

How to use the FVI and Frequently Asked Questions

2022/23 update

The Forage Value Index (FVI) is a rating system that helps Australian dairy farmers and their advisors to make more informed decisions when selecting perennial ryegrass cultivars.

It provides an accurate, reliable and independent assessment of the potential economic value of perennial ryegrass cultivars in different dairy regions of southeast Australia.

Why has it been developed?

Australian dairy farmers invest more than \$100 million renovating pastures each year. Until recently, there has been no easy way of assessing the agronomic performance or potential economic benefit of different cultivars for use in dairy production. The selection of better performing cultivars will help to increase pasture productivity at key times of the year and ultimately lead to higher farm profitability.

How is the FVI calculated?

FVI ratings are based on independently calculated Performance Values (PV) for seasonal dry matter production and Economic Values (EV). PVs are determined by industry assessed trial data. EVs are determined by an economic model that accounts for either the replacement cost of feed in deficit or the value of surplus feed as hay or silage in a given region, depending on the season and region. FVI ratings are calculated by multiplying the Performance Value (i.e. kg DM/ha) of each cultivar by its Economic Value (i.e. the seasonal \$ value of each extra kg of pasture grown).

How are FVI ratings expressed?

The PV for each cultivar is expressed as a percentage relative to a well-established reference cultivar in each of the 3 species.

The reference varieties for annual, Italian and perennial FVI's respectively are Tetila, Crusader and Victorian. The FVI also uses a colour rating system to differentiate between varieties. All cultivars with the same colour are not "statistically" significantly different to each other. A green colour rating indicates those cultivars that have performed the best in the trials and have the most potential to contribute to operating profit. A red colour rating indicates those in the bottom group of cultivars for performance and have the least potential to contribute to operating profit. Ideally, farmers should use cultivars in the green column wherever possible to maximise pasture productivity and farm profitability.

What data sources are included to create the performance values?

A range of data sources are used to calculate the FVI ratings. These include trial data from the Pasture Trial Network (PTN) and limited seed company trials that meet strict trial protocols and PTN eligibility data requirements. Only cultivars listed in the Australian Seed Federation Pasture Seed Database (asf.asn.au/seeds/pasture-seed-database) and confirmed as a certified 'variety' are listed in the FVI.

What varieties are eligible for inclusion? To be included in the FVI database, each perennial ryegrass cultivar must have data from at least three 3-year plot trials that have been conducted using Pasture Trials Network (PTN) protocols. Annual ryegrass trials run for one season and Italian ryegrass trials run for 1-2 years depending on location and a variety must also be in at least 3 trials to be included in the FVI. All plot trials are managed under mown conditions, with herbage cut, dried and weighed. Dry matter yield is assessed by direct measurement (i.e. cut, dried and weighed). Nitrogen is applied after each mowing at a rate equivalent to the amount contained in the dry matter removed. Only trials that meet these criteria are considered for inclusion in the FVI database.

Who determines whether data is eligible? All trial data are reviewed by a Technical Advisory Committee to determine its eligibility for inclusion in the FVI database. The FVI Technical Advisory Committee currently comprises representatives from farmers, research organisations and some of the commercial seed companies. Once approved, data are analysed by accredited statisticians using modern analysis tools similar to those used in the successful national trialling network for the grains industry.

Are there trials in my region? There are not trials from every corner of Australia dairy regions, though the number and range of trials has expanded greatly since the FVI was first released. The power and value of the FVI is in the aggregated data pool for southeast Australia and this is the most comprehensive and accurate data pool for ryegrass cultivars in Australia.

Where can I access the FVI?

The FVI information can be accessed free of charge from the Dairy Australia website.

What pasture species are included in the FVI in 2023?

The FVI initially started in 2017 with perennial ryegrass cultivars only for Victoria and Tasmania. In 2021, this was expanded to include annual and Italian ryegrass for Victoria and Tasmania. In 2022, North Coast and South Coast NSW lists were added for annual and Italian ryegrass for the first time.

What traits are included?

The FVI ratings are based on the potential economic value of seasonal dry matter yield for each cultivar. Other traits (e.g. nutritive value and persistence) will be added in the future. Currently nutritive value samples for perennial ryegrass cultivars are being evaluated and should be available in the next update.

Can I use the FVI if my region is not yet directly listed?

Yes it is still useful to check the lists even if your region is not yet listed. At present, many of the same varieties are sown across the country regardless of location. Farmers in places like Southeast SA should use the South West Victoria FVI for example. Western Australia is the main remaining area without a dedicated FVI and this is planned for inclusion next year. Limited trial data from WA has prevented the publication of an FVI for the region as well as the absence of economic values for WA which are planned for development in 2023. However, in 2022 DA partly funded an annual ryegrass PTN trial at Busselton which will hopefully eventually be a part of an FVI for WA in future. In the absence of a dedicated WA FVI, farmers should check out the results of this trial and other previous WA trials on the PTN website to get some independent information on cultivar performance for WA.



Who developed the FVI?

The FVI was developed as a partnership between several industry associations and government bodies as part of a wider strategy to increase the productivity and profitability of Australian dairy farms. They include Dairy Australia, the Pastures Trial Network, Agriculture Victoria, DairyNZ, the Australian Seed Federation and Meat and Livestock Australia.

How has the Forage Value Index changed in 2022/23?

All three species (perennial, annual and Italian) have been updated this year with new data from newly available Pasture Trial Network trials. For perennial ryegrass, we have new trials from Meander Valley (Tasmania), Macarthur (SW Victoria) and Ballarat (Victoria) included. In Italian ryegrass, new PTN trials from Colac (SW Victoria) and Aberdeen (NSW) have been added while for Annual ryegrass, newly available PTN trials from Colac (SW Victoria) MacArthur (SW Victoria) and Aberdeen (NSW) have been included.

Why is there no longer an Autumn performance value for Italian and Annual ryegrass?

Autumn production is defined as pasture harvested in trials from March to May. In the vast majority of short-term ryegrass (Annual & Italian) trials from the PTN, the first cut does not take place until June or later, depending on sowing date and region. For example, a typical annual ryegrass trial might have been sown on 15th April and the first harvest cut on 5th June. This led to an imbalance in the data whereby there was enough cuts and observations in the trials from June onwards to allow reliable performance values to be generated for winter, early spring, late spring and summer, but not for Autumn which requires a critical mass of harvest data prior to 31st May. Instead of publishing an Autumn performance value for each variety based on very limited data we have available at this stage, which may not be reliable, we have decided this year to only create BLUPs (performance values) for Winter, Early spring, Late spring and summer for each variety in annual and Italian ryegrass.



Will Autumn performance values return to the FVI in future for annual and Italian ryegrass?

Yes, the solution to this issue is to generate enough trial data for these species that is sown early enough to have a cut taken before 31st May. In 2023, the PTN will aim to sow several new annual and Italian ryegrass trials early enough to have the first cut taken before 31st May. This will then lead to a sufficient critical mass of data points for each variety in Autumn and allow a performance value to be published for autumn for all varieties in the FVI in future. However, it isn't possible to guarantee early established trials in every region as this is part of the problem. In a region like South West Victoria for example, unless irrigation is present it is very difficult to guarantee early establishment and both farmers and trial operators in this region will wait for the Autumn break before sowing. In recent years this has not happened until well into May, and clearly any trials not sown until late April or early May will not have their first cut until well after 1st June. It doesn't mean these trials are any less valuable as they reflect the environment that farmers were dealing with in that region in that year. In most regions the weather condition have a massive part to play in determining when trials can be sown. Other factors within PTN control such as seed availability from companies and quarantine arrangements for seed in each state have also caused delays in the past to trial sowing dates but these factors are being improved each year by the PTN.

What about perennial ryegrass, why does that have an Autumn performance value?

Perennial ryegrass trials run for 3 years. Generally no harvest data is collected from autumn in year 1 for the same reasons outlined above but multiple cuts are achieved in years 2 and 3 in autumn which allows a robust prediction of the yield potential of each variety to be generated between March and May.

Don't most Italian ryegrass trials go for 2 years though, why isn't data from the second autumn used in the Italian ryegrass FVI?

Of the 18 Italian ryegrass trials from the PTN, less than half of them run for 2 years. It is very dependent on location and environment. Broadly speaking, anything north of the high rainfall regions of South-Western Victoria and Gippsland will only run for one year and anything south of there will run for two years with an odd exception. Most farmers in Australia use Italian ryegrass as a "late" annual that lasts later into early summer than most annuals if moisture permits. In places like Tasmania and south Gippsland where there is an expectation that Italian ryegrass will persist for 2 years, the variety selection considerations can be quite different with the presence of novel endophytes in the varieties becoming a factor that isn't greatly considered for a single year of production.

For this reason, we have decided to only use year one data from Italian ryegrass trials in the FVI. Any harvest data from 2-year Italian ryegrass trials after 28th Feb in year 2 is not included. Therefore there is no data to create an autumn performance value in the Italian ryegrass FVI.

Will there be a 2 year Italian ryegrass FVI in future?

Yes, once we have sufficient trials. We probably need approx. 8–9 trial datasets to create a viable 2-year Italian ryegrass FVI which will definitely have Autumn performance values. This will likely happen in the next 1–2 years.

Will the 2 year Italian ryegrass FVI look much different to the one year version?

It is too early to say at this stage. Logically however, any varieties with novel endophytes such as AR37 or NEA should withstand insect pressure during hot dry summers at the end of year one in the PTN trials much better than varieties with no endophytes and it is likely these varieties will rank much higher in the 2-year Italian ryegrass FVI. This is important for farmers and service providers to be aware of and is one of the main reasons we don't just have a single Italian ryegrass FVI with one and two year datasets mixed together.

What about Hybrid ryegrasses with mixed parentage, how are they dealt with in the FVI?

This is a tricky area to deal with. In recent years the number of hybrid varieties on the marketplace has started to increase. The crossover occurs between Italian and perennial ryegrass. Breeding companies have tried to capitalise on the early establishment vigour of Italian ryegrass by breeding it with persistent perennial grasses to try capture the yield potential of Italians and the longevity and persistence of perennials in a single variety. Several of these varieties are currently listed in both the perennial and Italian FVIs. They could be marketed as either/or by the seed companies. We have taken the position of including any hybrid in the PTN trial species it was evaluated in. For example if a hybrid was evaluated in 3 year perennial ryegrass PTN trials, it is included in the perennial ryegrass FVI. These varieties have an asterisk beside them to signify that they may not be as persistent as other true perennials. The only way to quantify this is to do longer term perennial trials of 5–6 years and resource constraints prevent that at present.

Likewise in the Italian ryegrass FVI, hybrids may be advantaged in the 2-year Italian FVI (especially if they have an endophyte as most do) compared to true Italians but disadvantaged in the single year Italian ryegrass FVI. An FVI exclusively for hybrid ryegrasses is a possible solution in future but this would require specialised trials with only hybrid varieties entered and that is still some way away from materialising.

Why are the rankings for all the regions in each FVI quite similar?

The FVI has two components to it – performance values and economic values. At present the economic values are different for each region but the performance values are the same for each region. In order to have different performance values for each region, we need enough trials to do a genotype x environment analysis to determine which cohorts of trials are similar in rankings and can be clustered together. Until that happens, all trials are analysed together to create a single set of performance values for all regions. Importantly, the assumption is often that trials in the same region are similar. For example, it is logical to think that all trials from the same site, say Howlong in Northern Victoria, are similar across years and so these trials should be given a greater weighting in the calculation of performance values for Northern Victoria, and one would also logically assume that trials in NSW from the same location such as Taree are similar in rankings from year to year and should be given greater weight in the NSW FVI. Preliminary analysis of the perennial ryegrass trials indicates that it's not as simple as this. Often variation between years in rankings of varieties at the same site is greater than variation in ranking between sites in completely different agro-ecological zones. Until we have enough data that we can confidently demonstrate a critical mass of trials have similar rankings across the 5 FVI seasons from within a given region or rainfall range or agro-ecological zone, it is safer to use a single performance BLUP incorporating all trials and only allow regional differentiation in each season via the economic values.

Dry matter yield is just one trait influencing the value of a variety. When will other traits of importance be assessed in the FVI rankings?

At this stage forage quality analysis of several PTN trial where samples were collected across all five FVI seasons in perennial ryegrass trials is ongoing. This data will be available for analysis early in 2023 and the aim is that next year's FVI update will provide information on perennial ryegrass varieties in the FVI on forage quality at some level. Whether that is at an individual cultivar level, a maturity level (early, mid or late heading) or a ploidy level (diploid v tetraploid) will be determined by the quality and consistency of the data. The Dairy NZ FVI, for example, includes forage quality information but only at a ploidy level. The Irish Pasture profit index (FVI equivalent), by contrast, has information of forage quality at a varietal level.

Persistence is another trait of importance in perennial ryegrass and needs to be accounted for in the index. Generating sufficient data on persistence is very challenging in perennial ryegrass. Trials would ideally need to be run for 6 years or more, doubling the cost to the PTN.

In addition, there is a strong likelihood that varieties entered in year one in persistence trials would already be surpassed by competitors in the marketplace in the intervening years by the time the six years or more of persistence trial data is evaluated and added to the FVI. Work is well advanced as part of the FVI futures project in Dairy Feedbase to address this challenge via remote sensor technology that can potentially fast track the evaluation of perennial ryegrass cultivars for persistence.

What about annuals and Italians, persistence is not an issue in these species?

It's true that persistence of annual ryegrass and Italian ryegrass is not a major consideration for farmers sowing these species and therefore the focus for annual and Italian ryegrass is on obtaining good forage quality data for each variety in addition to seasonal yield information.

In 2022, we preselected two annual ryegrass PTN trials for evaluation of forage quality at each cut before the trials were sown but unfortunately only one trial was established properly and the first cut was delayed significantly due to late sowing on this trial so we decided not to proceed with sampling and instead will collect these samples in 2023 from new trials.

Will there be an FVI for Western Australia in future?

Yes there will be a Western Australia FVI for annual ryegrass initially and hopefully Italian ryegrass subsequently. Perennial ryegrass is not a major species on WA dairy farms and so there are no plans for a WA perennial FVI. The reason it has been delayed to date is that the handful of PTN trials from WA on annual and Italian ryegrass so far have been noticeably different to the eastern states in terms of demonstrating differences between cultivars in rankings for yield. In effect, this suggests a Genotype x Environment interaction is present whereby the same varieties don't show much yield differences in WA but do in other regions of Australia. The reasons for the differences may be due to the location of the trials in WA (most have been carried out at the WA Agriculture Department in Manjimup which is not in the main dairy production region of WA) and for that reason a new annual ryegrass trial was sown at Busselton in 2022. This trial is the first from WA that appears to show substantial differences in yield between the highest and lowest yielding varieties in the trial.

Another important factor in WA is the length of the growing season – in a long growing season where moisture is available to late spring or early summer, it is more likely that yield differences in rankings of annual and Italian ryegrass varieties will be apparent. In contrast to some of the previous years, 2022 has been an excellent growing season in WA and may also explain why the trial at Busselton is showing yield differences between varieties. Economic values for WA will be generated in 2023 and this will allow an FVI to be created for WA in the next couple of years.

Will there be an FVI for other species than ryegrass in future?

That depends on their being enough trial data of a sufficient quality to create an index. Continental Tall Fescue is probably the most likely next species to have a FVI created but this is still a couple of years away at least. In general, there are less varieties and less trials in the PTN for species like Cocksfoot, Phalaris and Tall fescue which is a reflection of the demand of the seed companies involved to evaluate ryegrass varieties in greater numbers. However Dairy Australia has funded a comprehensive PTN Tall Fescue trial with the majority of relevant cultivars for dairy farmers included at Warrnambool, sown in 2020. This will conclude in Autumn 2023 and forage quality samples which were also collected at several cuts on this site will be analysed. This is not a multi environment FVI for tall fescue but will still provide useful independent data on forage quality and yield for many tall fescue varieties.

Can individual trial results from the PTN be viewed in addition to the FVI?

Yes – all trials are available to view on the PTN website which can be downloaded **here**. Results of trials from many different species over several years are available. We encourage farmers using the FVI to also look at individual trial results from locations similar to their own environment or farm and factor these results into any decisions about variety selection.