How do I ...

manage grazing to maximise sub-clover seed set?

The issue:	Repeated inadequate seed set in sub-clover pastures results in depleted sub-clover pasture production.
The impact:	Poor performing pastures and pastures which fail to persist mean livestock productivity is decreased and a strong return from those pastures is not seen.
The opportunity:	Grazing management strategies are simple and easy to implement to ensure optimal seed set and persistent productive pastures.

A pasture with a 40% sub-clover content relies on having at least 200kg/ha of sub-clover seed in the soil. While only 10–20% of this seed needs to germinate each year to achieve optimal sub-clover density, repeat years of inadequate seed set will rapidly deplete the seed bank and subsequent pasture production.

Fortunately sub-clover has an amazing capacity to produce seed and, under the right conditions, a single plant can produce more than 100 seeds. Grazing management has a major influence on the amount of seed produced and is an important tool to maximise production.

Winter sub-clover growth

Optimising sub-clover seed set starts in winter. The aim over winter and early spring is to maximise leaf production, as this maximises potential flowering.

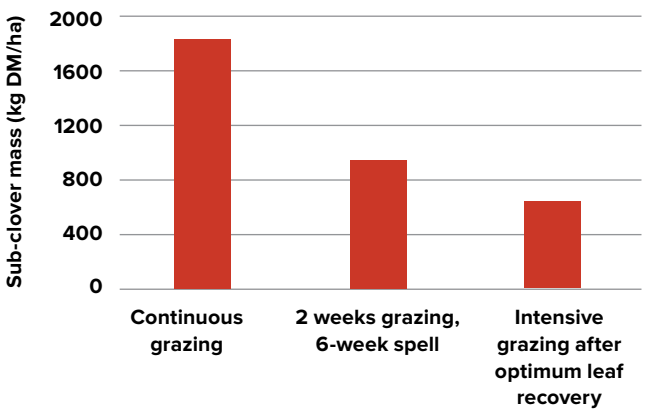
Maximum sub-clover leaf production is achieved by frequent heavy grazing, rather than light grazing and long periods of spelling. Sunlight reaching the crown of the sub-clover plant stimulates leaf production and shading reduces leaf production.

Lax grazing leads to sub-clover becoming shaded by grasses and reduced leaf initiation.

While sub-clover's prostrate growth means the plant is well adapted to frequent heavy grazing, it does make it susceptible to shading, particularly by upright-growing grasses.

Trials conducted at Broadford in Victoria demonstrated the grazing effect (Figure 1).

Figure 1: Sub-clover mass (October 2001) under three winter grazing regimes.



Source: Department of Primary Industries, Victoria

It is currently unknown if more upright-growing sub-clover cultivars are better suited to rotational grazing systems as many factors come into play for light capture, such as plant density and leaf size, angle and arrangement.

Hard grazing until the onset of flowering also encourages burr burial. Lenient grazing reduces seed burial, resulting in a higher proportion of burr remaining on the soil surface.

Management of winter growth

Grazing to maximise sub-clover leaf production runs counter to the rotational grazing mantra, where spelling is required to enable carbohydrate replenishment in the grasses after grazing and to allow three or four leaves to re-grow. Sub-clover is the opposite, which creates a grazing dilemma. It is recommended that frequent heavy grazing only be used when there is a clear objective to increase sub-clover flowering.

If more sub-clover is desired, grazing frequently and to 1,000kg DM/ha is necessary.

Grazing height to favour sub-clover over perennial grasses.

Compromised grazing height to suit both sub-clover and perennial grasses.

Intensive grazing does not need to be repeated each year, as the seed bank can build rapidly in a single season. Continual intensive grazing may also encourage the growth of broadleaf weeds such as capeweed and erodium. These weeds can be successfully controlled using spray grazing.

Once the seed bank has been replenished, grazing to 1,200–1,400kg DM/ha (approximately 5cm) is an acceptable compromise to achieve both adequate ongoing sub-clover flowering and enable perennial grasses to recover.

Maximum sub-clover growth requires adequate levels of phosphorus, potassium and sulphur. Calcium and boron are also required as they can affect seed production, even though vegetative growth is not compromised.

Spring sub-clover growth

Runners are produced on sub-clover after they experience a cumulative amount of heat. The production of runners indicates the beginning of flowering. The plant is still capable of producing leaves but production declines once flowers appear.

Flowers and leaves grow from the same position on the runner. The flowers along each runner will be at different stages of maturity, with the oldest flower closest to the crown of the plant and the newest flower at the end of the runner.

A sub-clover runner with the newest leaf emerging from the end of the runner and flowers at the stem intersection of each leaf.

The time or days to flowering is dictated by the genes in the plant and the temperature experienced during winter and early spring. While there can be early, mid and late-flowering cultivars, their exact timing will vary each year depending on seasonal conditions.

Sub-clover flowers are easy to observe. They are usually white and have three or four tubular florets. Different cultivars can have different markings, such as red pigmentation.

Sub-clover flowers on cultivar Mt Barker showing red pigment on the flower tube.

Sub-clover flowers on cultivar Riverina with a green flower tube.

Management of spring growth

If no flowers are visible, the pasture should be maintained at no more than 1,200–1,400kg DM/ha (5cm) to maximise sunlight reaching sub-clover leaves and encouraging runner development.

Grazing pressure should be reduced but not avoided once the first flowers become visible. Sub-clover still needs to capture light to ensure enough energy is available to support leaves, flowers and fill the maturing seed. Maintain dry matter around 2,000kg DM/ha (approximately 8–9cm). Avoid grazing below this height as flowers may be removed.

Regular inspections should be made for pests, especially redlegged earth mites which can damage the flowers without necessarily appearing to do damage to the leaves.

White flowers visible on sub-clover in a pasture.

TOP TIPS

Hard, regular grazing required to encourage sub-clover seed set is not ideal for perennial grasses, so choose paddocks that have a strong grass base.

Graze down to 1,000kg/ha several times during winter to maximise seed production.

Control the damaging effects of redlegged earth mites by removal of host plant capeweed, selection of resistant sub-clover cultivars and use of the Timerite® insecticide spray program.

How the seed industry does it

Jess Nottle (pictured), from PGG Wrightson Seeds, works with seed growers on mainly annual sub-clover and lucerne seed production in lower south east of South Australia and western districts of Victoria. One of Jess' tasks is to help them achieve high seed yields of quality pasture seeds.

"Whilst it's common for seed growers to achieve sub-clover yields of more than 1,000kg/ha under irrigation, with good seasonal conditions, dryland sub-clover yields reach at least 600kg/ha," Jess said.

Jess believes many factors contribute to maximising seed yield. "The big ones are reducing weed and insect pressure, grazing management, and creating optimum soil conditions for the sub-clover to thrive," she said.

Grazing management

Once established the seed crop isn't usually grazed until weeds start to become an issue.

"Following a broadleaf herbicide application, weeds are normally crash grazed for a short amount of time with sheep. They selectively graze the weeds over the sub-clover, which aids us with our broadleaf weed control. Otherwise grazing is done to keep the canopy from becoming too dense," Jess said.

Once growers start to see the first flowers, grazing is ceased. "They can lightly graze it, but growers lose potential yield if stock chew off any flowers," she said.

Weed and pest challenges

Weeds are the main challenge for growers. The broadleaf weeds are generally capeweed, wild radish, wireweed, thistles and nettles while the grass weeds are annual ryegrass and barley grass, which all like high soil fertility conditions. "Growers will normally have one grass clean-up during the year and one broadleaf herbicide application," Jess said.

Jess stressed it is extremely important to avoid applications of herbicides leading up to the flowering window of sub-clover.

"Hormone herbicides such as MCPA and 2,4-DB should be applied no later than four weeks prior to flowering. These hormone herbicides stunt the sub-clovers' growth and it takes the sub-clover some time to metabolise it and start growing again," she said.

Jess said the main pest challenge is Redlegged earth mite, normally seen early in the growing season.

More information

Fact sheet, *Redlegged earth mite* [Online] Available at cesaraustralia.com/sustainable-agriculture and search 'redlegged earth mites' (verified 17 February 2020)

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