

### Growing and using chicory in southern Australia



*Chicory and subterranean clover - Hamilton Proof Site*

#### Chicory – the plant

Chicory is a summer-active perennial herb suited to areas with annual rainfall of at least 550 mm. It has a tap root that can access moisture from 2–3 m in the soil profile. Soil moisture data from EverGraze indicates it dries the soil to 3 m, which is comparable to lucerne.

Summer rain is particularly important – see the guidelines below which are based on experience in southern Victoria. If chicory can access subsoil moisture then it may be able to be grown in slightly drier conditions. Chicory has been successful in many situations including sands in WA and clay loams in Vic.

#### Summer rainfall requirements for chicory

December–March

Soil type	Average rainfall/month
Sandy loam	40 mm
Clay loam	30 mm

Chicory provides herbage with high digestibility and high zinc, copper, manganese, magnesium, phosphorus, calcium and potassium levels, from October to April. It is usually more nutritious than grass pasture species.

Chicory is well suited for winter-spring lambing sheep systems. It provides a high quality diet for weaned lambs in summer, is ideal for increasing ewe liveweight over summer and provides an energy boost immediately before joining.

Chicory can be sown as a pure stand or with other summer-active species such as lucerne, summer-active tall fescue, plantain or brassicas. Sub clover should be included to provide nitrogen for the chicory.

#### Actions summary

- ▶ **Summer-active perennials provide quality forage for livestock over summer and autumn**
- ▶ **Summer-active perennials use soil water and help reduce soil salinity**
- ▶ **Chicory is a summer-active, deep-rooted perennial herb that is suitable for areas too wet or too acid for lucerne**
- ▶ **While chicory plants often only persist for 3–5 years, managed reseeding can extend stand life to 6–8 years**



Three year old chicory growing in deep sand near Albany WA

## Does chicory suit my farm?

Chicory should be considered for soils that are too wet or too acid to grow lucerne. Chicory does not cause bloat but if lucerne grows well on your farm it will be a better option than chicory.

Weed control is easier in lucerne because there are no registered herbicides for weed control in chicory. If the paddock has a history of thistles, it will not be suitable for chicory.

Winter grazing must be carefully managed, especially if the paddocks are wet. Stock should be removed if there are any signs of damage to plant crowns. Chicory has a habit of sending up unpalatable reproductive stems in spring, therefore it cannot be used to accumulate a large volume of herbage in spring to overcome feed shortages in summer.

Chicory is not suitable for hay but it can be used for silage.

Chicory can be an alternative to annual brassica crops. It will not provide as much feed in the first summer, but it has good resistance to the insect pests that plague brassica crops and so is a 3–4 year semi-permanent fodder crop.

### Which paddocks and soils?

Chicory tolerates lower pH, higher aluminium, higher soil salinity and more waterlogging than lucerne though precise values are unclear. Soil modification prior to sowing chicory (lime, drainage) is usually not necessary.

While chicory will tolerate short periods of waterlogging in winter, grazing under wet conditions should be avoided. Persistence on heavy, wet clay soils is often poor due to crown damage during grazing and subsequent infection by fungal diseases caused by *Sclerotinia* spp.

Chicory is well suited to recharge areas as well as lower-lying paddocks where soil moisture is available. Soil water measurements at the Hamilton EverGraze Proof Site have shown that chicory has significantly dried the soil to 3 m compared to paddocks sown to perennial ryegrass.

## Managing paddocks ahead of sowing chicory

It is critical to control weeds two years prior to sowing. Spray-topping and winter cleaning should be used to control annuals. If onion grass is present, chemical control should be undertaken. In the year before sowing, red-legged earth mite should be controlled.

A knockdown herbicide should be used 2–3 weeks prior to sowing.

Establishment of chicory following cereal crops is more successful than going directly from pasture to chicory due to improved seedbed and tillage at sowing.

Chicory should not be sown after brassica crops as both species are susceptible to the same diseases.

Chicory responds to high soil fertility so soil tests should be used to identify the need for nutrients. Based on limited data, it is assumed that chicory requires the following soil nutrient levels:

- phosphorus: 10–15 mg/kg (Olsen)
- potassium: 150–200 mg/kg (Colwell)
- sulphur: 8–10 mg/kg.

## Cultivar selection

### Longer term chicory pastures

Cultivars such as Puna, Puna II and Choice are winter dormant but are the most persistent. With good management these cultivars should last 3–4 years; though with managed reseeding this can be extended.

### Short term chicory pastures

Cultivars such as Grouse and Chico are more winter active but commonly persist for only 1–2 years.

New cultivars of chicory are released regularly and the Pasture Species Database maintained by the Grassland Society of Southern Australia is one way to keep up with current cultivars. Visit the database at <<http://www.grasslands.org.au/pasturespecies.htm>>.



*Chicory seedlings three months after spring sowing - Hamilton Proof Site*

## Establishment

Sow chicory in spring (August–October).

Chicory seed should be treated with insecticides to reduce insect damage. Suggested seeding rates assuming chicory is sown into a prepared seedbed are:

- pure chicory stand: 4–5 kg/ha
- chicory + lucerne: 2–3 kg/ha chicory, 6–8 kg/ha lucerne.

Seed should be covered with 1 cm of soil and paddocks should be rolled after seeding to provide good seed-soil contact. The seed germinates over 2–8 weeks so initially, germination may look poor.

Chicory can be established by direct drilling but seeding rates should be increased by 20%. Direct drilling works best on sandy loam and clay loam soils. Cultivated seed beds are preferred on heavy clay soils to provide good seed-soil contact.

Chicory is responsive to nitrogen fertiliser. It should be sown with DAP at 100 kg/ha (18 kg N/ha, 20 kg P/ha) to ensure good establishment and to give it an advantage over weeds.

### Over-sowing with chicory

When over-sowing chicory with sub clover, avoid damage to existing chicory plants. Disc drills with wide spacing used at 90 degrees to the established chicory are best suited to this task but narrow “Baker Boot” style drills can also be used. Air seeders with wide wings must not be used.

## Companion species

Chicory is normally sown with sub clover, which will provide nitrogen. Other perennials may be included in the mix but care should be taken to ensure that the companion species do not compete too strongly during establishment. Ideal species are lucerne, summer-active tall fescue and plantain. If the paddock has a good clover history, then regeneration following chicory establishment should be sufficient. However, if the paddock has a poor clover history, sub clover should be over-sown the following autumn at 10–15 kg/ha.

## Grazing management

When first introduced to chicory, livestock may take several days to accept the different looking and tasting herbage. During this time, they may selectively graze grass or weeds in the paddock. However, once accustomed to chicory, they will readily consume it.

New chicory should be grazed when the plants are 15–20 cm high, and down to about 10 cm high. Grazing must be for short periods with high stocking rates, ie 3–5 days, 100 DSE/ha. Subsequent grazing can be to lower residuals (5–10 cm) but a recovery period of 3–6 weeks is required.

Chicory pastures must be rotationally grazed to avoid selective grazing of the chicory and to allow the plants to build energy reserves. Following are recommended grazing strategies for each season.

- **Spring:** spell for 3 weeks between grazing. If flower stalks start to appear, grazing pressure must increase to keep the plant in a vegetative state for as long as possible. Towards the end of spring, it is often difficult to control all flower heads and mechanical slashing may be required.
- **Summer–autumn:** spell for 5–6 weeks between grazing. After these spells, the chicory should have 3 new leaves and be 15–20 cm high.
- **Winter:** chicory should only be grazed when the paddock is dry, ie no evidence of soil pugging; long spells of 6–10 weeks are required for recovery.

Stock grazing chicory especially in spring should have current vaccination against clostridial disease. Due to high copper levels in chicory, sheep treated with copper supplements should not be grazed on chicory.

It is commonly reported that sheep grazing chicory have lower worm burdens than if grazing conventional pastures. This may be due to naturally occurring anti-helminthic chemicals in the chicory or just the taller growth habit of the chicory so that animals do not ingest worm larvae from the soil.



*Chicory allowed to go to seed at Hamilton, summer 2006–07*

## Nutrition management

Chicory is responsive to nitrogen and pasture management. Companion species selection should encourage a high legume content (lucerne and/or sub clover) to fix nitrogen for the chicory.

Urea should be applied in August–September at 100 kg/ha (46 kg N/ha) to make best use of the spring conditions for chicory growth.

Annual applications of at least 20 kg P/ha are recommended.

## Weed control

There are no registered herbicides available for use in chicory. Therefore, weed control relies on grazing and promoting a dense, vigorous chicory stand. The critical steps of a weed control program are as follows.

- Ensure a weed-free site prior to establishment – if the paddock has a history of thistles don't sow chicory.
- Use nutrients and soil treatment to encourage chicory to be more competitive.
- Rotationally graze chicory with high stocking rates to ensure that weeds are eaten.
- Use companion species to reduce the opportunity for weeds to colonise gaps in the pasture.

Agronomic advice should be sought on winter cleaning and spray-grazing to control grass weeds in pastures containing chicory.

## Encouraging reseeding of chicory

Chicory stands thin out with 20–30% of plants dying each year. Allowing seed set, and then encouraging recruitment of new seedlings in the third or fourth season after sowing can help to rejuvenate stands.

Spring sown chicory will not normally set seed in the first year as the plants need to go through a cold period to stimulate seed set in late spring.

The following steps will promote reseeding.

- Rotationally graze the chicory through spring, using high stocking rates to ensure weeds are consumed.

- In November–January, spell the paddock from grazing and allow seed heads to develop and seed to ripen. The chicory should not be spelled from grazing until weeds have finished seeding, otherwise weed prevalence will increase.
- Chicory flowers from late spring right through summer. Its flowering habit is like canola from bottom to the top but over an extended period. The seeds mature some 20 days after pollination. Commence grazing after the majority of seeds have matured.
- In autumn, graze off any green chicory leaf and then slash the paddock to spread the seeds, get rid of the coarse stems and encourage new growth from the base of the plant.
- Some bare ground is needed to allow seeds to germinate in autumn. Experience at DPI Hamilton (Victoria) has shown that new seedlings continue to establish up to 18 months after reseeding occurred.

## Disease and pests

Sclerotinia is a fungal disease that commonly affects older stands of chicory (it is caused by several *Sclerotinia* spp). Symptoms are occasional dead plants in a stand which on inspection may contain small black 'pellets' near the crown. The disease spreads into new plants via damage to the crown. The best way to reduce spread and impact is to avoid damage to the plant crown, ie avoid grazing when wet, pugging, and over-sowing with tined implements. There is no control for Sclerotinia.

Chicory is resistant to heliothis and diamond back moths and so does not need application of insecticides.

## Trialling chicory on farms

- Consider how you can benefit from quality herbage in summer.
  - What animals would best use the feed?
  - Are you prepared to apply the management required for success?
  - Is chicory or lucerne the most appropriate summer-active species for your farm?



New plants in May 2007  
following summer reseedling -  
Hamilton Proof Site

- Select a small paddock that can be easily managed and does not have weed problems.
- Soil test to determine nutrient requirements and control weeds in the two years prior to establishment.
- Seek agronomic advice on companion species, sowing time and cultivars.
- Don't skimp on weed management prior to sowing, seeding rates or fertiliser use. It's better to do small areas well.
- Manage grazing to ensure that the plants are not damaged – especially in winter.
- Allow the stand to seed in the third year to boost plant density.

#### Authors

Geoffrey Saul, Pasture Utilisation Consultant  
PSA Services, 98 Leura Lane, Hamilton, Victoria  
geoff.saul@bigpond.com

Steve Clark, Pasture Agronomist  
Department of Primary Industries, PB 105, Hamilton, Victoria  
steve.clark@dpi.vic.gov.au

#### Further information

Chicory. NSW Agriculture AgFact P2.5.40 Information available from <<http://www.agric.nsw.gov.au/reader/past-varieties/chicory-part-a.htm>>.

## Case Study

### Chicory at Mokanger, Cavendish, south west Victoria

Shane Arnold, manager of *Mokanger*, aims to increase the area of chicory-based pastures on the 2000 ha property to about 120 ha.

Currently, 90 ha have been established with additional sowing held over due to recent tough seasonal conditions. Chicory has been established with sub clover and either tall fescue, phalaris or cocksfoot.

Shane's aim with the chicory is to move lambing back to September–October so that the feed demand of the ewes fits better with the pasture growth, and lambing occurs during better weather conditions. The chicory provides high quality forage at weaning and may also be cut for silage.

The original chicory pastures are now four years old and are still in quite good condition. Managed reseedling may be used to thicken up the chicory if plant populations start to decline.

### EverGraze on line: [www.evergraze.com.au](http://www.evergraze.com.au)

For further details of EverGraze and to find out about activities in your area go to <[www.evergraze.com.au](http://www.evergraze.com.au)> or write to Geoffrey Saul, National EverGraze Coordinator, 98 Leura Lane, Hamilton, VIC 3300.

### EverGraze is a Future Farm Industries CRC, MLA and AWI research and delivery partnership



Established and supported under the Australian Government's Cooperative Research Centres Program. Through the implementation of innovative research outcomes and new technologies, the Future Farm Industries CRC is developing new and adaptable farming systems for Australia that will improve livestock and cropping industries productivity, offer new woody crop options, make better use of limited rainfall and create more diversity in landscapes.

© EverGraze, 2008

#### Disclaimer

The information provided in this publication is intended for general use, to assist public knowledge and discussion and to improve the sustainable management of grazing systems in southern Australia. It includes statements based on scientific research. Readers are advised that this information may be incomplete or unsuitable for use in specific situations. Before taking any action or decision based on the information in this publication, readers should seek professional, scientific and technical advice.

To the extent permitted by law, the Commonwealth of Australia, Future Farm Industries CRC, Meat and Livestock Australia, and Australian Wool Innovation (including their employees and consultants), the authors, the EverGraze project and its project partners do not assume liability of any kind resulting from any persons use or reliance upon the content of this publication.