Prarie grass

(Bromus Wildonowii Kunth)

prepared by Bill Fulkerson

SUMMARY

Prairie grass appears to be more productive and persistent than perennial ryegrass as a temperate dairy pasture, due to its more extensive root system, better heat tolerance and ability to regenerate from naturally-shed seed.

Recommended practices include:

1. Establish in a weed-free seedbed with at least 50kg/ha prairie grass and 3-4 kg/ha white or red clover seed before mid-April.
2. Apply 500-600kg/ha of superphosphate-muriate of potash mix/ha at sowing and 50kg/ha of nitrogen after every second grazing when pasture is grass dominant.
3. Graze at about 4 new leaves/tiller, which would be 30-40 days in winter to 18-24 days in spring. A long interval in mid to late spring is critical to form a senescent mat and allow seed to set and shed.
4. If weed infestation becomes high, spray out pasture with appropriate herbicide in mid-summer and allow naturally shed seed to establish new sward.
5. Retain a 4 leaf/tiller grazing interval in autumn. Deferring grazing provides no advantage in a weed-free pasture. In a weedy pasture, deferring grazing allows greater weed establishment.
6. Prairie grass is sensitive to pugging by stock, delay grazing until drier – drain the area.

ORIGIN

Prairie grass is a brome grass which originated from the Pampas region of South America. The most common variety is Grassland Matua which was selected in New Zealand for rationally grazed dairy pastures. Other varieties include Tango and Atom.

ROLE OF PRAIRE GRASS

Prairie grass has been commonly used as a replacement for perennial ryegrass for its greater tolerance to heat and moisture stress, while its nutrient quality is as high as perennial ryegrass.

Cattle prefer prairie grass over perennial ryegrass at all stages of growth, and prairie grass retains leaf quality, even during seed set.

Prairie grass is a genuine temperate perennial grass replacement for perennial ryegrass for inland areas and all areas north of Sydney, where perennial ryegrass does not persist. In southern Victoria and Tasmania there is unlikely to be any benefits of replacing perennial ryegrass with prairie grass.

ESTABLISHMENT

Soils

Prairie grass is similar to lucerne in that it grows best in well drained soils. It does not tolerate water logging and pugging by stock.

Like ryegrass, prairie grass, requires a high fertility soil and responds very well to nitrogen. To assess potassium or phosphorous a soil test is needed. Sowing with 100kg/ha diammonium phosphate/ha is a good practice.

Sowing

The growth of prairie grass in winter is nearly as good as perennial ryegrass in winter. Prairie grass is slow to establish under colder conditions.

Sow into a prepared seedbed in early autumn, preferably following a summer crop to reduce the weed seed bank. Sow at 60kg/ha prairie grass seed plus 4kg/ha white or red clover. Use fungicide-treated seed to prevent head smut (Ustilago bullata) and clipped seed. Direct drilling into an existing pasture is not recommended.

It is worth doing a germination test before sowing because the germination rate of prairie grass can decline to very low levels (<20%) if seed is stored for prolonged periods, particularly in hot and humid conditions.

Grazing

If prairie grass pasture becomes infested with C_4 summer grasses, spray the area with 2-3L/ha of glyphosate in early- to mid-February. The timing will depend on rainfall. If the main seed is shed in mid-January, then the seed remains relatively dormant until mid-February.

After germination, continue to water if irrigation is available. The new plants can then re-establish from seed set previously (see later under grazing).

When rejuvenating a pasture from naturally shed seed, the density is often too high, so graze hard when seedlings are 10–15cm high to allow a proportion of plants to be pulled by stock, then apply nitrogen. Most seedlings will die from competition for nitrogen and moisture if not thinned out or if grazing is deferred in autumn to allow establishment. If plant density is adequate when sown in a prepared seed bed or from naturally-shed seed, graze only when seedlings are well anchored.

GRAZING MANAGEMENT

Vegetative stage (April to September)

Graze at the 3-4 leaf stage but before senescence of the older leaves, to allow soluble carbohydrate reserves to accumulate. Graze earlier if pasture is severely lodged. This will maximise persistence, regrowth, utilisation by stock and herbage quality.

Set stocking is not recommended as it reduces survival.

Grazing duration should be two days or less otherwise regrowth will be retarded by cows grazing new shoots.

To ensure good regrowth, graze more laxly than ryegrass, to 6–10cm stubble height as the plant reserves and buds are contained below this.

Grazing more severely, won't damage the pasture as long as it is given an adequate regrowth interval (>3 leaves/tiller).

Reproductive growth (October to January):

Prairie grass begins to set seed from mid-September. From mid-November, graze laxly at an interval of three weeks, so that 2–3 seed heads/m^2 remain intact. This lax grazing has two benefits:

1. Even under good management, only about two thirds of prairie grass plants survive summer. To 'perenniate', the pasture relies on natural seedlings from seed set in spring.
2. The lax grazing in early summer allows a mat of senescent material to build up. This greatly reduces evaporative loss and keeps soil temperature much lower. It also prevents C_4 summer grasses and other weeds from germinating.

Studies on the subtropical north coast of NSW confirm the need for a relatively long grazing interval in spring to ensure plant survival through summer and seedling recruitment in autumn (see Table 1).

Table 1. Yield (kg DM/ha) of prairie grass pastures after two years establishment at Wollongbar on the north coast of NSW. Effect of grazing at 1, 2 or 4 leaves/tiller stage of growth on plant survival, prairie grass seedling recruitment and invasion of kikuyu plants.

Grazing interval in spring	Yield over 2 years (kg DM/ha)		Plant density in autumn, third year (plants/m2)		
(No. leaves)	Prairie grass	White clover	Kikuyu	Prairie grass (original)	Prairie grass (new seedlings)
1 leaf	22,700	2,850	14.8	5.1	36
2 leaves	28,000	2,902	9.3	9.7	107
4 leaves	28,600	3,560	5.3	12.0	96

Although a 2-leaf interval gave the same yield as 4 leaves, plant survival was less and more kikuyu plants invaded.

FERTILISER MANAGEMENT

Nitrogen should be applied at the equivalent of 40-50kg/ha after every second grazing as this reflects growth and hence nitrogen needs.

Adequate soil nitrogen availability is reflected in a herbage content of 3.5% nitrogen or more. Nitrogen content may rise to more than 5% in dairy pastures heavily fertilised with nitrogen or in ryegrass/white clover pastures.

In contrast, the milking cow only requires about 2.8%, with excess nitrogen being excreted in urine. A high concentration of urea in urine (can be >800kg in a urine patch of nitrogen in a urine patch) can be toxic to plants, leaving bare patches where plants have died (known as pasture 'scorch'). In some cases this can cause significant areas of the paddock to become unproductive. To minimise this risk, ensure that total nitrogen intake by cows is not greater than about 3% of DM (about 18% crude protein in the diet)

The amount of phosphorus and potassium applied depends on the initial soil status and the amount removed by animals.

NUTRIENT CONTENT

Because prairie grass is notoriously low in magnesium a supplement will be needed if prairie grass is a major part of the diet for long periods.

Apart from this, the nutrient content of prairie grass is similar to perennial ryegrass. In late spring/summer prairie grass probably has better metabolisable energy density (see Table 2).

Table 2. The nutrient content (%), metabolic energy (MJ/kgDM) and water use efficiency (MJ ME/mm water) of prairie grass and perennial ryegrass (vegetative state) and in comparison to cow requirements.

Nutrient/WUE (% DM)	Perennial Ryegrass (vegetative)	Prairie grass (vegetative)	Cow requirements[b]
Metabolisable energy (MJ/kgDM)	11.4	10.7	10.3
Nitrogen	3.9	4.2	2.4
Non-protein N	0.9	1.4	N/A
Nitrate N	0.10	0.09	0.14d
Crude Protein	24	26	15
Acid Detergent Fibre	23	24	18e
Neutral Detergent fibre	49	42	45
Water Soluble Carbohydrate	7.8	7.6	
Calcium	0.53	0.50	0.51
Phosphorus	0.22	N/A	0.33
Potassium	2.2	3.0	0.9
Magnesium	0.28	0.22	0.2
Sodium	0.38	0.35	0.18
Chloride	0.10	N/A	N/A
Sulphur	0.43	N/A	0.2
ERDP:FME (g/MJ)[a]	17	22	10
Water Use Efficiency (MJ ME/mm water)			
Winter	360	`310	-
Summer	160	160	-

Note: All figures %DM except where otherwise stated
a – Rate of effective rumen degradable protein (ERDP) to fermentable metabolisable energy (FME)
b – Requirements for a 600kg Holstein-Friesian cow giving 20 litres milk/day
c – Includes all water – irrigation, rain and use of soil moisture

REFERENCES

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Fulkerson WJ et al. (2007) Nutritive value of forage species grown in the warm temperate climate of Australia for dairy cows: grasses and legumes. Livest Sci. Vol 107.

About FutureDairy

FutureDairy aims to help Australia's dairy farmers manage the challenges they are likely to face during the next 20 years. The challenges are expected to be related to the availability and cost of land, water and labour; and the associated lifestyle issues.

Our activities are structured around three priority areas – Forages, Feeding and Innovations. These are the areas where there are opportunities to address the challenges related to water, land and labour resources.

FutureDairy's approach is unique in that our work considers Science, Systems and People issues. In addition to conducting trials on research farms (Science), we explore how our findings work under commercial conditions on Partner Farms (Systems). We also use social research to help understand the social issues (eg labour, lifestyle and practical implications) involved in taking on new practices and technologies (People).

Our Forages work is all about producing more home grown feed from the same area of land. We are investigating the potential to concentrate resources (water, fertiliser and management). Our target is to produce more than 40t DM/ha/yr in a sustainable way. To achieve this we are trialling a 'complementary forage rotation' based on growing three crops a year:

- a bulk crop (eg maize);
- a legume for nitrogen fixation (eg clover); and
- a forage to provide a pest/disease break and to improve soil aeration (eg a brassica).

Our Feeding work is researching if it is more profitable to use extra bought-in feed to feed more cows (ie increase stock numbers) or to increase production per cow.

FutureDairy is investigating a number of Innovations that could improve farm efficiency, labour management and lifestyle. We have a major study on automatic milking systems (AMS), the obvious labour saving innovation. We are adapting automatic systems to be profitable and suitable for Australia's pasture-based, large herd situation.

We are also studying innovations that allow precision farming without increasing labour needs. Some examples include remote sensing of animal function and pasture status, and the use of video cameras to monitor paddock activities (eg calving) remotely via a computer.

Contact us

Dr Sergio (Yani) Garcia
ph (02) 9351-1621
email: sgarcia@usyd.edu.au