

NOVEL FORAGE CROPS



Photo: Agricology

PROBLEM

Modern forage crop cultivars do not always provide the yield or other benefits for livestock

SOLUTION

Novel forage crops will often provide higher yield, drought tolerance and even medicinal advantages without the need for high artificial inputs.

OUTCOME

Crops such as Lucerne, Sainfoin and Chicory are deep rooting and so are drought tolerant, Lucerne is also a legume producing its own nitrogen.

They also produce high protein forages which are beneficial in livestock diets.

Chicory is commonly used in grazing leys, with an additional benefit of bringing minerals and nutrients up to the soil surface where it can be utilised by other grasses. Sainfoin has also high levels of tannins which have been shown to have anti-bloat and anti-helminthic benefits, reducing worm burdens through actively inhibiting worms in the gut.

APPLICABILITY

Applicable production types



Application time

All year-round growth, autumn grazing

Required time

Can provide 3-5 years feed if managed.

Equipment/resource required

Normal agricultural equipment to plant.

Best in

Sainfoin and Lucerne are best suited to alkaline soils and dry regions, but not limited to those areas. Chicory is best as part of a grazed sward in light soil.

PRACTICAL RECOMMENDATIONS

IMPLEMENTATION

Chicory

- A deep-rooted perennial which can be grown as a pure stand but is usually grown in a grazing mix
- Suits rotational, strip and mob grazing because it will be selectively grazed and should not be grazed below 7cm
- Grazing before it reaches 20cm in height should prevent early bolting and flowering
- Seed inclusion rates of 5kg per hectare in mixed swards
- Suits pH range 5.0 to 6 but tolerates 4.8-6.5.



Photo: Phil Sumption/ORC



Lucerne

- A deep-rooted leguminous perennial suited to alkaline and free draining soils which can be cut 3-4 times a season producing high (20%) protein silage with good digestibility, making for high livestock intake
- Soil pH of at least 6.5 on the surface and 6.0 at 30 cm depth is recommended
- Seed rate is 20 kg per hectare and an inoculant is essential to aid nodulation. Spring sowing is more reliable, particularly if sown further north
- It is often sown with a non-aggressive companion grass such as timothy or meadow fescue which provides competition against weeds, particularly over winter and after cutting
- The seed is normally shallow-sown, rather than broadcast
- P and K requirements are high, around 150Kg at index 1, but this can come from slurry or FYM in the autumn. (Cattle FYM at 25% dm = 3.2kg/t total phosphate; 9.4t total potash, struggle to deliver this much P&K. Sensitive to Crown Rot if too much slurry is applied). Trace elements may be deficient on lighter soils: Boron, Magnesium and Molybdenum.
- First cut should be at flowering stage and from then on at bud stage. Light grazing is possible in the autumn. The crop will die back with severe frosts but will grow back from good root stock in the spring.
- Yield should rise over the second and third year to 15t dm/ha

Sainfoin

- A high yielding, drought resistant legume which also supplies rumen protected protein, as well as being an anti-helminthic. It also contains high levels of omega-3 which is beneficial for human health.
- It needs an alkaline subsoil and can persist for long periods
- Seed rate is 70Kg/Ha, sowing to 20mm
- Previously a popular crop, there are local landraces which may suit the region rather than commercial seed varieties
- Slow to establish and so yields poorly in first year but can produce up to 15t/ha in later seasons. Can be grown with spring barley as a nurse crop producing some income in the first year.
- Cannot tolerate heavy grazing, and is highly palatable so also vulnerable to selective grazing by sheep.
- Cutting for hay or silage should be done when the flower is half way through flowering but can be grazed as the tannin content prevents bloat. Regular cutting is possible but can reduce persistence
- Frost tolerant

EASE OF ADOPTION ON NON-ORGANIC FARMS

- All three have large potential on non-organic farms, Sainfoin and Lucerne particularly as legumes can yield high protein crops with no artificial fertilizer inputs
- Chicory does benefit from medium to high fertility but is usually grown in mixtures and with clovers
- Lucerne is suited to a multi cut system
- Sainfoin can be cut and grazed

BENEFITS OF IMPLEMENTATION

- Reduction in fertiliser inputs, reduced concentrate food and healthier stock
- Provide high quality feed stuffs particularly during droughts and dry periods
- Will improve soil if used within an arable rotation and provides free nitrogen for the following crop

DRAWBACKS OF IMPLEMENTATION

- Chicory will be selectively grazed, and more grazing management is needed
- Particularly susceptible during wet years, and crop failures can occur due to verticillium wilt
- Lucerne hay is particularly difficult to make because leaves shatter easily
- Weed control can be difficult



BARRIERS AND RISKS

- Often considered to be poor yielding in first season but this can be resolved using nurse crops
- Lucerne suits a multi-cut system which is less practical for silage but works well with baled silage. More layers of wrap needed if too 'stemmy'.
- Doesn't suit all soil types

FINANCIAL ANALYSIS

For the sheep sector there is likely to be an increase in financial output, due to increased returns from finishing lambs earlier in year, but with there will be no substantial effect on margins. The use of novel forages in the pig and sheep sectors is mainly associated with a decrease in feed costs.

	Initial investment	Ongoing costs	Yields	Financial output	Expected effect on margin
Pig sector	~	↓	Not assessed	Not assessed	Not assessed
Sheep sector	~	↓	~	↑	↑

Rating approach used to describe the effect and direction of change (increase or decrease): Unknown = ? None = ~ Low = ∨ Moderate = ∨∨ High = ∨∨∨

The financial estimates were based on the following assumptions:

- Pigs: forages such as lucerne can meet 50% of the energy requirements of dry sows
- Lambs: sward mixtures with chicory can increase lamb growth rates by 20%

FURTHER INFORMATION

Video

- Example of sainfoin <https://youtu.be/t6J7CWuK3R4>
- Dr Lydia Smith of NIAB on sainfoin: <https://youtu.be/rUS26yUYYtw>

Further reading and weblinks

- Mora Ortiz, M, Smith, L (2016) Sainfoin Surprising Science Behind a Forgotten Forage. Cotswolds Seeds, UK. http://legumeplus.eu/system/files/downloads/u6/Sainfoin_Growers_Guide_website.pdf
- AHDB Guide to using chicory and plantain: <https://tinyurl.com/AHDB-chicory-plantain>
- AHDB Guide on growing and feeding Lucerne: <https://tinyurl.com/AHDB-lucerne>
- Food and Farming Futures – guide to use of alternative forages for helminth control: <http://ofi.direct/I.17090738>



CASE STUDY FARMER APPLYING THE PRACTICE: CHOLDERTON ESTATE

Location: Wiltshire

Enterprises: Dairy and sheep

Henry Edmunds said:

“Sainfoin is so persistent under natural (low input) conditions, which makes it especially suitable for organic farming. I have around 200 acres dedicated to sainfoin and I have some sainfoin fields that have been growing as a continuous stand, without re-seeding for over twelve years.

“I operate a rotational system on my farm. After sainfoin has been ploughed in and has improved the soil fertility, I grow three or four annual crops over five years. The first rotation is usually oats or barley followed by a forage crop like vetch. During this time I will maintain sainfoin growing simultaneously in other areas of the farm, so when I want to re-drill sainfoin, I can use my own seed. I normally grow around 20 acres of sainfoin for seed production per annum, harvesting a seed crop from plants that are in their fourth year of growth.

“To establish a new field of sainfoin, I like to sow it with barley, under-sowed with the sainfoin. The barley is drilled first and then sainfoin and grass seeds. It is very important to grow grass as a companion to the sainfoin, since it increases the final yield by at least 50% and also stops weeds from invading the bottom area of the crop. The best mixture for my farm is about 5 kg of meadow fescue with about half a kilo of timothy grass, with 25 kg of sainfoin seed.”



Photos: Cotswold Seeds

ABOUT THIS PRACTICE ABSTRACT

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