



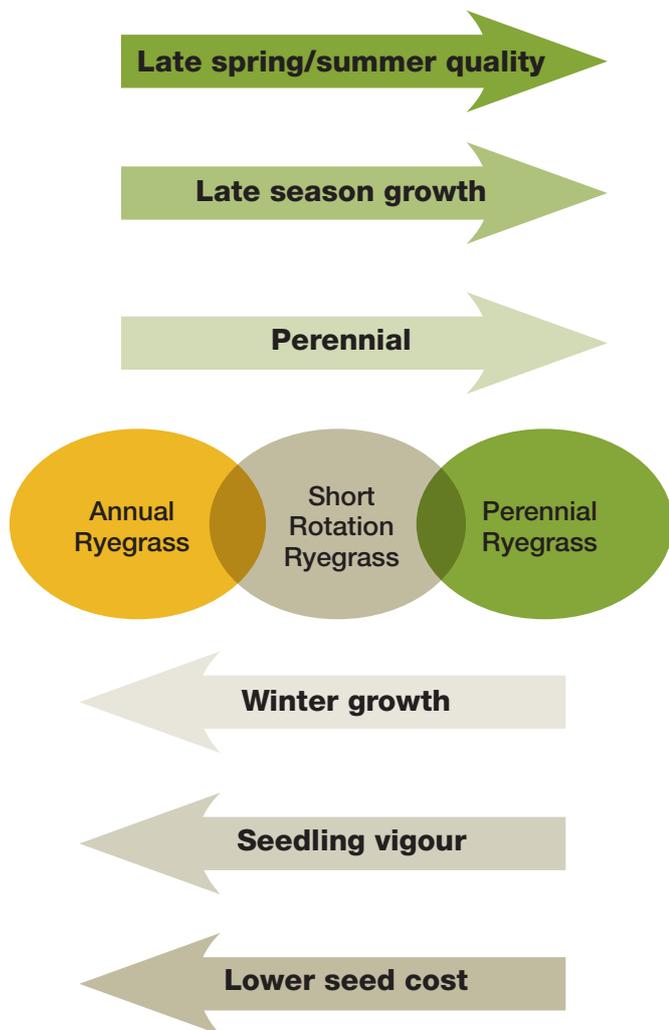
## Strengths, Weaknesses, Opportunities and Threats for the use of annual and short rotation ryegrass on southern Australian dairy farms

Perennial ryegrass (PRG) pastures will continue to be the mainstay of pasture-based dairy farming in southern Australia in the foreseeable future. The 3030 Project has explored alternatives including annual (ARG) or short rotation (SRG) ryegrass that could complement some of the weaknesses of perennial ryegrass. The Project's aim is to lift home-grown forage consumption.

This Information Sheet analyses the key features of annual and short rotation ryegrass adopting a SWOT approach (Strengths, Weaknesses, Opportunities and Threats).



The main characteristics of annual, short rotation and perennial ryegrass that are important in dairy systems are shown in Figure 1. For most of the characteristics, there is not a clear distinction between the three. The incorporation of ARG into PRG and SRG breeding programs, coupled with the existing variation between their cultivars, means that the progression from annual to permanent ryegrass is more a continuum than distinct steps.



**Figure 1.** Comparison of annual, short rotation and perennial ryegrass characteristics of importance to dairy farmers. The direction of the arrow indicates increasingly favourable levels of each characteristic.

### Annual ryegrass (ARG)

Annual ryegrass is usually chosen where post-spring growing conditions are expected to be limiting. The aim of using ARG is to maximise growth rates while there is still sufficient soil moisture. Similarly, ARG is often used when a combination of low summer rainfall and soil type do not allow a stand of perennial ryegrass to be maintained all year round. In this way, ARG is often the choice as a 'crop' species to maximise pasture production for a less than 12-month period. It can be grown as either a pure stand or in combination with other crops, such as regrowth Brassicas (Figure 2).

Annual ryegrass is popular as the autumn-sown option for an autumn/spring double-cropping system due to its ease and low cost of establishment, combined with superior quality of winter/early spring growth. With optimal grazing and nitrogen fertiliser management, ARG can yield a similar amount of forage to most cereals. The advantage of ARG is that it is significantly better suited to grazing than cereals. On the other hand, cereals are not as prone as ARG to 'lodging' issues when they are harvested as a single cut. The 'Winter cereals for silage' Information Sheet provides further discussion of the issues to consider when choosing between annual ryegrass and cereals.

It is also common to see ARG oversown in autumn into existing swards of poorly performing perennial pastures that are ear-marked for renovation in the following autumn. This can be a cheap option to improve the productivity of a poorly performing sward for 12 months. Similarly, ARG is suitable to be oversown into existing stands of chicory and/or plantain (see the 'Chicory' Information Sheet for more details).



**Figure 2.** Annual ryegrass plus regrowth Brassica (cv. Winfred) mix at 3030 Project studies at Terang before (above) and during (below) grazing by dairy cows (April 2003).

## Annual Ryegrass SWOT analysis

### Strengths

**Body of knowledge**—Annual (ARG) and Italian (IRG) ryegrasses have similar management requirements to PRG, so much of what is known about PRG management can be easily transferred to ARG and IRG.

**Winter growth**—As a result of its superior winter growth one of ARG's key strengths is its ability to provide additional high-quality grazeable feed during late autumn, through winter and until early spring compared to PRG and other perennial grasses.

**Seedling vigour**—In comparison to PRG and other perennial grasses, ARG cultivars generally have superior seedling vigour. This allows for an earlier first grazing compared to perennial grasses sown at the same time.

**Lower seed costs**—In general terms, ARG seed costs are substantially less (about 1/2 to 1/3) than PRG or IRG.

**Ideally suited to grazing**—ARG is ideally suited to grazing and has similar grazing guidelines to that of PRG or IRG. The 'Perennial ryegrass management' series of Information Sheets provides details of the management practices used to optimise the performance of PRG pastures in the 3030 Project.

**Broadleaf weeds**—Are easy to control with minimal impact on growth rates.

**Suited to forage conservation**—With its rapid growth through late winter/spring ARG is suited to forage conservation and due to potentially higher yields can result in reduced forage conservation costs (Figure 3).



**Figure 3.** Annual ryegrass to be cut for silage (c.v Winterstar II) at 3030 Project Forage Insight Trials (9 November 2011).

**High quality**—ARG provides excellent quality feed for dairy cows, particularly through winter and early spring.

**Minimal health issues**—As with PRG, there are minimal animal health issues associated with ARG although there is some anecdotal evidence that ARG is more likely to cause nitrate poisoning than other perennial grasses.

**Suitable for oversowing**—Due to its seedling vigour and aggressive winter growth, ARG is ideally suited to being sown into an existing perennial pasture to provide additional winter grazeable feed. This is a suitable option for perennial

pastures that have decreased in density and is normally used during the year before the pasture goes under a full renovation. The considerations for oversowing are outlined in the 'Perennial ryegrass management VII. Pasture renovation' Information Sheet in this series.

**Suited to double cropping**—With its ability to provide the bulk of its growth by early/mid spring, ARG is well suited to double cropping programs where a spring-sown brassica or millet/sorghum type is to be used. ARG could be chosen for its rapid winter growth, which enables an early seedbed preparation and sowing of the summer crop.

### Weaknesses

**Resowing costs each year**—While there is some evidence that swards of ARG can be managed to regenerate each autumn through self seeding, ARG in south-eastern Australia must generally be resown each year.

**Establishment phase ('downtime')**—In comparison to an established high-performing sward of PRG, ARG can have significant downtime during the seedling establishment phase every year.

**Low summer growth rates**—Some of the newer ARG cultivars provide some grazeable feed post-spring when conditions are favourable (particularly soil moisture), but PRG will generally provide superior growth rates of quality leafy pastures.

**Lower quality from mid-spring onwards**—Almost 100% of ARG tillers will go reproductive in the spring. Reproductive tillers have significantly lower values for both metabolisable energy and crude protein. Although PRG's tillers also go reproductive and with the same consequences, it can produce new tillers that will stay vegetative until the next season.

### Opportunities

**Responses to nitrogen**—ARG is highly responsive to nitrogen applications. However, due to the increased risk of nitrate accumulation, particular care is needed when ARG regrowth is grazed after a nitrogen application.

**Responses to grazing management**—Particularly through autumn/winter when there is little to no chance of pasture quality declining, ARG is highly responsive to sound rotational grazing management (i.e. grazed somewhere between the 2.5 and 3 leaf stage).

The 3030 Project has shown that by combining nitrogen use and sound rotational grazing/cutting management, ARG performance can equal winter cereals in terms of DM production per ha.

**Potential for regeneration (self seeding)**—While there is little evidence in south-east Australia of ARG consistently regenerating from self seeding, the practice is common in similar climatic conditions in south-west Western Australia.

### Threats

**Potential nitrate accumulator**—ARG carries a higher risk of nitrate poisoning than PRG. Anecdotally, nitrate poisoning is more likely to occur where hungry, unadapted cows are allowed to gorge on high-nitrate pastures. Nitrate poisoning has been implicated in sudden and significant livestock losses in the past (see the 'Perennial ryegrass management V. Use of N fertiliser' Information Sheet for more details).

**Establishment risk**—As with seedlings of any other grass species, ARG is most vulnerable to failure due to pests during the establishment phase.

The following diagram summarises the SWOT analysis of ARG pastures:

#### Strengths

- Winter growth
- Seedling vigour
- Lower seed cost
- Ideally suited to grazing
- Ideally suited to forage conservation
- High quality (autumn–early spring)
- Minimal health issues
- Suitable for oversowing into a perennial sward

#### Weaknesses

- Re-sowing costs each year
- Down time (needs time to be established each autumn)
- Low/zero summer growth
- Lower quality from mid Spring onwards

#### Opportunities

- Responses to nitrogen
- Responses to PRG best management practices
- Potential regeneration through self seeding

#### Threats

- Potential nitrate accumulator
- Establishment risk

### Short rotation ryegrass (SRG)

Short rotation ryegrass is usually chosen by dairy farmers under similar circumstances to ARG. The main difference is that SRG could be more suitable where there is potential for reasonable levels of growth from late spring/early summer rainfall.

Winter growth rates of SRG cultivars are normally not as good as ARG. However, they have the potential to provide significant growth through the first summer and well into the second and third years.

When oversowing into pastures that are unlikely to be fully renovated in the next 12 months, SRG is likely to be preferred to ARG due to its potential to last 2–3 years. On the other hand, improved winter growth has been one of the major improvements in the newer PRG cultivars. Due to their better persistence and similar winter growth to SRG cultivars, perennials are tending to replace short-term cultivars for oversowing purposes.

Under more favourable growing environments, SRG can be sown as a pure sward of high-performing pasture that would be expected to last 2–3 years.

The following diagram summarises the SWOT analysis of SRG pastures:

#### Strengths

- Late spring and summer growth
- Some growth in the second season
- Winter growth
- Better quality post spring
- Ability to contribute to the yield of the pasture sward in years 2 and 3
- Ideally suited to grazing
- Minimal health issues
- Suitable for oversowing into a perennial sward
- Body of knowledge (very similar management to PRG)

#### Weaknesses

- Resowing costs
- Limited growth in years 2 and 3
- Downtime (needs time to be established each autumn)

#### Opportunities

- Responses to nitrogen
- Responses to PRG best management practices

#### Threats

- Potential nitrate accumulator
- Establishment risk

### About 3030

PROJECT 3030 aims to help farmers achieve a 30% improvement in farm profit by consuming 30% more home-grown forage (pasture plus crop). It is aimed at dryland farmers in southern Australia who have mastered the challenge of growing and using ryegrass pasture for dairy-cow feeding.

### For further information

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