective scores

Species	Yield	Limit environmental impact	Flexibility	Agronomic support	TOTAL SCORE
Chicory	2	3	1	2	8
Plantain	2	2	2	2	8

Cereal crops – subjective scores

Species	Yield	Limit environmental impact	Flexibility	Agronomic support	TOTAL SCORE
Maize	3	2	1	2	8
Oats	2	3	1	2	8
Barley	2	2	1	2	7
Wheat	2	2	1	2	7
Triticale	2	2	1	2	7
Sorghum	3	2	1	1	7
Japanese millet	2	2	1	1	6
Sunflower	2	2	1	1	6

Brassica/root crops – subjective scores

Species	Yield	Limit environmental impact	Flexibility	Agronomic support	TOTAL SCORE
Fodder beet	3	1	1	2	7
Bulb turnip	2	2	1	2	7
Forage rape	2	2	1	2	7
Leafy turnip	1	2	1	2	6
Kale	2	1	1	2	6
Swedes	2	1	1	2	6

Summary – Species score = 8

Species (+clover)	Yield	Limit environmental impact	Flexibility	Agronomic support	TOTAL SCORE
Ryegrass	2	2	2	2	8
Tall fescue	2	2	2	2	8
Lucerne	2	3	1	2	8
Chicory	2	3	1	2	8
Plantain	2	2	2	2	8
Maize	3	2	1	2	8
Oats	2	3	1	2	8

- These seven species can form the basis of feasible farm systems.

Other species could replace some of these, e.g. Italian ryegrass for oats, or bulb turnips for chicory.

Logic behind scores for species with highest scores

- *Tall fescue* similar to ryegrass but would not be recommended in place of ryegrass unless persistence of the latter was a problem
- *Lucerne* better than ryegrass for environmental impact. Lends itself to a conserved-feed pad system (so manure N can be captured), but not able to be grazed easily.
- *Chicory* not grazed in the winter so less urine return, but therefore less flexible
- *Plantain* – similar attributes to ryegrass
- *Maize* – out yields ryegrass but can only be conserved so less flexible. Has pros and cons for environmental impact
- *Oats* – not grazed in winter. Can remove winter soil nitrate, but only if conserved as silage in late spring.

Best options for further systems analysis

- Status quo – grazed PRG-C with management interventions to mitigate excessive N use and N, P and sediment losses
- Perennial ryegrass – white clover with *chicory* or *plantain*, but only with lower N input and/or urine capture on standoff.
- Perennial ryegrass – white clover with *Lucerne* as a perennial crop to provide silage for off-paddock (or off-catchment) facility.
- Perennial ryegrass – white clover with *maize* silage in an off-paddock facility. Further option of winter-spring *oats* for silage.

Scope for trials?

- The major need is to analyse the 4 options and others for on-farm feasibility. Look at farmers (ideally in catchment) already using these options and then model economic and environmental outcomes.
- No need to investigate most alternative species – we have lots of information.
- Some more in-depth investigation of Lucerne and maize may needed. N balance of ryegrass-white clover and pure Lucerne paddocks in whole systems. Ways to grow maize to capture yield potential and effluent usage without environmental impact of full cultivation.

Conclusions

- Good news – we have the agronomic and farm systems knowledge to put each of the 4 options in place – some analysis needed.
- Bad news – there are no ‘miracle’ species that currently solve the economic-environmental conundrum