Benefits of Pasture Diversity - Species Guide

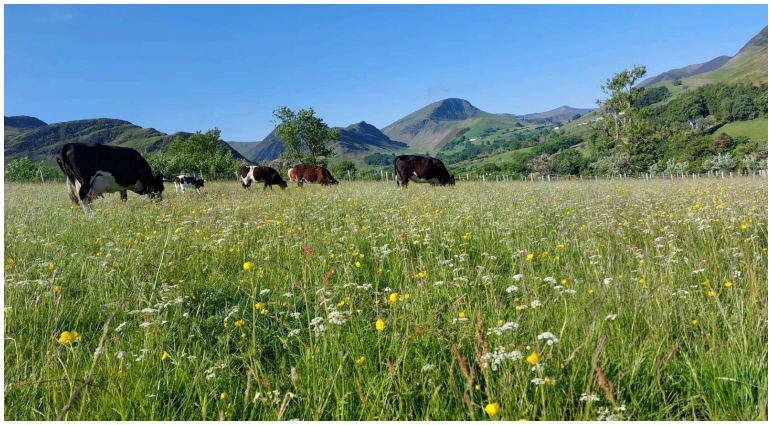


Photo courtesy of Rick Cooper

"First and foremost a diverse combination of plants provide a wide range of vitamins and minerals which boost immunity and good health and prevent issues arising in the first place."

-Kate Scott, Medical Herbalist and Farmer at The Drover's Daughter

Introduction

In recent decades, agronomists and farmers have favoured grassland species that help livestock get to slaughter weight quickly. These plants, such as rye-grass and white clover, have come to dominate seed mixes and pastures across the UK, because of traits such as their high levels of protein and metabolisable energy (ME) which make them high quality forage in intensive systems. These species thrive on the higher levels of fertility characteristic in improved and semi-improved grasslands, outcompeting more traditional species, and reducing the diversity of the sward. This shift has led to the decline of many native species of grasses, herbs, and legumes, which may have lower levels of protein, but have a range of other benefits for livestock health. These include not only vitamins and minerals, but phytonutrients, tannins, and more, all of which provide benefit.

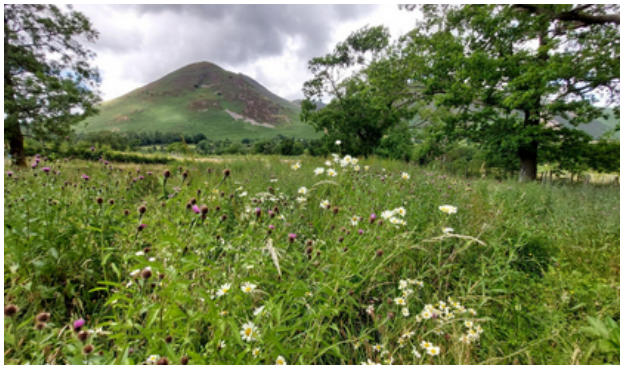


Photo courtesy of Rick Cooper - Meadow following green hay applications

The exact **nutritional value of species-rich grassland** or individual species is dependent on a variety of factors such as the specific species composition, growth stage, haying conditions, soil type etc. Because of this, we strongly advise farmers to conduct forage analysis (i.e measure the nutrient content of hay or pasture) of both home grown and bought-in forage to

gain a more accurate understanding of the benefits and deficiencies of their fodder, rather than relying on studies from other contexts.

More diverse pastures are **more resilient to extremes in weathe**r; a simple one to two species mix might be severely impacted by a drought, but a twenty species mix will likely contain a proportion of plants that are deeper rooting, and able to withstand prolonged dry periods. It can also improve the structure of the soil over time allowing better water infiltration during periods of heavy rainfall.

There is clear evidence surrounding the **nutritional benefits** to humans of consuming meat and dairy from animals fed a species-rich diet, and it seems intuitive to assume that the animals reaped these benefits over their lifetime as well.

A diversity of plant species also provides a **greater range of forage and habitat for wildlife species** such as pollinators and other invertebrates (some of whom may depend on one or two species entirely), and therefore birds, bats, and other wildlife. Aside from providing valuable shelter, trees are also a highly valuable and often forgotten source of fodder for livestock, and there is growing research into the nutritional and mineral benefits that browsing fresh and dried tree fodder can bring.

Although diversity can be increased by bringing in **green hay or reseeding** with a seed mix, you can increase the diversity of species in your pasture by simply **implementing grazing practices that allow these species to establish naturally** - not only is this free, but these species will be well adapted to your local conditions. This also allows the preservation of valuable, existing diversity, rather than replicating a certain mixture of species (which may not be typical for your location). We hope this guide illustrates that the greater the variety of the species in your pastures more generally, the more likely your livestock are to benefit.

Species ID

Birds-foot Trefoil

(Lotus corniculatus)

- Birdsfoot Trefoil is considered an “outstanding” forage plant because of its high protein content, and is nitrogen fixing, benefiting the species around it.
- It is high in tannins, meaning it has anthelmintic properties, reducing worm burdens and the likelihood of bloat (it doesn’t carry the same bloat risk as clover)
- Some of the compounds in it have anti-inflammatory, antibacterial, and antiviral properties.

Source: https://www.canr.msu.edu/resources/birdsfoot_trefoil-1

Chicory

(Cichorium intybus)

- Chicory is a deep rooting plant which allows it to survive through drier seasons as it can draw upon water reserves deep in the soil
- It is a good source of zinc, copper, manganese and iron as well as calcium, magnesium, potassium and sodium
- It is known to be palatable and an excellent feed source for high livestock growth rates
- It is well-suited to rotational grazing, but can bolt with the stem becoming woody
- It does also offer anthelmintic properties to help expel internal parasites from livestock

Source: https://www.natureinstitute.org/article/craig-holdrege/a-day-in-the-life-of-a-chicory-flower

Common Dandelion

(Taraxacum officinale)

- Like plantain, Dandelion is an extremely underrated plant, perhaps because of its ubiquitousness as a lawn weed, and the fact it flourishes in marginal areas.
- It is very nutritious, with high levels of protein and a range of vitamins including A, B9, C, K, and minerals including potassium, manganese, iron, and calcium.
- Its deep tap roots also mean it can thrive in challenging spring conditions and can act as a useful source of nutrition early in the year

Source: https://biodiversity.utexas.edu/news/entry/backyard-biodiversity-dandelions

Nettle

(Urtica dioica)

- Common nettle is high in protein and a powerhouse of minerals and vitamins, including calcium, potassium, magnesium, phosphorus, iron, sulphur, zinc, manganese, copper, and nickel and Vitamins C, B2, B5 and B9, K and A.

- All parts of the nettle plant from roots, shoots, leaves, and seeds can be eaten and have benefits. Livestock may graze preferentially at certain times of year, or nettles can be harvested and dried as hay, which is reported to support milk production in livestock. It also be cut and left to wilt, then fed in-situ to make it more palatable without the need for drying and collecting.

Source: https://www.canr.msu.edu/resources/stinging-nettle-urtica-dioica

Ribwort Plantain

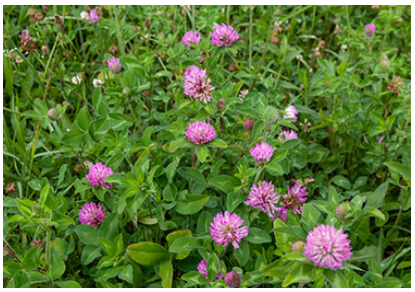
(*Plantago Lanceolata*)

- Protein levels of around 20% make it an excellent forage crop.
- Rich in minerals such as calcium, potassium, cobalt, zinc and selenium, and vitamins A, B, C and K (it contains twice the amount of selenium than perennial ryegrass)
- Contains antihistamines, and has both antifungal and anti inflammatory properties.

Source: *https://www.stockfood.co.uk/images/00210959-Ribwort-plantain-Plantago-lanceolata*

Red Clover

(Trifolium Pratense)

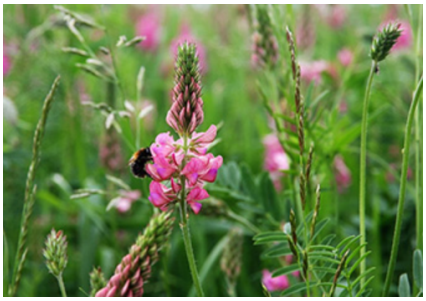


- Red clover is a legume which is high in protein and provides high quality forage, especially for dairy cattle
- It can tolerate well drained and poorly drained soil, and a wide variety of pH soils
- Helps to reduce nitrogen loss in the soil when grown with companion grasses
- Be aware that it should not be fed to breeding ewes for 6 weeks before and after tupping due to its high level of phytoestrogens (AHDB)

Source: https://hayandforage.com/article-3029-red-clover-unique-benefit-for-fescue-pastures.html

Sainfoin

(Onobrychis viciifolia)



- High in protein, sainfoin is highly parable to sheep and cattle and supports high liveweight gain
- The tannins present in sainfoin also mean that it doesn't cause bloat, and can reduce bloat
- Acts as a natural wormer; when fed to livestock it disrupts the worm life cycle
- Grows particularly well on well drained alkaline soils, for example on chalk or limestone
- Attracts bees, butterflies and other invertebrates with its long flowering period

Source: https://www.organicresearchcentre.com/news-events/news/the-benefits-of-growing-sainfoin/
https://www.soilassociation.org/farmers-growers/low-input-farming-advice/herbal-leys/benefits-of-holy-hay-sainfoin/

Salad Burnet

(Sanguisorba minor)

- High in iron and potassium, and vitamins C, A, and some B complexes.
- A valuable forage herb as it provides grazing year round, and is resilient in drought conditions.

Source: https://wildflowerfinder.org.uk/Flowers/B/Burnet(Salad)/Burnet(Salad).html

Common Sorrel

(Rumex acetosa)

- Another deep rooting plant, its leaves are high in Vitamins A and C, as well as minerals such Iron and Magnesium.
- It is said to have antibacterial, anti-viral and antifungal activities
- Does contain Oxalic acid, which if consumed in large quantities can be toxic (but if grazed as part of a mixed species sward should not be problematic)

Source: https://www.irishwildflowers.ie/images/folder1/140b2.jpg

Yarrow

(Achillea millefolium)

- Like all plants with deep tap roots, Yarrow is able to tolerate drought conditions and able to access minerals from deeper within the soil layer.
- It is considered to be high in minerals such as Iron, Magnesium, Potassium and Copper as well as vitamins such as A and C.
- Medicinally, it is known to have anti-inflammatory and anti-microbial benefits, and to assist in blood circulation and wound healing.

Source: *https://www.wildfooduk.com/edible-wild-plants/yarrow/*

Further Reading and Resources

"Herbs in grassland and health of the dairy herd Part 1: The potential medicinal value of pasture herbs" *Louis Bolk Institute* https://edepot.wur.nl/247302

"Is the rye-grass always greener? An evidence review of the nutritional, medicinal and production value of species-rich grassland" *Magnificent Meadows*
http://www.magnificentmeadows.org.uk/assets/pdfs/Is_the_rye-grass_always_greener_An_evidence_review.pdf

"Flower-rich Pasture: benefits to livestock and how to restore and manage them" *Plantlife*
https://meadows.plantlife.org.uk/3-maintaining-meadows/managing-a-flower-rich-pasture-with-grazing/flower-rich-pasture/

"Regenerative Agriculture Practices Provide Benefits for Ruminant Health" *Vet Sustain*
https://vetsustain.org/work/regenerative-agriculture-practices-provide-benefits-for-ruminant-health

"Weeds and What They Tell Us" *by Ehrenfried E. Pfeiffer*
https://www.florisbooks.co.uk/book/Ehrenfried-E.-Pfeiffer/Weeds+and+What+They+Tell+Us/9780863159251

"How to Use Red Clover" *AHDB*
https://ahdb.org.uk/knowledge-library/how-to-use-red-clover

"Benefits of Sainfoin" *Soil Association*
https://www.soilassociation.org/farmers-growers/low-input-farming-advice/herbal-leys/benefits-of-holy-hay-sainfoin/

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Darch *et al*. 2022. *The effect of soil type on yield and micronutrient content of pasture species*. PLoS ONE 17(11). https://doi.org/10.1371/journal.

Distel et al. 2020 *Designing Diverse Agricultural Pastures for Improving Ruminant Production Systems* Frontiers in Sustainable Food Systems Vol. 4 https://www.frontiersin.org/articles/10.3389/fsufs.2020.596869

French, K. 207. *Species composition determines forage quality and medicinal value of high diversity grasslands in lowland England*, Agriculture, Ecosystems & Environment, Vol. 241, P. 193-204, https://doi.org/10.1016/j.agee.2017.03.012.

Reiné, et al. 2020. *Nutritional Quality of Plant Species in Pyrenean Hay Meadows of High Diversity* Agronomy 10, no. 6: 883. https://doi.org/10.3390/agronomy10060883

Chicory Part B - The chicory plant, cultivars, and advantages/disadvantages in pasture.
https://www.dpi.nsw.gov.au/agriculture/pastures-and-rangelands/species-varieties/pf/factsheets/chicory/part-b

Cornell University Cooperative Extension, 2014. *Red Clover for Quality Forage for Dairy.* Fact Sheep 81.
http://nmsp.cals.cornell.edu/publications/factsheets/factsheet81.pdf

Resource by Charlotte Wheeler with additions from PfL research and project team (2024)
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