

How do I spray-graze to remove broadleaf weeds?

- The issue:** Annual broadleaf weeds, if present, reduce the value of sub-clover based pastures for livestock production. Spray-grazing is an effective tactic to reduce weeds, but only if the herbicide and grazing interventions are well managed.
- The impact:** Spray-grazing can increase the composition and contribution of desirable grasses and sub-clovers, making the pasture more productive.
- The opportunity:** If spray-grazing is carried out correctly, it can lift livestock productivity, while becoming a valuable weed management tool.

What is spray-grazing?

As the name suggests, spray-grazing involves the combination of herbicides and grazing. The technique sees a sub-lethal rate of a phenoxy herbicide applied to broadleaf plants at rosette stage, followed by intensive grazing. The combined action of herbicide and grazing kills or severely retards the weeds, preventing seed setting and allowing more desirable species to flourish.



The effect of spray-grazing on pasture composition at the end of October. Untreated pasture (left) compared with treated areas (middle and right) in the same paddock

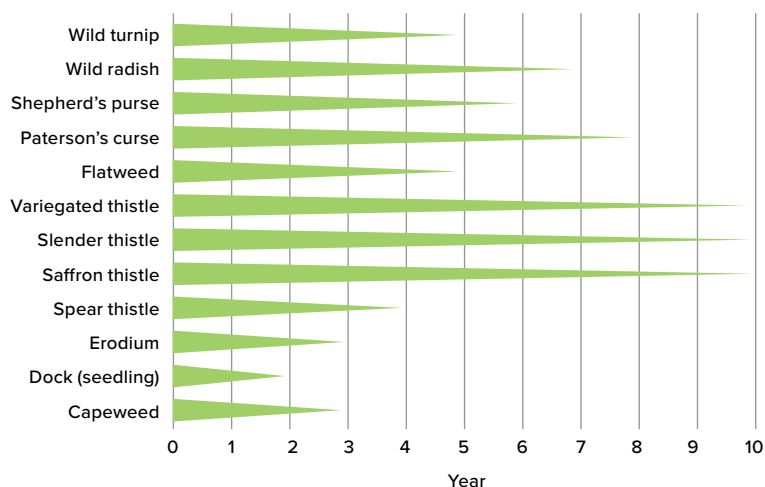
What plants does spray-grazing work on?

The technique is most effective on annual broadleaf plants with short seed life, such as capeweed, erodium and dock at seedling stage (Figure 1). Few weed seeds from previous years remain viable in the soil, so preventing seed production for only one year can dramatically reduce the seed left to germinate the next year.

Other broadleaf weeds can also be reduced and prevented from seeding in the year of treatment, however the impact in future years is less. This is because of the residual viable seed left in the soil from previous flowerings, or because the weeds are perennial and eventually recover.

Phenoxy herbicide applied at the label rates has no effect on annual or perennial grasses.

Figure 1: The longevity of viable seeds of weeds registered for treatment with spray-grazing (the thicker the line the higher the proportion of viable seeds)



How do I get the spraying right?

The most common herbicides to use contain MCPA® Amine or 2,4-D Amine 625 as the active ingredient. In sub-clover based pastures, MCPA® Amine is preferred. In white clover or sub-clover/white clover pastures 2,4-D Amine is recommended. MCPA® Amine and 2,4-D Amine can be used on balansa and Persian clover.

Other clovers vary in their tolerance to both herbicides, both between species and between cultivars within the same species. For specific advice on cultivar tolerance, contact the herbicide supplier.

MCPA® Amine and 2,4-D Amine are phenoxy herbicides (Group 1), which act like a growth

hormone causing rapid cell division. At high rates, uncontrollable growth occurs, causing death. At lower rates, the herbicide stimulates cell division, making the plant grow more upright.

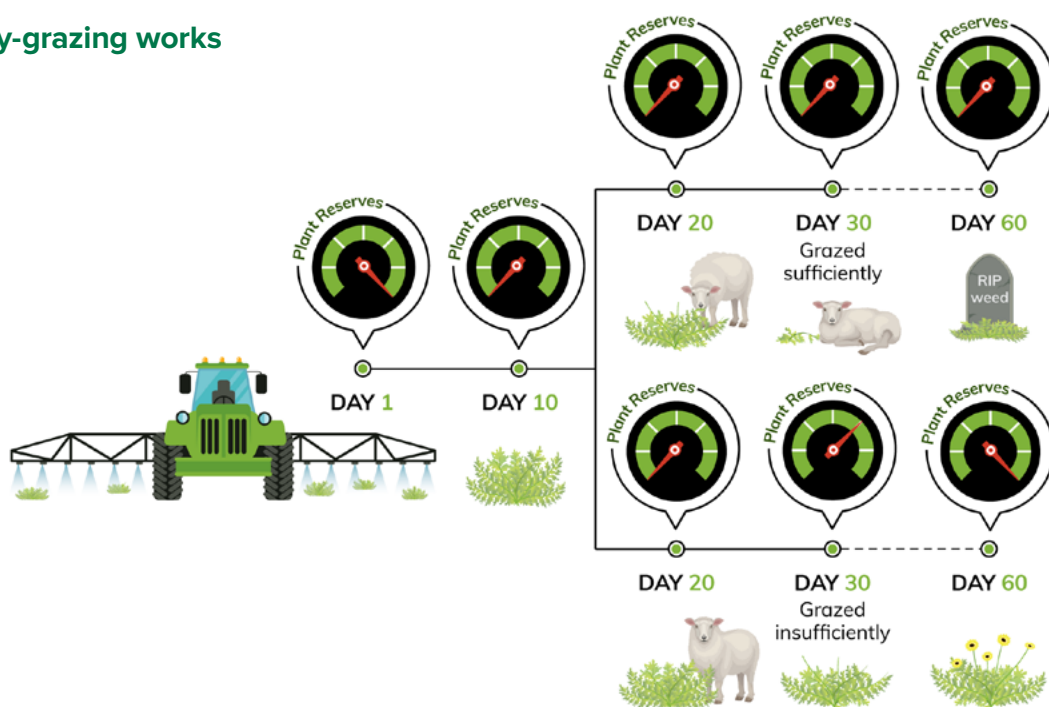
The plants respond by temporarily drawing sugars from the roots and crown into the leaves. The herbicide makes the plant more palatable and more accessible for grazing, while depleting the reserves the plant uses after grazing to regrow new leaves.

The effect only lasts about two weeks, after which the reserves slowly return to the root system, even though the plant may still look deformed.



Unsprayed capeweed (left) and sprayed capeweed (middle and right) showing distorted leaves and upright growth

How spray-grazing works

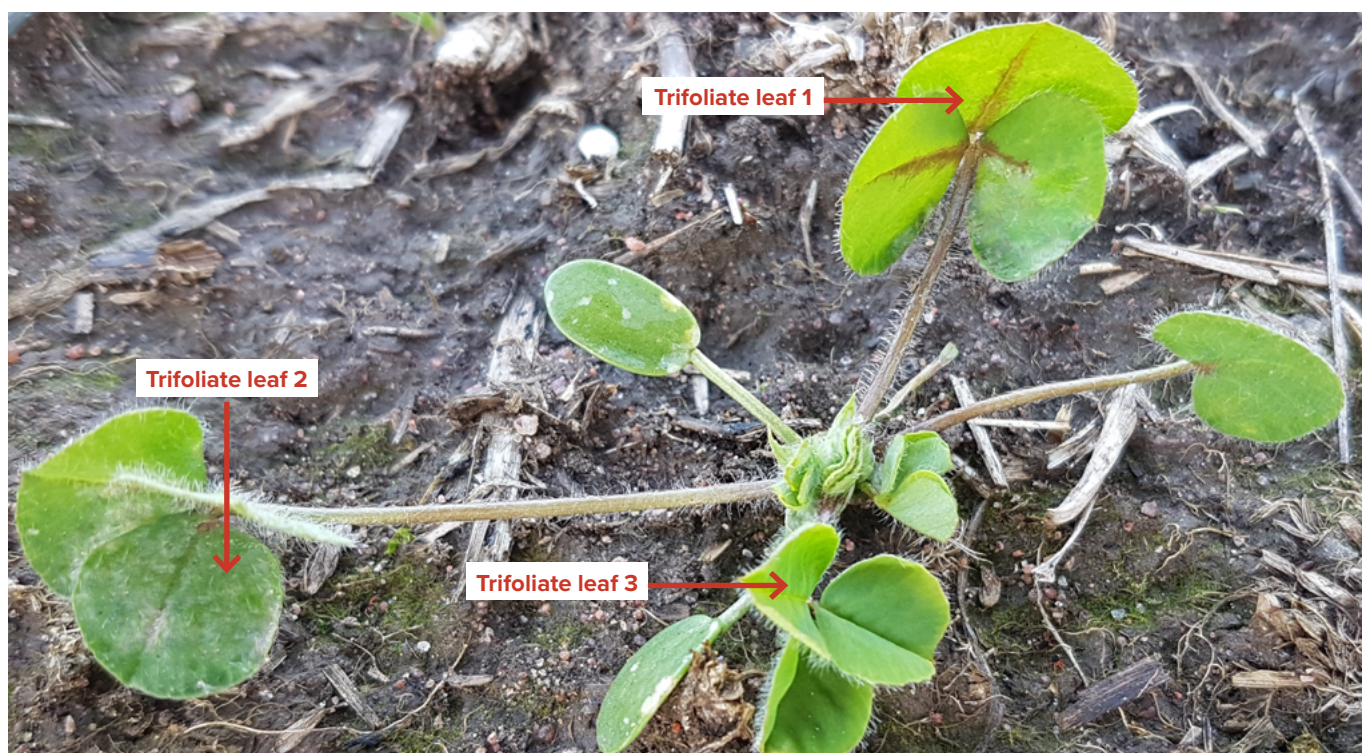


Timing

The aim is to apply herbicide as early as possible in the growing season, as this reduces the herbicide rate required and the amount of weed biomass that must be removed by grazing.

However, this needs to be balanced against the maturity of the companion clovers. To avoid significant

herbicide damage to clover, at least three trifoliolate leaves need to have grown on sub-clover when applying MCPA® Amine at the low rate and generally eight leaves for balansa and Persian clover. When using 2,4-D Amine, white clover should also have at least eight trifoliolate leaves. Adequate clover maturity is commonly reached 6–8 weeks after germination.



Sub-clover with the minimum number of trifoliolate leaves to tolerate herbicide application at the minimum rate

The ideal size of the target weed is about 20cm (hand diameter). Plants greater than 30cm diameter (dinner plate sized) become too difficult to control with this technique, as the additional rate will result in significant damage to the clover.



Capeweed plant size for spray-grazing. Ideal (top) is no greater than a hand, with a maximum size equivalent to a dinner plate (middle). Capeweed (bottom) too large (pen 14cm long)

Spraying too late in the season can also have negative effects. Firstly, sub-clover seed production can be compromised. Secondly, there is insufficient time for the desirable species to grow in the gaps left by the decaying weeds before the season finishes.



The impact of spray-grazing timing on pasture recovery. Spray-grazed June (top) and early September (bottom)

Herbicide rate

The herbicide rate increases as the target plants become larger. Therefore, the earlier spraying can mean less herbicide is required. Rates may vary depending on the herbicide used, so always follow label recommendations.

How do I get the grazing right?

Timely and intensive grazing is critical to the success of this technique. An advantage of spray-grazing is the opportunity to use the treated weed as part of the feed supply. One challenge is having sufficient stock numbers to complete the grazing within the desired period. The less feed on offer when grazing starts and the smaller the weed, the easier this is to achieve.

Timing and stocking rate

Avoid grazing for 7–10 days after spraying to allow the herbicide response to occur. The label withholding period of grazing is seven days. Always refer to the label before applying any herbicides to pastures where livestock will be grazing, as withholding requirements may vary.

Grazing should start at stocking rates high enough to remove the target weed within two weeks. The label

recommendation of four to five times the long-term stocking rate is suggested to achieve this desired grazing pressure, however smaller paddocks may not require this intensity.

The effectiveness of the treatment is lessened as the grazing period is extended or the start of grazing is delayed.



Required pasture removal: feed on offer before grazing (left) and after grazing (right)

Animal selection

Spray-grazing requires the removal of as much of the weed as possible. Sheep are more effective in achieving the desired grazing height than cattle because they graze closer to the ground. Grazing with cattle to a maximum pasture height of 4cm is a minimum target and lower heights are desirable when grazing with sheep.

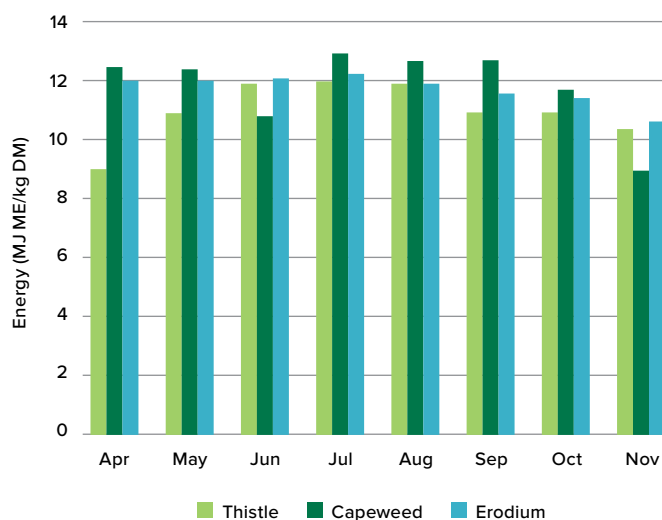
The pasture must be grazed down to reduce the chance of weeds growing back due to residual sugars in the uneaten leaves.

The effect of reduced intake as feed on offer declines is partially offset by the high quality of the weeds being eaten (Figure 2).

Where possible avoid grazing with animals with metabolic sensitivities, such as late-pregnant ewes or cows, or animals in light condition.

In a spray-grazing paddock demonstration run by Southern Farming Systems at Inverleigh, Victoria, animals gained weight. Composite lambs gained 410g/head/day over a 21-day grazing period and ewes maintained a condition score of 3.3-plus.¹

Figure 2: Energy content (MJ ME/kg DM) for spray-grazing target weeds throughout the growing season



Pasture recovery

Pasture regrowth will be affected because leaf area is lower than desirable, bare ground has increased and the clover will also be impacted. Expect lower than normal pasture growth for the two months following treatment.

The largest effect on sub-clover production will occur three to five weeks after application, with some studies showing a short-term decline of between 10–40% after application of MCPA® Amine.^{2,3}

Long-term, the clover will recover, producing runners to populate bare areas, leading to higher overall clover content.

Remaining plants need an extended period of rest to recover. The next grazing should occur once the perennial grasses have reached at least three new leaves per tiller.



Antas sub-clover three weeks after spraying with MCPA® Amine 750 at 940mL/ha in late June (right) compared to unsprayed (left). Image: Mark Slatter, Nufarm

What are the risks?

Spray-grazing is not without risks to livestock and the pasture.

Pastures

The intent of spray-grazing is to remove broadleaf weeds to create space for desirable species to expand. An integrated approach to weed management is required, otherwise the benefits from the technique will be lost.

If those desirable species are not present, bare ground will eventually be populated by other weeds. Therefore, the decision to use this technique should take into consideration the existing plant population.⁴

Grazing management and soil fertility are also important to create a favourable environment for the desirable species to compete against the weeds.

There is also likely to be a temporary reduction in pasture growth. This is partially offset by the stock eating weeds they would generally avoid, however some short-term reduction in pasture growth will be encountered. The technique should be used sparingly and avoided when feed supply is low.



Animals

Stock are likely to eat increased quantities of these treated plants. This may cause nitrate or nitrite poisoning and/or liver damage. The more broadleaf weeds present, the higher the chances of poisoning, especially if the paddock has high soil nitrogen and has experienced frost conditions.

Also some weeds, like capeweed, have a high water content (greater than 90%) and low fibre (neutral detergent fibre of less than 35%) and this can result in loose faeces (Table 1).

To reduce these risks, avoid introducing hungry stock and consider feeding roughage to reduce intake of the weeds.

Delays in grazing can lead to partial weed recovery, lessening the effect of the treatment. To ensure adequate and timely grazing, consider boxing mobs of animals together. If multiple paddocks are to be treated, a staged spraying program should be considered.

Table 1: Feed quality of capeweed throughout the growing season

Month	Dry matter (%)	Crude protein (%)	Neutral detergent fibre (%)	Digestibility (%)	Metabolisable energy (MJ/kg DM)
Autumn average	8	34	32	82	13
Winter average	10	24	31	83	13
September	12	26	29	83	13
October	14	19	34	77	12
November	19	11	44	61	9

References and more information

1. Brogden J (2020) Spray grazing – Turning weeds into feed, *2019 SFS Trial Results Autumn 2020*. Southern Farming Systems.
2. Evans PM, Smith RS, Carpenter JA and Koen TB (1989) Tolerance of subterranean clover cultivars and balansa clover to selective herbicides in Tasmania, *Australian Journal of Experimental Agriculture* 29(6), 785–789.
3. Sandral G and Dear B (2005) Weed control options in annual pasture legumes, Rural Industries Research and Development Corporation.

The herbicide label provides all the critical comments and precautions for the safe and responsible use of this technique. Always read the label and only use as directed.

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