

Alternative forage options

Whilst grassland will continue as the mainstay of a sustainable livestock farming industry, there's no doubt that a significant and increasing contribution is being made by alternative forage crops.

In all cases, whether for grazing or cutting, new forage options now available add to the productivity of livestock farms, by helping overcome some of the potential shortcomings of livestock farming systems – in many cases exacerbated by the effects of climate change.

Consider alternatives for grazing:

- White clover; perhaps more of a mainstay than an alternative these days, white clover is grown as a companion species to ryegrass and contributes in the region of 150 – 250 kgN/ha through nitrogen fixation. It is also beneficial in terms of soil structure and provides high protein quality forage.
- Puna II perennial chicory; this herbaceous deep rooted plant is another grazing option that is usually grown as a companion species with grass and white clover, but may also be grown as a stand-alone grazing crop. Its deep-rooting characteristics make it tolerant to drought and a rich source of nutrients.
- Forage brassicas; new hybrid brassica varieties such as Swift or Redstart are being used increasingly to fill summer grazing gaps or provide quality grazing for out-wintering. Kale varieties such as Maris Kestrel also offer high quality autumn or winter grazing options.



Swift hybrid brassica is a valuable alternative forage.

Consider alternatives for cutting:

- Red clover; a significant source of homegrown protein with the same nitrogen-fixing capabilities as white clover (up to 250 kgN/ha). Red clover will typically produce three cuts of quality silage plus late aftermath grazing, either grown as a stand-alone crop or more usually in combination with hybrid ryegrass. New longer-lasting varieties (e.g. AberClaret) now offer 4 – 5 years duration, making the crop suitable as a medium term ley when grown in combination with compatible perennial ryegrasses.
- Lucerne; another nitrogen-fixing legume, lucerne is almost always grown as a stand-alone crop for cutting, but it does have some grazing potential. Select a modern hybrid with a suitable winter dormancy rating for UK conditions (such as Timbale, winter dormancy 4.4).



Long lasting red clover trials, IBERS.



The K-Line sprinkler pod line in place at Humbleton, demonstrating a potential low cost, low input solution to short term grassland irrigation. The K-line equipment was supplied and demonstrated by Wroot Water working in partnership with Connicks Ltd.



The K-line system being demonstrated in action at Humbleton, supplied by Wroot Water in partnership with Connicks Ltd.

Cheviot Futures Practical Demonstrations

On 13th May 2013, Cheviot Futures hosted a practical demonstration event in partnership with Catchment Sensitive Farming to showcase the equipment available and the benefits to be realised through a proactive approach to grassland management.

The event, held at **Rams Haugh, Park House, Harbottle** by kind permission of Jilly and Mark Woolston-Houshold, Rural Partners Ltd and Robert Mackay, was very well attended and promoted a great deal of discussion. In total, 78 people attended the event which comprised a practical demonstration of six separate pieces of equipment.

The equipment being demonstrated on site included the Ritchie aerator, provided by Carrs Billington Agriculture, the Opico Sward Slitter and McConnell Shakaerator, both provided by Rickerby's. Representatives from Carrs Billington, Rickerby's, Ritchie, Opico and McConnell were all on hand to explain the merits of the equipment, and to offer advice and guidance on the practical application of the techniques being showcased.

In addition, equipment was also demonstrated by local contractors offering grassland management services – Silvermoor Haylage with a customised machine and Paul and James Drummond with the Ritchie Actisol.

On 6th August 2013, Cheviot Futures hosted a practical demonstration event in partnership with Catchment

Sensitive Farming to consider the role of sustainable water management in climate change resilience.

The event offered an opportunity in particular to showcase the innovative K-line sprinkler pod irrigation system. Used extensively in New Zealand, this system is now available to farmers in the UK thanks to Wroot Water and Connicks Consultants, and may be of assistance to farms with issues of drought stress in grass swards.

The event was held at **The Fenton Centre/ West Fenton Farm and Humbleton Farm, Wooler**, by kind permission of Simon

Henderson and Jim Short, and headlined a practical demonstration of the K-line system in action as a low input, low cost, low maintenance option for small scale irrigation of grassland. A total of 18 people attended the event and discussion throughout the day was lively and diverse.



The K-line system can be used to supply irrigation to a larger area by moving the lines with a quad bike on a rotational basis.



Grassland Management and Climate Change Resilience

The management of grassland resources has a huge, often underestimated, role to play in maximising the resilience of the farmed landscape to the effects of climate change.

Permanent pasture in particular offers a significant carbon sink, and integrating long term grass leys into a rotational system offers benefits of resource protection as well as soil profile improvement – through additional organic matter content and associated increase in soil microbial activity and larger soil fauna.

Management of grassland also offers benefits to the management of surface water and problematic runoff. Increased vegetative cover on fields assists the slowing down of surface water runoff, reducing the risk of soil losses and erosion, and associated nutrient leaching to watercourses. By maximising the water retention of grassland, grass growth and livestock are better placed to deal with drought conditions.

Relevant climate change effects and their impacts on grassland management

- Reduced summer rainfall and increased temperatures
 - Increased stress to swards – drought stress; burn off
 - Reduced palatability and nutritional value for stock
- Increased CO2 concentrations
 - May enhance primary production but could lead to changes in leaf:stems ratio, reduced nitrogen and increased fibre content; reduced feed quality and digestibility; limited liveweight gain
 - Fertilisation effect linked to increased CO2 in the atmosphere generally, which may stimulate herbage production – potential for 10-20% increase for the same nitrogen fertiliser in an average year in 2025 – 2035; however this may equally be offset by summer drought conditions.
- Increased winter rainfall and more extreme weather events
 - Waterlogged ground, increased incidence and coverage of rushes
 - Poaching and compaction

- Reduced soil moisture holding capacity; compaction limiting potential further
- Degraded soil structure
- Reduced infiltration and associated increase in surface water

Suggested adaptation and resilience measures applicable to grassland management

- Integrate long-rooted drought tolerant grass species into the sward composition
- Research currently underway regarding effectiveness of a Ryegrass-Fescue hybrid variety to maximise productivity and resilience traits in grassland
- Consider alternative forage crops more suited to dry conditions – e.g. Sainfoin, Lucerne
- Soil assessment and testing – a regular programme to assess soil profile for compaction problems as well as testing for nutrient status. Checking for compaction will inform whether there is an issue to address, and if so, what the most suitable treatment method is likely to be. Testing nutrient status allows for effective nutrient management planning, allowing efficient use of organic and inorganic fertiliser inputs as well as ensuring mineral levels are suitable for maximising productivity of grazing livestock
- Take a proactive approach to grassland management – utilise aeration and/or sward lifting equipment and techniques to alleviate compaction issues; maximise infiltration of water resources and thereby reducing surface water runoff and the associated problems of flooding, soil erosion and nutrient losses.



Event attendees discuss the value of proactive management of grassland resources to manage soil and grassland productivity, reduce diffuse pollution and manage surface water runoff, and the importance of making regular assessments and testing of soil resources.

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Get Digging!

The most important tool in the farm shed remains the humble spade! By taking a proactive approach to soil assessment, it is possible to identify issues such as compaction and problems with water retention and movement through the soil profile ahead of there being significant impacts on productivity. All by digging a soil pit, as James Bretherton of AgScope explains:

Using a spade is key to understanding a soil and its structure as well as function, and there is no need to dig too deep for this type of assessment, for example the type of hole I dig is usually 30 cm square by 20-25 cm deep (8-10 inch), at this type of depth I get a good indication of what is happening in the root zone, and the area of the soil that is key to some extent to crop production.

Pull up the sod and look firstly for any surface compaction, i.e water may be trapped in the surface of the soil, and if that's happening then air also may not be passing through this zone, and this is key to soil function, then smell the soil, if it has a nice soil aroma this is a good sign of good soil function and microbial activity, if it smells sour and stagnant this means the soil could be anaerobic and struggling to function.

Worms are also a very good indicator of soil function the target amount in a soil pit of this size is 6 plus, (be mindful if the weather is hot at the time



The value of the humble spade should not be under estimated! Digging soil pits allows an assessment of the structure of the soil and can identify compaction and other issues affecting productivity and water management.

of digging they may have gone deep), and ideally you should see a mixture of small and big worms (young and old), if there are no worms in the soil then it could be due to the lack of air in a soil because of compaction if this is the case look at methods to reintroduce air.

Digging soil with a spade helps us condition score soil as we would with cattle, and helps us make decisions about soils other than just via a soil sample, because soil is more than just Ph, P & K, so happy digging.



Grassland Management for Maximum Productivity and Resilience

The following guest article has been provided by British Seed Houses – specialists in grassland seed mixes and sward revitalisation.

Further information is available from British Seed Houses by contacting representative **Iain Eadie** on 07971 640428 or by downloading brochures at www.britishseedhouses.com



Iain Eadie, British Seed Houses

Soil health – the first step in improving returns from forage

With four out of the last seven summers being unseasonably wet in the UK, livestock farmers will have suffered an increased risk of soil problems that may well threaten performance of grazing and cutting leys

unless the appropriate action is taken.

Compaction, smearing and surface capping are all potential consequences of poaching by animals or damage from machinery forced to work in less-than-ideal conditions.

It is also important to ensure soil nutrient levels are maintained if forage crops are to perform to full potential.

Carry out a soil health check:

Firstly, check soil condition in at-risk areas by digging out a spade-size soil section to look for tell-tale signs, which are as follows:

- Soil does not break easily in your hands
- The sod splits horizontally
- Grass roots do not penetrate more than six inches or are growing horizontally
- Evidence of brown rusty deposits or dull grey patches (water logging)
- Little or no evidence of earth worms



Soil Assessment

Above ground, look for:

- Standing water
- A reddish tinge to grass leaves (usually in spring)
- Rushes, marsh thistles, and other wet-loving species
- Scorch marks from urine patches

Take the appropriate action:

Corrective action should be specific to the problem:

- Surface capping (0 – 10 cm) – Use a soil aerator with spikes or knives.
- Compaction (10 – 15cm) – Use a sub-soiler or sward lifter.
- Plough pans – Use a sub-soiler or mole plough.

Soil sampling:

Soil analyses should be carried out before pasture renovation or reseeded to ensure that the correct nutrient balance exists for optimum forage crop performance.

Optimum pH for plant growth and uptake of nutrients is 6 – 6.5.

Applying lime at 5 t/ha will raise pH by 0.4 units after 9 – 12 months. Phosphate and potash indices should ideally be 2 for optimum sward performance so fertiliser should be applied to seedbeds as necessary. Low phosphate will lead to poor root development and lower nutrient use efficiency. Low potash is associated with poor transport and utilisation of nutrients and inhibited plant growth.

Sward Assessment: Are your leys fit for purpose?

Why carry out regular sward assessments

All swards will deteriorate in time, with the actual productive life span depending upon the type of ley, the grazing and/or cutting regime, nutrient inputs and other variables such as soil type and condition, weather and so on.

The aim of regular sward assessments is to identify signs of deterioration at the earliest opportunity so that timely reseeding or renovation can be carried out, so avoiding the costs and consequences of worn out leys and helping to prioritise your grassland management.

Why sward quality counts

- Older leys (8 years +) typically comprise of more than 50% indigenous weed grasses such as meadow grasses, Yorkshire fog and creeping bent.
- D-value of modern ryegrasses are 10 units higher than common weed grasses.
- Raising forage D-value by 1 unit increases milk yield by 0.25 - 0.4 litres per cow per day and liveweight gains by 20g/day (lambs) or 40g/day (beef cattle).
- Optimum sward content of modern clover varieties contributes 150-200kgN/ha/year.
- Response to nitrogen is five times greater in modern ryegrasses than in common weed grasses.
- Modern ryegrass leys can extend grazing by up to 90 days per year when compared with older unimproved leys.

How to assess your sward

British Seed Houses recommends a simple system that enables all livestock farmers to regularly monitor the status of their leys.

A thorough inspection of pasture composition should be carried out for each grazing and/or cutting field twice annually, with an early spring check being the most important.

Each inspection should be carried out at approximately 10 randomly selected points per field in order to obtain a representative assessment.

Ground cover:

Make an assessment of overall sward density, or the proportion of foliage to bare soil, bearing in mind that shorter term Italian or hybrid ryegrass leys are naturally more 'open'.

Target ground cover is 85 – 95%.

Perennial ryegrass content:

Make an assessment of how much of the grass content of the sward is perennial ryegrass (or other originally sown grass species such as timothy) as opposed to weed grasses.

Initially, mark out a one metre square area and assess the area of leaf that is ryegrass and identify the non-ryegrass species. Assessment will become easier with practice.

Target for perennial ryegrass content is over 70 - 85%

Weed content:

Make an assessment of the total weed content (include all non-sown species, not just grass weeds). Target for weed content is less than 10%.

Clover content:

For grass and clover swards, make an assessment of the clover content as a proportion of the total sward. Remember to factor in natural seasonal variation to arrive at an annual average. Target for clover content is 20 – 40%.

Select grass mixtures fit for purpose

It is important to consider a range of factors when selecting your grass mixtures, according to Iain Eadie of British Seed Houses:

The main use for the sward:

Decide whether your new ley is to be used mainly for grazing or cutting, or does your system require a dual purpose approach with cutting followed by aftermath grazing, for example.

Different varieties have characteristics more suited to grazing or cutting, and there are issues such as heading dates to consider also. Diploid perennial ryegrasses, for example, tend to be better for grazing due to their prostrate growth habit, whereas tetraploids present a more open and less persistent sward that is better suited to cutting.

The desired productive life:

Are you looking for a short fast-growing silage crop or a long term grazing pasture that will remain productive for six or seven years? Again, different grass types and varieties are suited to different applications, with Italian ryegrass, for example, suited to one or two year duration in contrast with longer-lasting perennial ryegrass.

Extended seasonal production:

Extending the grazing season can be worth an estimated £60-£75/day in reduced concentrate feed costs alone for a 150 cow dairy herd, and that's before the costs of conserved forage and housing are taken into consideration. Similar arguments will apply for beef and sheep systems.

From a grazing perspective, success requires the availability of quality grass and effective utilisation. Progress in grass breeding now means that some of very best perennial ryegrass varieties on the Recommended Lists excel in early spring and autumn production.

In the AberXtend mixture from British Seed Houses, for example, the component perennial ryegrass varieties combine to offer 10% and 14% higher dry matter yields in early spring and autumn respectively than the average of all perennial ryegrass varieties on the Recommended Lists.

Consider drought tolerance:

If your location has a history of drought conditions, it is worth looking at options that will help maintain productivity of the sward when under moisture deficit. White clover, which may be included routinely in grazing swards for nutritional value and nitrogen fixing, will certainly help performance in dry conditions. Other options might include, for example:

- Inclusion of Puna II perennial chicory as a companion species in grass mixtures
- Inclusion of new stress-tolerant festuloliums such as AberNiche in grass mixtures
- Consider drought tolerant forage crops such as lucerne

Consult the Recommended Lists:

- Are varieties in your mixtures highly ranked on the NIAB or SAC Recommended Lists?
- Do varieties offer the best combination of yield and quality?
- Are heading dates appropriate for your system and compatible?
- Are varieties resistant to your local disease challenges?



Optimum sward clover content



Identify perennial ryegrass by its red stem.