



FACT SHEET

APRIL 2019

ANNUAL LEGUMES ENHANCE ANIMAL PRODUCTION FROM SUMMER DRY PASTURES

Annual clovers produce more in early spring than perennials. This is because annuals have a lower optimum air temperature for germination and growth (10-15 degrees C) than perennial legumes such as white clover (20-25 degrees C).

Subterranean (sub) clover starts rapid growth at least a month earlier than lucerne, white, red or Caucasian clovers.

In summer dry sites, the early spring production of annual clovers such as sub, followed by their strong flush in October/November complements the start of rapid growth by perennials. In these sites a mix of annual and perennials will give a wide spread of legume production.

Well-managed dryland pastures can get 50-60 per cent of the Dry Matter from clover in late spring when both annual and perennial pastures are growing rapidly in response to rising air temperatures.

Fix nitrogen

As well as having a high feed value, clovers also fix nitrogen (N) at around 30kg of N/tonne of legume grown. This means 3t DM of sub clover grown will fix 90kg of N. This N increases the growth and feed value of the grasses which results in greater animal production before the summer dry sets in.

Annual clovers are drought tolerant

On drier sites (sunny hill faces, stony soils) most perennial legumes, with the exception of lucerne, are unproductive during dry summers and some may not survive summer drought such as white clover.

Annual clovers can survive from year-to-year as they set large amounts of seed before dying, ensuring a seed-bank and rapid regeneration of seedlings with autumn rains. Sub clover buries its seed in the ground. Arrowleaf, Persian and Balansa clover all produce a flower head above ground which needs to dry off to allow seeds to mature.

Enhanced stock production

Pastures with high legume content from August to November drive milk production in lactating ewes, ensuring high pre-weaning growth rates and more lambs drafted by Christmas. Grasses in the sward are also more palatable because of the nitrogen supplied by the clovers. Grazing animals, when given a choice, prefer a diet that is 70 per cent clover and 30 per cent grass.

Identify what legumes you have on your farm, how much is there and when each thrives.

Due to being included in seed mixes in the early days of aerial topdressing, sub clover is endemic in many hill country pastures throughout the east coast of both islands. The presence of volunteer annual clovers, such as Cluster, Striated, Suckling and Hare's-foot clovers indicate sites where more productive annual legumes will thrive.

Subterranean Clover: the most common- and valuable annual clover

As an annual clover, sub clover germinates in autumn, flourishes and flowers in spring and dies off in summer. As plants mature in late spring and early summer seed burrs are buried in the soil.

Cultivars differ according to their flowering date, ability to handle dry or wet sites, leaf size and the degree of hardseededness.

Pure swards of sub clover produce four to ten tonnes DM/ha year depending on rainfall. This production is similar to mixed grass/sub clover pastures at the same site, however clover production is only likely to be 20 per cent of total production in mixed pastures.

A clover grazing experiment carried out at over eight years at Lincoln University's dryland site (Max Clover grazing experiment) showed the higher clover content in sub/cockfoot pastures gave greater liveweight gain/ha from August to October than white clover/ryegrass or white clover/cockfoot pastures (600-1200kg LW/ha compared with 580-820 kg LW/ha).

While endemic in many hill country pastures, sub clover populations usually need to be actively managed by reducing grazing intensity during spring flowering and seed-set or added to by drilling or broadcasting clover seed in autumn to build clover content.

Tempello- An on-farm success story

David and Jo Grigg have focused on promoting existing sub clover on their Marlborough dryland hill country property.

The clover has been endemic in their hill country pastures for decades and by fencing and understanding how to manage it, they have been able to utilise this high-quality feed to drive ewe lactation and pre-weaning lamb growth rates.

The proportion of lambs the Griggs sell before Christmas is strongly linked to the quantity of sub clover in the sward.

In years when clover flourishes in spring, 80 per cent of lambs are sold prime before Christmas at 10-12 weeks of age.

“When sub clover is good, we calculate it’s usually worth another 8kg of liveweight per lamb at weaning.”

Tempello is typical of many east coast dryland farms where 65 per cent of annual feed production is grown over 90 days between September and the end of November. Sub clover’s production cycle fits this nicely.

To ensure good sub production in spring, the couple are careful to hard graze blocks in summer to ensure areas of bare ground where the sub can germinate in autumn. They then manage the seedlings by not grazing until the plants have four trifoliate leaves. If grass begins to dominate in late autumn, a light grazing with cattle will open up the sward. Most importantly, ewes are not allowed onto the clover at this stage as they will eat it to the ground.

If necessary, the Griggs will feed a supplement in autumn rather than graze the sub too early and compromise the potential for sub clover dominant pastures in spring.

Careful management in autumn will pay dividends in spring, which is the money-making season.

In June, blocks are grazed to 700kg DM/ha to reduce grass competition in spring. Blocks are then given two months to produce feed cover before set-stocking in late August.

Roughly every five years a block will be lightly grazed in spring and then left to flower. This helps replenish the sub clover seed bank.



Photo credit: Rural Delivery

Other Annual clovers



Balansa

Balansa is an erect, hollow-stemmed, multi-branched annual clover which can grow to over 80cm. Adapted to temperate climates with annual rainfall of 350-800mm, early flowering varieties are more suited to lower rainfall zones and later flowering to higher rainfall areas.

Balansa clover flowers earlier than most sub clover cultivars providing high-quality feed in August and September. As it is a top flowering annual clover (in contrast to sub which buries its seed burrs), Balansa seed production is therefore more vulnerable to grazing during spring.

On the east coast of the North Island, Balansa clover is capable of producing 8-10 tonne of feed in winter and spring. In the South Island, it can be used as an alternative to sub clover where soils are wet in winter and spring.

Balansa management

In the North Island, there have been very few situations where Balansa has successfully set-seed. It is a prolific flowerer and as it seeds above ground, plants need to be spelled or lightly stocked in the first spring to allow seed to set. Because the seed is hard, it can require more than one year to germinate and plants are not always present in the second winter after planting. Seed-set and regeneration has been more successful under extensive grazing systems in the South Island.



Persian

Persian clover is an erect, hollow-leafed annual legume producing high quality feed over late winter through to early summer. It is suitable for sheep grazing, hay or silage production.

Not typically grown in the South Island, as it is slow growing at low temperatures, it has been grown successfully in the Hawkes Bay where it can produce 10 tonne of high quality dry matter as a stand-alone autumn crop. It tolerates poorly-drained soils better than any other annual clover.

It has been successfully grown in mixes with plantain resulting in a high legume-content feed in spring following an autumn sowing.

Growing up to 50cm, Persian clover flowers at the top of its stem.

Persian clover may produce photosensitivity in stock if fed as a pure sward and it is not bloat safe. It is very palatable to insects, slugs and grazing pests such as ducks, geese and rabbits who will pick out the Persian clover in the sward.

Arrowleaf

This annual legume is more suited to North Island areas such as Hawke's Bay, where it is used for ewes and lambs and as a late season hay crop. It has also been sown with plantain and other clovers providing extra legume in the first year.

An upright plant that resists lodging, it can grow at over 100kg DM/ha/day in October and November and drive lamb growth rates of 254 g/day from November through to January.

It is bloat-safe, highly palatable and suitable for hay. Arrowleaf has a deep tap root and responds well to winter rain. The downsides of this species are: it is intolerant of poor drainage, it is very slow to establish, is susceptible to weed competition as a seedling, and has poor winter growth. The need to restrict grazing during flowering to enable re-seeding means it is not suitable for permanent pastures and requires re-sowing annually.

Arrowleaf management

Arrowleaf must be sown into well-drained, fertile soils at a maximum depth of 4mm. Good weed control is necessary prior to sowing and post-emergence weed control may also be necessary. Plants may be grazed mid to late winter as this encourages stem development, however hard grazing may remove developing stems. Arrowleaf clover produces high quality, high protein forage and feed nutritive value remains high through to maturity. It is well suited to silage or hay after one to two grazings.



Persian Management

Persian clover should be sown in autumn at a depth of no more than 4-5mm. Good weed control is required during establishment but Persian clover is susceptible to glyphosate and can be damaged by many broad-leaf herbicides. It is also susceptible to a wide range of insect and grazing pests.

It should be rotationally grazed over winter to avoid over-grazing and the removal of developing stems. Persian clover is very palatable with high soluble carbohydrate and high protein content. It is suitable for hay and silage production.

Because Persian clover flowers are at the top of the clover stem, flowers and seed heads are consumed by stock which makes setting seed challenging under grazing. Most cultivars are soft-seeded so false strikes are common in summer. Persian clover requires annual re-sowing under New Zealand's grazing systems.

Volunteer Annual Clovers

The four most common volunteer annual clovers are Cluster, Striated, Suckling and Hare's-foot. Their distribution may indicate sites where more productive annual legumes will thrive.

All four of these small-leaved clovers are top-flowering with a similar growth form to Balansa clover. They have all developed strategies to produce seed even under intensive grazing.

These clovers are less productive and less palatable than sub clover, but they still fix nitrogen with each tonne of leafy herbage (about 25 kg N/tonne).



Striated clover

Easily confused with sub clover, its leaves are unmarked, are hairier than sub and feel like velvet. The flowers are pink and the seed head is spiky and harsh to touch.



Cluster clover

Cluster clover is hairless and can be confused with white clover, but has no stolons and smaller leaves. Its flowers are pink and lacks a peduncle (flower stem). The flowers form a small ball at the base of each leaf stem.



Suckling clover

Suckling clover has yellow flowers and the short stem from the middle leaflet is longer than the stems on the two side leaflets. Its leaflets are heart-shaped and hairless.



Hare's-foot clover

Hare's-foot clover is grey green due to the dense hairs covering the plant. Its leaves are narrow and the pink flower/ seed head looks like a hare's foot. In some years it can dominate sunny faces, giving the hill a pink hue.

B+LNZ RESOURCES

 www.knowledgehub.co.nz

Further reading online:

- Fact sheet: Using subterranean clover
- Fact sheet: Grazing management to encourage sub clover in dryland pastures
- Guide for subterranean clover identification and use in New Zealand

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