

How do I increase my pasture persistence?

The issue:	Poor seedling recruitment, weed incursions and soil limitations result in perennial ryegrass, sub-clover and phalaris pastures failing to persist in south-eastern Australia.
The impact:	Livestock production potential is not achieved and producers face costs for pasture renovation.
The opportunity:	Early intervention and lifetime management can increase the length of a pasture's peak production period and lift the return on investment.

How do I know if my pastures are failing to persist?

Counting the number of perennial grasses per square metre is a good way to assess:

- how well the plants have established
- how well the sown plants are persisting.

To measure plants/m², make up a quadrat (25 x 25cm metal or plastic square). Throw the quadrat 20 times across the paddock and record the number of perennial plants inside the quadrat.

Work out the average number of plants recorded inside the quadrat. Multiply results by 16 to convert to plants/m².

Pastures will recover with careful grazing management if you have 5–8 perennial plants/m².



Quadrat in action

Get a handle on ground cover

Ground cover includes existing pasture, weeds and other herbage, as well as litter. To estimate ground cover, stand in a representative part of the pasture with your feet 30cm (one foot) apart. Picture a 30cm square in front of you and, looking vertically into the pasture, estimate the percentage area covered by plant matter and litter.

Walk over the paddock and repeat the assessment at about 20 random sites. Record and average the results to accurately determine the percentage of ground cover. One way to conduct this is to take photographs at each site and then compare them.

What does it mean?

Ground cover at 20% means:

- high water and soil loss
- poor plant production and sustainability
- low water infiltration
- plants exposed to climate extremes
- low microbial activity
- poor organic content
- poor soil structure
- low plant and green leaf vigour.

Ground cover at 90% means:

- minimal water run-off and soil loss
- good topsoil and nutrient retention
- minimal weed colonisation risk.

Profitable persistence

What is profitable pasture persistence in a high-performing farming system? It is when pastures perform at peak production for the maximum length of time while meeting the needs of the production system within local conditions.

Well-managed pasture establishment and early intervention will reap more productivity long term and could potentially extend production by at least five years. Interventions such as weed control, encouraging reseeding and nutrient application need to be timely and well managed to increase the chances of good persistence.

An MLA-funded Perennial Pasture Systems (PPS) Producer Research Site project (B.FDP.0051) found maintaining a phalaris pasture may be different to having it produce at its potential, and achieving its full potential required a higher level of management. Persistence doesn't equal production.

Why do pastures fail to persist?

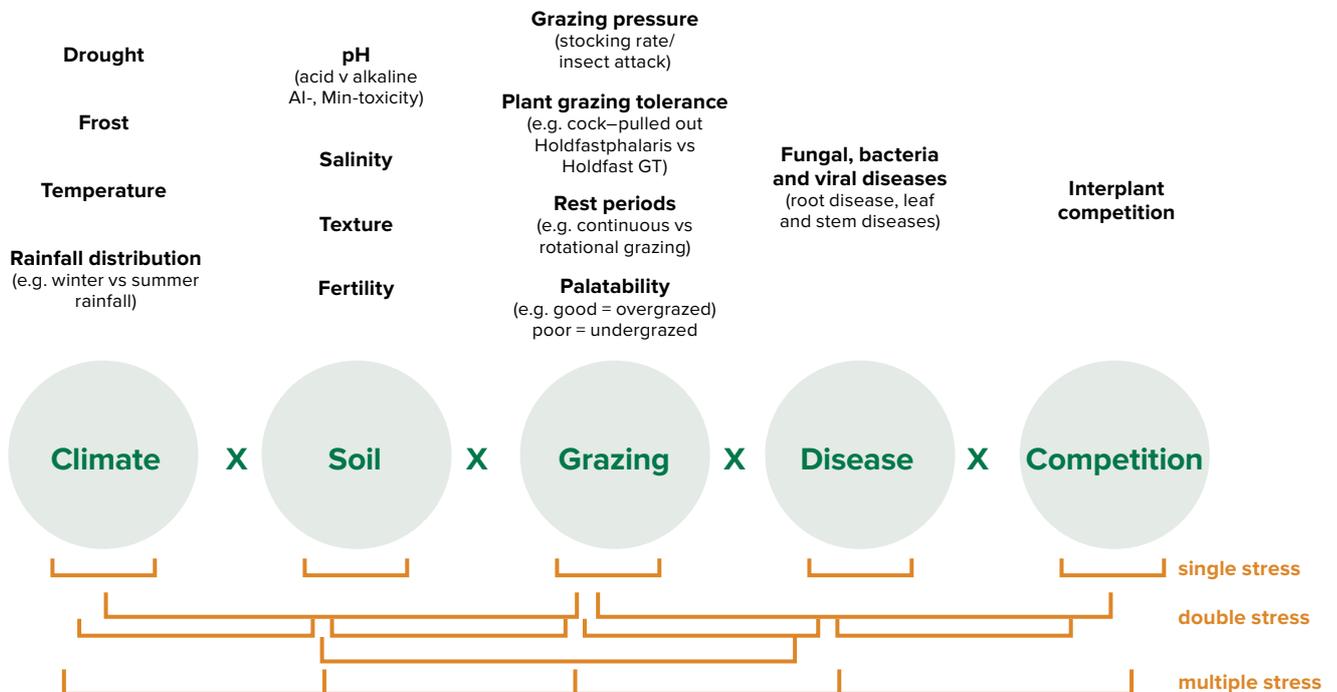
Phalaris and ryegrass-dominant pastures are impacted by:

- multiple stresses (see Figure 1 below)
- soil nutrient levels
- plants not allowed to regenerate or set seed
- poor grazing regimes.

The PPS project found:

- optimal paddock size to improve phalaris persistence is less than 20ha
- producers underestimated the quality of old phalaris stands and the potential to rejuvenate them into productive pastures
- preconceived ideas that phosphorus levels and annual rainfall had significant impact on persistence were not true
- persistence and productivity are not always mutual
- supplying nitrogen to phalaris via good sub-clover production in mixed pastures positively impacts production
- as little as five phalaris plants/m² can constitute a productive phalaris pasture.

Figure 1: Stresses affecting pasture persistence in southern Australia emphasising the potential for interaction between stresses (Culvenor and Simpson, 2014)



Pasture persistence strategies

- Fully assess paddocks – it may be more cost-effective to renovate seriously run-down pastures.
- Establish whether your pastures are merely persisting or are reaching maximum productivity.
- Minimise combined stresses on pastures. Ryegrass has a shallow root system which struggles with long hot summers and insect attack.
- Apply early intervention weed control in ryegrass-based pastures. Weeds weaken pastures by taking nitrogen and moisture.
- Increase the percentage of perennials in the mix.
- Allow ryegrass to reseed naturally.
- Identify nutritional deficiencies in the soil.
- Graze strategically to encourage reseeding and good utilisation.
- Plan the management of weeds and understand the input costs and time involved in spraying versus pasture gains.
- Understand the impact of some herbicides on growth rates of species.
- Ensure good supply of nitrogen via other nitrogen-fixing species in the mix (e.g. sub-clover).
- Manage soil pH for phalaris persistence. As soil pH increased, so did persistence.
- Address low soil potassium in ryegrass pastures. Low potassium puts the plants at risk during drought, limits seed production and reduces growth.

Persistence in hard-seeded legumes

MLA-funded research (B.PSP.0013) on pasture establishment and grazing guidelines for persistent pastures in hard-seeded annual legumes developed guidelines for managing the seed bank in hard-seeded annual legumes.

Seedling regeneration occurs via three means:

- retaining residual herbage to achieve seed yields of 150kg/ha in spring
- the spread of seeds via livestock digestion
- the storage of the hard seed in the soil in tough seasons for regeneration in good conditions.

Due to the hard-seeded nature of the species, it means more than 50% of ingested seed remains viable after digestion.

Management recommendations for newly sown hard-seeded legumes:

- **Biserrula:** Graze in spring down to a residual herbage of 1,500kg DM/ha for a seed yield of 150kg/ha, which should result in 500 plants/m² to regenerate the following autumn.
- **Arrowleaf clover:** Graze to 2,000kg DM/ha for 150kg/ha of seed and 500 plants/m².
- **Bladder clover:** Graze to 1,750kg DM/ha.

In poor seasons it is recommended to forego grazing to ensure maximum seed production.

Providing there has been a seed bank in the order of 150kg/ha in the establishment year, grazing no lower than the minimum targets mentioned every two to three years should maintain an adequate seed bank.

Hard-seeded annual legumes can be established using the following techniques:

- summer sowing – where seed in pods or unscarified is sown in mid-to-late summer to soften over late summer and early autumn, allowing establishment on autumn rain (not all varieties are suitable and producers need to seek advice on this)
- scarified seed sowing, which is suitable for all species
- undersowing seed in pods with cereal crops for emergence as a pasture the following year.

Making more from ryegrass

Victoria's South West Prime Lamb Group (SWPLG) ran a four-year MLA-funded Perennial pasture persistence Producer Research Site project (B. FDP.0052) to help producers understand why ryegrass-based pastures were failing to persist longer than six years.

It found the key to maintaining peak production for as long as possible was early intervention in pasture management, particularly with weed control.

The starting point is to measure and understand the content of perennial ryegrass and weeds and soil conditions in autumn and then establish if and when interventions will be needed according to the production system.

Managing barley grass and silver grass and strategic spelling of ryegrass pastures were found to be the most beneficial interventions. Generally, weed interventions worked best if carried out for two consecutive years, particularly if the weed content was high in the first year.

Over sowing/direct drilling without weed control proved to be of no value as weeds outcompeted new seedlings.

The Producer Research Site also demonstrated that strategic use of a seedling recruitment intervention when numbers started to decline, or following a poor spring, was beneficial.

How do you do this? In the trial, mesh was attached to the back of a motorbike and dragged across the pastures. The concept was to reduce the traditional lock-up periods (when there is enough grass in late spring) from four months to eight weeks – which is followed up by a spell of three to six weeks following the autumn break.

The trial found if 1,000kg/ha of viable seed hits the ground and only 3% survives, that equates to 30kg/ha of seed.

Before implementing such a program, producers need to consider the following:

1. Is the pasture free from weeds to avoid weed seed set, as well?
2. How long can the paddock be spared?
3. Do they understand when flowering occurs and are they prepared to lock up the paddock at this time?
4. Is it economically viable to supplementary feed livestock due to reduced pasture access?
5. How will seedy pastures be managed to avoid seed infestation in sheep?



Seedling recruitment intervention strategy

The importance of nutrition

Regular testing of soils and an understanding of nutrient depletion and cycling underpins good decision making on the application of nutrients.

The three important nutrients are:

1. Nitrogen, which can be supplied to pastures as follows:

- via pasture plants
 - pasture nitrogen is supplied from legumes (clovers, medics) which fix nitrogen from the air through their root systems
- high rates of fertiliser nitrogen
 - applied after every grazing or every second grazing while pasture is growing
 - useful for maintaining high stocking rates
 - should be used if legume content is <25%
- strategic fertiliser nitrogen
 - when adequate nitrogen is being supplied by legume populations but fertiliser is applied to fill short-term feed gaps during cool periods.

2. Phosphorus, which can be applied to pastures as follows:

- single and triple superphosphate, phosphate fertiliser or poultry litter
- using lime on strongly acidic soils can make phosphorus more available to plants
- on high-production farms, such hay farms, six-monthly or annual applications of phosphorus can be necessary.

3. Sulfur, which can be applied to pastures as follows:

- single superphosphate
- gypsum
- sulfur-coated urea.

Producers need to be aware of the guidelines for successful application for their pasture type and location, which includes timing, pasture height, rates and suitable soil conditions.



No stress



Under stress

How do I diagnose soil deficiencies?

- Soil testing. This can be arranged through local agronomists, advisors, government departments and fertiliser agencies.
- Visual assessment such as checking for changes in plants. Generally visual signs appear after yield has been compromised.
- Plant tissue testing. Consult a specialist as to how to take the test and where to submit samples.
- Animal sample testing. This can be arranged through a veterinarian.

More information

Download the MLA Pasture Health Kit mla.com.au/pasture-health-kit

MLA's Tips & Tools:

Tactical grazing to maximise pasture and animal productivity mla.com.au/tactical-grazing

Looking after drought pastures mla.com.au/globalassets/mla-corporate/12943-looking-after-drought-pastures.pdf

Making perennial ryegrass-based pastures productive mla.com.au/perennial-ryegrass-pastures

Winning against seeds mla.com.au/winning-against-seeds

Weed removers, pasture improvers – effective weed control mla.com.au/weed-removers

and MLA publications on using biserrula, bladder clover and French serradella to increase crop and livestock production

Making the most of phosphorus fertiliser applied to soils mla.com.au/managing-soils

Managing soils to keep them healthy and productive mla.com.au/phosphorus-fertiliser

More Beef from Pastures:

Pasture utilisation: Tool 3.01 *Pasture rulers, sticks and meters* mbfp.mla.com.au/pasture-utilisation/tool-31-pasture-rulers-sticks-and-meters/

Pasture growth: Tool 2.11 *Grazing management tactics* mbfp.mla.com.au/pasture-growth/tool-211-grazing-management-tactics/

Read the full research report from the [South West Prime Lamb Group](#)

Making More From Sheep:

Tool 6.2 *Measuring groundcover and litter levels* makingmorefromsheep.com.au/healthy-soils/tool_6.2.html

Tool 7.5 *Grazing management guidelines for individual species* makingmorefromsheep.com.au/grow-more-pasture/tool_7.5.html

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