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Tall fescue

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Tall fescue (*Festuca arundinacea* Schreb.) is a perennial grass adapted to a wide range of growing conditions. In Australia tall fescue is principally found from southern Queensland through the tablelands and upper slopes of New South Wales and Victoria to areas of Tasmania, South Australia and Western Australia.

Tall fescue is deep rooted and in some plants has short slowly spreading rhizomes. The leaf blades are dark green, 4–12 mm wide and 100–600 mm long. The upper leaf surface is dull with distinct veins

running the length of the leaf. The lower leaf surface is smooth glossy and slightly keeled with the leaf edges rough to touch. The seed head is a loosely branching panicle.

The more traditional varieties (temperate varieties) of tall fescue used in NSW (Demeter and Au Triumph) grow in spring, summer and autumn and are suited to high rainfall temperate climates. In contrast Mediterranean varieties of tall fescue grow well in winter but are summer dormant and are better suited to winter rainfall regions.



Tall fescue is highly productive and can be used for all classes of livestock including cattle, sheep, horses, deer and goats.

FESCUE VARIETIES

Two types of tall fescue are grown in Australia: those that originate from temperate Europe or America (spring/summer active varieties) and those of Mediterranean origin (winter active/summer dormant).

The temperate varieties grow vigorously in spring, summer and early autumn, but have slow winter growth. These varieties are the most commonly used in NSW. Temperate varieties of tall fescue provide good year-round production of quality feed, not frosting off in winter as readily as cocksfoot and phalaris. Temperate varieties include Au Triumph, Advance, Demeter, Dovey, Jesup, Quantum, Torpedo and Vulcan II.

Mediterranean varieties are winter active and summer dormant so they can tolerate summer drought better than the temperate varieties. They have a more pronounced winter and early spring growth pattern, similar to phalaris. The level of summer dormancy varies with cultivar ranging from totally summer dormant to some summer production in response to summer rain. Until recently these varieties were not commonly used in Australia with the only registered cultivar being Melik, which was not widely grown in NSW. Today there are a number of new Mediterranean varieties available (e.g. Flecha, Fraydo, Prosper and Resolute).

SOILS

Tall fescue grows on a wide range of soil types but grows best on deep, heavy to medium textured (basalt to fine granite) soils that are high in organic matter. It also grows well on alluvial soils and on lighter granite soils that are regularly fertilised to maintain phosphate and sulfur. Tall fescue tolerates wet soils and short periods of flooding, but also has moderate drought tolerance.

Tall fescue will tolerate low pHCa (<4.8) and moderately high levels of exchangeable aluminium (up to 20% of cation exchange capacity of soil) but is most productive when soil pHCa is 5.0 to 6.5. On the more acid soils with high levels of exchangeable aluminium liming may be required. Tall fescue will also tolerate moderately saline soils (< 8 ds/mECe).

CLIMATE

The temperate (spring/summer active) tall fescue varieties are suited to high rainfall temperate areas of NSW with an annual average rainfall greater than 650 mm and preferably summer dominant. These spring/summer active varieties are particularly well suited to higher altitude (> 700 m) areas of NSW. At lower altitudes where irrigation is used these varieties will also grow well. Tall fescue is more tolerant of frosting than cocksfoot and phalaris; however, heavy frosts may burn leaf tips. The spring/summer active varieties will grow slowly through the winter months if adequate soil moisture is available.

The winter active/summer dormant tall fescue varieties are better suited to dry summer Mediterranean type environments, with an annual average rainfall of greater than 450–500 mm with winter dominance.

ESTABLISHMENT

The best time to sow tall fescue is in autumn and early winter (March – June) when soil moisture is adequate. In high altitude, high rainfall country spring sowing (September) can also be successful.

There are approximately 420 000 tall fescue seeds per kilogram. A seeding rate of 1 kg/ha is equal to approximately 42 seedlings per square metre. Tall fescue has poor seedling vigour with the roots and crown developing slowly, so sufficient seed should be sown to promote good ground cover. Some of the newer tall fescue varieties have improved seedling vigour. In dryland pastures where tall fescue is the only grass species to be sown use a seeding rate of 6–10 kg/ha. For irrigated pastures use a seeding rate of 10–15 kg/ha.

As tall fescue seed is small it should be sown relatively shallow (0.5 to 1.5 cm deep) and ideally into moisture by either broadcasting and harrowing, drilling with a conventional combine/band seeder into a prepared seedbed worked into a firm, fine tith, or by direct drill techniques. Tall fescue can also be surface seeded, however, due its low seedling vigour it is not as suitable for this method of seeding as other introduced grasses such as ryegrass, phalaris and cocksfoot. Surface seeding in conjunction with a herbicide will increase the success of establishment.

Tall fescue can be sown with a range of legumes including white clover, red clover, sub clover, strawberry clover, lotus and lucerne. Tall fescue can also be sown with other temperate grass species such

as cocksfoot, phalaris and ryegrass. As tall fescue is slow to establish it is sensitive to competition from more vigorous pasture and weed species. When sowing tall fescue in a mixture it is best to sow at a rate of 6–8 kg/ha (dryland) or 8–10 kg/ha (irrigation). If using a more vigorous grass species such as perennial ryegrass a seeding rate of less than 2 kg/ha of ryegrass is preferred.

FERTILISERS

While it can survive on low fertility soil, tall fescue produces more when it is grown on highly fertile soils and responds to applications of phosphorus, sulfur and nitrogen.

When establishing a new pasture the use of a compound or starter fertiliser (containing nitrogen, phosphorus, and sulfur) is usually more effective than superphosphate alone. If applying compound fertiliser with seed, nitrogen levels should not exceed 20 kg N/ha. Rates of nutrients to apply will depend on soil nutrient levels; phosphorus and sulfur are the major nutrients of concern. On low phosphorus and sulfur soils 20 to 30 kg P/ha and 20 kg S/ha (250 to 375 kg/ha of single superphosphate or equivalent) needs to be applied per year for three to four years to maximise production. Fertiliser rates can then be reduced to maintenance dressings (at average stocking

rate this is generally 125 kg/ha of single superphosphate or equivalent).

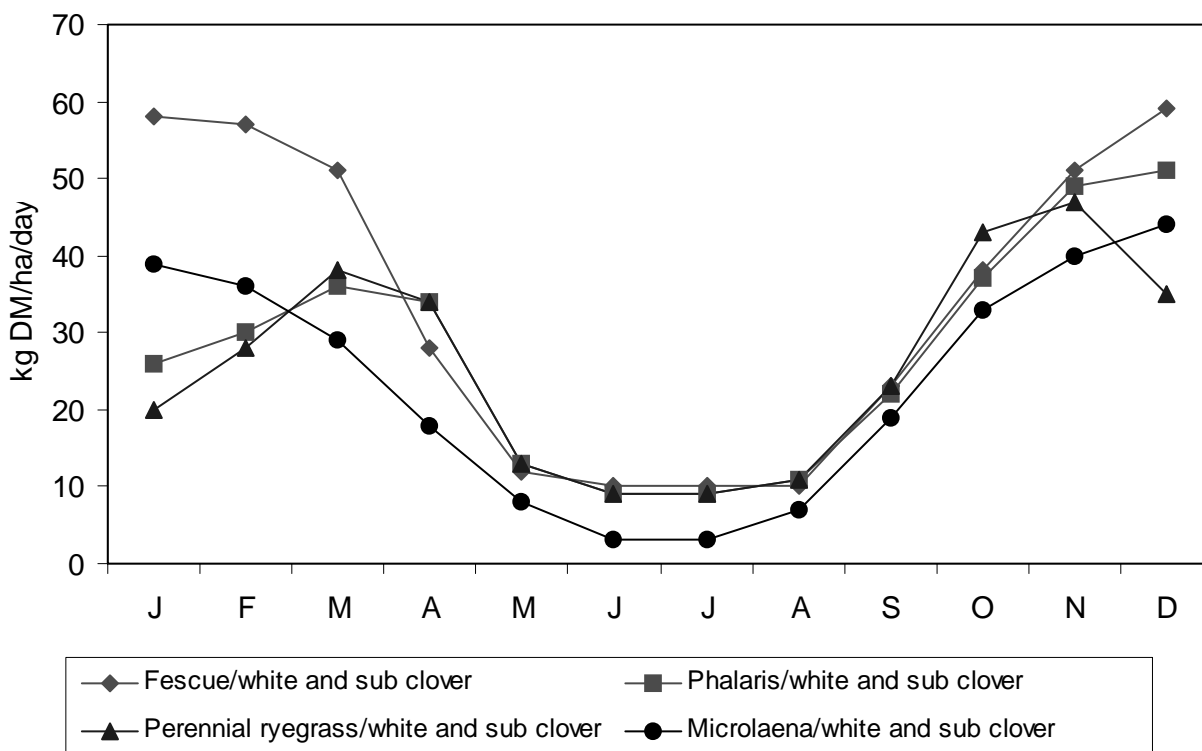
Generally tall fescue will be sown in combination with one or more legumes including white clover, red clover, sub clover or lotus. These legumes, when fertilised regularly with phosphorous and sulfur, will provide sufficient nitrogen for productive tall fescue.

Deficiencies of molybdenum and other trace elements should be corrected. In acid soil areas molybdenum should be applied every three to five years at rates of 50–100 grams (elemental) per hectare depending on soil type. More regular applications of molybdenum may be necessary in higher rainfall areas on more acid soils. However, guard against copper deficiency in animals, which can be induced by excessive applications of molybdenum. Before applying molybdenum consult your local Agronomist.

PASTURE PRODUCTION

Temperate cultivars of tall fescue are highly productive with greatest growth over spring and early summer (40–60 kg dry matter/ha/day). Tall fescue growth progressively declines in late summer and autumn (20–40 kg dry matter/ha/day) to a minimum in winter (5–10 kg dry matter/ha/day) as shown in Figure 1. Work on the Northern Tablelands of NSW

Figure 1. Estimated pasture growth rates (kg DM/ha/day) of specific pasture types on the Northern Tablelands. It is assumed that each pasture type is grown on a soil of moderate to high fertility with nutrient requirements maintained and has a 20 per cent legume content. Source: PROGRAZE Manual 5th Edition 2000.



has shown that tall fescue has a much longer effective growing season than phalaris or perennial ryegrass under summer rainfall conditions. Pasture production of the temperate tall fescue cultivars in southern NSW is similar to the north over spring and summer (where there is adequate moisture), however, declines to a minimum of <5 kg dry matter/ha/day over winter.

The Mediterranean varieties of tall fescue are highly productive with greatest growth over winter and early spring (45–55% of annual dry matter production). There is little growth over summer and early autumn, although some varieties will respond to summer rain.

NUTRITIVE VALUE AND ANIMAL PERFORMANCE

Tall fescue has a high nutritive value comparing favourably to perennial ryegrass, phalaris and cocksfoot. Nutritive value studies on the Northern Tablelands showed that the digestibility of temperate tall fescue / white clover pastures was relatively uniform across all seasons (ranging between 60–70%) compared to phalaris / white clover pastures (40–70%). This was the result of more uniform distribution of green leaf over the year. Limited data on the Mediterranean tall fescue varieties also indicated high digestibility across all seasons (60–70%).

Good performance of stock grazing tall fescue is widely reported. Lamb growth and sheep live weight gain from tall fescue based pastures were more

uniform and consistent across seasons by comparison with phalaris based pastures in Northern NSW trials (Figure 2). In the same trial sheep grazing the tall fescue / white clover pasture produced 0.6 kg/head more clean fleece than those grazing phalaris / white clover pastures.

In trials under irrigation in south-east Queensland there was little difference in average daily milk production and milk quality from perennial ryegrass pastures and tall fescue pastures. Although perennial ryegrass was the most efficient producer of milk, tall fescue had a number of useful traits for dairy pastures. Tall fescue was more persistent and provided good autumn grazing which lowered the requirement for supplementary feeding, however it required more intensive grazing management to delay maturity and hence quality.

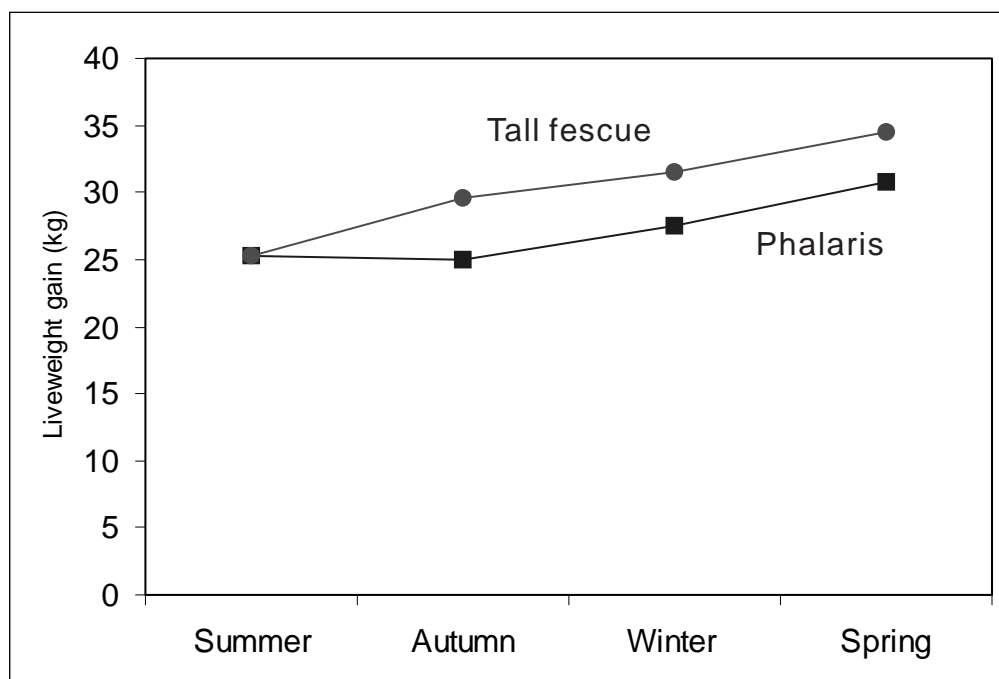
GRAZING MANAGEMENT

Tall fescue pastures have been known to persist for up to 20 years when appropriate grazing management has been used and soil fertility is maintained. Grazing management for temperate and Mediterranean types differ.

Temperate types

Most cultivars of tall fescue have poor seedling vigour resulting in slow establishment. Grazing management during the first 12 months after sowing is particularly important to ensure a satisfactory plant population.

Figure 2. Seasonal pattern of liveweight gain (kg) of fine wool Merino wethers grazing fescue based and phalaris based pastures with a similar legume content on the Northern Tablelands of NSW. Source Ayres et al. 2000.





A Demeter tall fescue plant in a persistent (25 years old) tall fescue pasture at Armidale on the Northern Tablelands of NSW.

Establishing stands of tall fescue should be grazed only when the root system is well developed and will not be pulled out of the ground. If sown late, surface sown or establishing under difficult conditions delay grazing until flowering. If weed competition is not a problem it is desirable not to graze tall fescue pastures until 6–8 months after sowing. If weeds are a problem a registered herbicide or grazing management (heavy grazing for short periods to remove top growth of weeds) is recommended to reduce competition.

Once established tall fescue is able to tolerate heavy grazing. Grazing management should aim to prevent a build up of rank herbage. Where practical tall fescue pastures should be kept in the “active-growth” phase to maximise tillering, growth rate, quality, allow rapid post grazing recovery and encourage companion legumes. It is desirable to graze between yield limits of 800 kg dry matter/ha and 2500 kg dry matter/ha (between 5–12 cm in height). This will generally require some form of rotational grazing particularly during a favourable spring and summer. During dry spells and drought tall fescue pastures will require longer periods of rest to allow replenishment of energy reserves for regrowth. If tall fescue is allowed to set seed about every three years, seedling recruitment to increase paddock persistence and density will be favoured. During winter tall fescue can tolerate set stocking. Avoid bulk in late summer and early autumn to encourage legume growth.

Established tall fescue pastures should be heavily grazed strategically to prevent the formation of large erect tussocks containing a high proportion of rank, low quality material.



Quantum tall fescue 90 days after sowing into a prepared seedbed at Glen Innes on the Northern Tablelands of NSW.

Mediterranean types

Although some of the Mediterranean fescues have increased seedling vigour it is still important not to graze the pasture until the root system has developed so that establishing plants are not pulled out by grazing. Pastures sown in autumn can be lightly grazed (to height of 10 cm) in spring to encourage tillering and reduce weed competitiveness.

When tall fescue is established the pasture should be rotationally grazed over autumn and winter to promote tillering and allow companion legumes to germinate or increase stolon density. During a favourable spring tall fescue can be continuously grazed at a high stocking rate but if the spring is dry, stocking rate will need to be reduced. Over summer low stocking rates should be used to lightly graze tall fescue to promote bud activity and tiller development. Heavy stocking should be avoided, otherwise loss of plants will occur.

DISEASES

Fungi cause most of the important diseases affecting tall fescue. Crown rust *Puccinia coronata* is common on tall fescue during warm moist periods of the growing season. If infected with rust, grazing of the sward is recommended to promote healthy regrowth.

Damping off (*Pythium* and or *Rhizotonia*) can cause severe seedling loss particularly when tall fescue is sown into a cold, damp seedbed. This occurs more frequently where there is a considerable amount of litter remaining after fallow spraying prior to direct drilling. The use of registered fungicides, as seed coatings will control damping off.

Tall fescue can also be infected with ergot (*Claviceps purpurea*). The ergot affects the development of the grain in seed crops and pastures and is characterised

by the presence of the purplish - black, elongated (up to 5 mm long) ergots in the seed head. Summer ill thrift or winter lameness in livestock is associated with ingestion of ergot alkaloids.

INSECT PESTS

Pasture scarabs (*Sericesthis* spp.) and Corbie grubs (*Oncopera* spp.) can cause damage to tall fescue plants by attacking the roots just below the ground. Tall fescue tolerates attack by these pasture grubs better than perennial ryegrass and cocksfoot. Other insect pests such as red legged earth mite, blue oat mite, field crickets, slugs and snails can also damage plants particularly between germination and establishment.

TALL FESCUE ENDOPHYTE

Tall fescue endophyte is a fungus (*Neotyphodium coenophialum*) that lives inside the tall fescue plant. The endophyte and the plant have a symbiotic relationship where the endophyte is supplied with nutrients and is able to spread via the host plants seed. The host plant benefits through increased tolerance to insect attack. It is also believed that the host plant benefits from increased tolerance to moisture stress and drought.

The endophyte, however, produces alkaloids that can be harmful to livestock. Sheep and cattle grazing tall fescue dominant pastures infected with endophyte are subject to tall fescue toxicity and fescue foot. These conditions are caused by the toxin ergovaline. Ergovaline is a vasoconstrictor; it causes heat stress in animals by constricting the blood vessels. This reduces the animal's ability to cool itself. Other symptoms include severe lameness, reduced feed intake and poor weight gains. Fortunately the occurrence of tall fescue toxicity and fescue foot in Australia is not common because the current cultivars of tall fescue used are low in or free of endophyte. Some of the earlier varieties of tall fescue used in Australia (Alta, Kentucky-31) may contain endophyte.

Scientists have selected strains of endophyte that do not produce the toxic alkaloids. These endophytes, however, still produce compounds that are beneficial to plant persistence. These are referred to as 'select or novel endophytes'. Varieties of tall fescue containing 'select endophytes' traded as MaxQ and MaxP are being developed and will be commercially available in NSW from 2003.

Management options that can be used to deal with endophytes in tall fescue pastures include;

1. The negative effects on livestock can be reduced by – providing alternative feed during summer and autumn when alkaloid content is high; avoid close grazing during summer and autumn; slash pastures to remove seed heads; and avoid nitrogen applications during summer and autumn.
2. Use endophyte free tall fescue cultivars in new pastures to avoid animal health and production problems but accept that the pasture persistence may be reduced.
3. Use select endophyte cultivars that may have improved persistence but reduce the risk of livestock problems.

When using select or nil endophyte cultivars where previously high endophyte cultivars have been used it is important to reduce the residual seed bank in the soil to prevent contamination of new pastures. This is best achieved by growing at least 2 forage crops before sowing pasture or using a long chemical fallow.

SELECTING TALL FESCUE VARIETIES

When sowing a new tall fescue pasture there a number of factors to be considered when selecting a new cultivar to replace an older cultivar. The new cultivar should be selected on the basis of;

- Plant type – Temperate types grow vigorously in spring, summer and autumn but have slow winter growth. They are adapted to areas with summer dominant rainfall, higher elevation or under irrigation. Mediterranean types have a more pronounced winter and early spring growth pattern but are dormant over summer. The Mediterranean types are better suited to dry summer environments.
- Seedling vigour – Tall fescue has poor seedling vigour and is slow to establish. Cultivars with improved seedling vigour may improve establishment.
- Rust resistance – In high rainfall areas where rust is known to be a problem over autumn select tall fescue cultivars with high rust resistance.
- Performance – Seek local trial results (if available), for information on seasonal performance and persistence.
- Other factors that may be of importance include leaf digestibility or quality; maturity, endophyte content and rhizomatous spread potential.

FURTHER INFORMATION

For further information contact your local NSW Agriculture District Agronomist.

FURTHER READING

The following Agfact contains information on tall fescue. The Agfact is available at your local NSW Agriculture office.

P2.3.9 *Endophytes of perennial ryegrass and tall fescue*

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Livestock health disorders

Pasture improvement may be associated with an increase in the incidence of certain livestock health disorders. Livestock and production losses from some disorders are possible. Management may need to be modified to minimise risk. Consult your veterinarian or adviser when planning pasture improvement.

Native vegetation

The Native Vegetation Conservation Act 1997 may regulate some pasture improvement practices where existing pasture contains native species. Inquire through your office of Department of Infrastructure, Planning and Natural Resources for further details.

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