Dairy Australia

How to use the FVI and Frequently Asked Questions

2024/25 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, Italian and Annual ryegrass cultivars.

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

Why was it 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 for each cultivar are calculated using the following parameters:

1 Performance Values (PV) for seasonal dry matter production

2 Performance values for Forage Quality (Perennial ryegrass FVI only at this stage)

3 Economic Values (EV) to reflect the differing dollar value of extra dry matter and varying forage quality across the five FVI seasons.

The PVs for each cultivar are determined by industry assessed trial data, while the EVs are determined by an economic model that accounts for either the replacement cost of feed in deficit or the value of surplus feed such as hay or silage in a given region, depending on the season and region. FVI ratings for each cultivar are then calculated by multiplying the Performance Value (i.e. kg DM/ha) of each cultivar by its Economic Value (i.e. the seasonal dollar value of each extra kilogram of pasture grown). For the Perennial ryegrass FVI, forage quality was also valued and included in the FVI calculation for 2025, in addition to seasonal DM yield. The Annual and Italian ryegrass FVI ratings are still based only on seasonal DM yield, but forage quality of some cultivars is still presented in the 2025 update.

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Change in statistical methodology used to calculate performance values from 2024 FVI

Up to 2023, the performance values for each cultivar in the FVI were generated using a Best Linear Unbiased Prediction (BLUP) approach. Following widespread industry consultation by Dairy Australia in 2023, this has now been changed to a slightly different methodology termed a Best Linear Unbiased Estimate (BLUE) approach. In practice, both methods are very similar and there was minimal change in the ranking of the Perennial ryegrass FVI for 2024 when BLUEs were used instead of BLUPs to create performance values. A Lins concordance correlation of 0.88 was achieved between both methodologies indicating a very high level of agreement between both approaches.

The main difference between BLUEs and BLUPs is that under the original BLUP methodology there was a very slight regression to the mean in the performance value of a cultivar that had a limited number of trials. This was the case regardless of whether a cultivar ranked very high or very low in the FVI. In some ways it could be viewed as a conservative, cautious prediction of the value of that variety as it had limited trial information. This meant that in many cases newer varieties with perhaps only three to four trials worth of data were slightly penalised compared to more established cultivars with several trials of data on its performance within the FVI.

The switch to BLUEs to create performance values essentially removes any regression to the mean in a cultivar ranking. In practice, this means that the total number of trials a variety is present in assumes greater importance as a proxy for its reliability in the overall FVI.

In 2024, some newer cultivars with three trials were ranked quite high in the Perennial FVI in particular, and as the years go on and these cultivars have more data included, FVI users can have greater confidence in their position in the FVI.

The seed industry was strongly supportive of this move to allow newer superior genetics to be ranked without any limitations applied in the FVI; however, users of the FVI should still recognise that cultivars with lower trial numbers may have a greater chance of being re-ranked up or down when new trial data is added in the subsequent years. Notwithstanding this, it is highly unlikely that a cultivar ranked high in the FVI with a small number of trials is going to dramatically slide up or down the rankings when more trial data on that variety are added in later years.

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 three species. The reference varieties for Annual, Italian and Perennial FVIs 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 three-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 one to two years depending on location, and a variety must also be in at least three 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 is 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 is 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?

Trials have been conducted in the majority of Australia's dairy regions, especially where ryegrass is an important component of the feedbase. 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 and this is the most comprehensive and accurate combined data pool for ryegrass cultivars in Australia.

In 2025, 37 different trial sites across Australia were included in the FVI updates for each species, making it by far the most comprehensive and independent analysis of aggregated varietal performance in the country available to farmers and their advisors

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 2025?

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 New South Wales lists were added for Annual and Italian ryegrass for the first time. Then in 2024, an annual ryegrass FVI for Western Australia was released for the first time, utilising trial data sourced exclusively from WA.

What traits are included?

The FVI ratings are based on the potential economic value of seasonal dry matter yield for each cultivar. This year for the first time, cultivar level data on seasonal forage quality - measured as metabolisable energy per kilogram of dry matter - is included in the Perennial ryegrass FVI value for each cultivar. Furthermore, forage quality values for the majority of Annual and Italian ryegrass cultivars are presented in this years update, though importantly they are not yet considered in the calculation of the overall FVI value for each cultivar in those two species. These data were collected from PTN trials in 2023 at Bool Lagoon and Lardner Park (Italians) and Aberdeen and Lardner Park (Annuals). Persistence is also a trait of economic importance in the Perennial ryegrass species and efforts to measure this at a cultivar level are still in development.

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

Yes it is still valuable and worthwhile 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 South-east South Australia should use the South-west Victoria FVI for example.

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 2024/25?

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, new trials from Upper Natone (Tasmania), Ballarat (South-west Vic) and Howlong (Northern Vic)l have been added while in the Italian ryegrass FVI, seven new trials from Colac and Penshurst (both South-west Vic), Aberdeen and Wingham (both NSW), Bool Lagoon (South Australia), Tallygaroopna (Northern Vic) and Lardner Park (Gippsland) were added. In Annual ryegrass, six new trials from Smeaton and Penshurst (both South-west Vic), Aberdeen and Wingham (both NSW) Tallygaroopna (Northern Vic) and Lardner Park (Gippsland) were included. In addition, as described earlier in this document, forage quality values for Perennial ryegrass are now included in the FVI calculation for each variety in the Perennial ryegrass FVI list.

Does the Italian ryegrass FVI use data from the second year of Italian ryegrass trials that last for two growing seasons?

Of the 25 Italian ryegrass trials used in the FVI, less than half of them run for two years. It is very dependent on location and environment. Broadly speaking, anything north of the high rainfall regions of South-west Victoria and Gippsland will only run for one year and anything south of there will run for two years with some exceptions. 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 two years, the variety selection considerations can be quite different. This is because of the presence of novel endophytes in some varieties, which become 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 two-year Italian ryegrass trials after 28 February in year two is not included.

Will there be a two-year Italian ryegrass FVI in future?

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

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

It is too early to say at this stage. Logically, 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. This is much better than varieties with no endophytes, and it is likely these varieties will rank much higher in the two-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 are hybrid ryegrass varieties?

Hybrid ryegrasses, positioned between Italian and Perennial varieties, excel in both growth and persistence. Hybrids will generally have superior winter and early spring production compared to Perennial ryegrass due to their Italian ryegrass parentage. Therefore they provide an option to maximise production over a shorter time period of around two to four years. Developed by crossing Italian with Perennial ryegrass, their longevity or persistence will generally be less than Perennial ryegrass, but more than Italian ryegrass.

Care must be taken in selecting the hybrid ryegrass for your system as there are use patterns ranging from shorter-term (two to three years), to medium (three to four years), to longer-term where hybrids essentially perform like a Perennial ryegrass. This depends on the level of Italian vs Perennial parentage in the hybrid variety. Generally the more Perennial in nature the parentage is, the less winter and early spring production it will exhibit, but there are exceptions to the rule. The agronomic characteristics depend on the genetic background and breeding objectives. As hybrids are common in intensive production, where farmers are looking to maximise annual forage production, optimal pasture management is crucial for maximising performance and longevity.

How are Hybrids presented in the FVI?

Given the fit of hybrids into a Perennial dairying system, and the relatively short three-year PTN trial & evaluation program that feeds into the FVI, hybrids have previously been listed in the Dairy Australia Perennial ryegrass FVI to assist farmers in understanding their fit and benefit relative to Perennial ryegrass over that timeframe.

However from 2024 onwards, they are listed in a separate sub-list to the true Perennial varieties in recognition of the fact that they are not the same, but still compared to the Perennial ryegrass reference cultivar (which is Victorian or "Vic-rye").

Some hybrids have been trialled in the Italian ryegrass PTN trials and in the future when a two-year Italian ryegrass FVI is generated, these cultivars will be listed.

In an ideal scenario, longer-term Perennial ryegrass trials of five years or more would reflect both the yield and persistence of yield over a longer period for each variety but logistical and resourcing constraints within the PTN mean that for now, Perennial ryegrass varieties are evaluated over a three-year timeframe. This is under review at present within the PTN to see if longer Perennial trials are feasible.

Given all data in the Perennial and Hybrid ryegrass FVI reflects yield performance over three years, care must be taken in understanding the positioning and value of hybrids listed in the Perennial ryegrass FVI tables, their benefit to your system in respect to seasonal growth patterns, and the expected longevity before sowing a hybrid variety. It is highly recommended to consult with your agronomist when deciding between a Perennial or Hybrid variety.

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. So, these trials should be given a greater weighting in the calculation of performance values for Northern Victoria. 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 five 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?

In 2024, forage quality information on a varietal level was included in the FVI tables for the first time, both on an yearly average basis and on a seasonal basis. For 2025, we have taken this one step further and included forage quality in the overall FVI calculation for each variety.

In the Perennial ryegrass FVI lists, there is now an FVI - DM and FVI - ME value for each variety. The overall FVI is then simply the sum of both of these values. Further details on the methodology used to integrate Forage Quality trait into the FVI can be found in a recently published paper from Lewis et al (2024). Meanwhile, two new PTN trials each of Annual and Italian ryegrass were sampled for Forage Quality in 2023 and the performance values for each variety have been included in the 2025 FVI updates for those two species. However, unlike the Perennial ryegrass FVI, these forage quality performance values in Annual and Italian ryegrass have not been included in the 2025 overall FVI calculation for each variety. When sufficient forage quality data is available in future on all varieties in the marketplace for Annual and Italian ryegrass, this trait will be included in the overall FVI calculation for Annual and Italian ryegrass varieties.

Persistence is another trait of importance in Perennial ryegrass and needs to be accounted for in the index at some point in the future. Generating sufficient data on persistence is very challenging in Perennial ryegrass. Trials would ideally need to be run for six 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 the expansion of the FVI to Western Australia?

In 2024, a Western Australia FVI for Annual ryegrass was released using ten trials carried out in WA between 2016 and 2023, at Busselton, Boyanup, Dardanup, Forest Grove and Manjimup. The environment in the South-west WA dairy production region is quite different to the rest of Australia with a short and very defined growing season from May to November that does not deviate year to year. Hence, we decided to create a separate FVI for this region containing only trial data from WA. If enough Italian ryegrass trial data becomes available, we may look at creating an Italian ryegrass FVI for WA too in future. 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 were apparent. In contrast to some of the previous years, 2022 was an excellent growing season in WA and may also explain why the trial at Busselton showed yield differences between varieties that were not as evident in many of the earlier trials in WA. Economic values for WA have not yet been generated so only performace values are used to rank the cultivars. Economic values for this region willl be generated in the future.

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 few 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 refection 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 concluded in autumn 2023 and forage quality samples, which were also collected at several cuts on this site, were analysed and were publicised on various channels in 2024. The trial yield results can be viewed on the PTN/MLA E-tool already (Warrnambool 2020 - Continental Tall Fescue). 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 MLA PTN eTool, which can be viewed **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.

What does a PTN trial actually look like in practice?

The image shown is from a typical Perennial ryegrass PTN trial, sown at Colac in 2023. Several features of the trial are clearly illustrated from this photo that contribute to the high quality standards a PTN trial has to meet in order to be published:

1 Every variety is replicated four times. in this example each line of plots is a replicate and there are 20 varieties in the trial (each plot within a rep is a different variety).

2 A dry matter sample is collected from every single plot at every single harvest event.

3 This is then used to calculate the exact DM yield of each plot.

4 Use of four randomised plots for each variety in a trial means that a greater chance of a statistically significant yield difference between varieties can be observed.

5 The plots are randomised so that spatial variation is accounted for a much as possible (i.e. all four reps from a variety within a trial are not in the same corner of the trial area).

6 Plots are mowed to that the yield removed at each cut is in a target range of 500–2,000 kg DM/ha

7 Best practice weed and pest management control is applied throughout the trials and fertiliser is applied to as DM yield production is not limited by nutrient shortages.

8 All PTN trials are audited at least once a year, and audits are reviewed. Trials not meeting specifications are addressed or cancelled.

9 A panel of industry experts reviews trial management, raw data, and agronomy, and an independent statistician analyses the data for publishing to the MLA PTN eTool.

Are PTN trials the highest standard trials run by the seed industry?

Generally PTN trials are run to the highest standard and strictest protocols of all pasture seed industry trials in Australia. A number of companies in recent years have started running internal trials using the same quality standard and protocol as PTN trials.

However often seed industry trials are not run to the same standard as PTN trials and usually cost and resourcing reasons dictate this. Some other seed industry trials may only have two or three replicates instead of four for example. Another difference is often a common dry matter value is used for all varieties in some seed company internal trials at each cut - which differs from PTN protocols were every single plot at every single cut has its own DM. Certain other industry trials may be measured using plate meters or pasture probes - which is not as accurate as cutting and weighing every plot as per the PTN protocol.

Overall farmers and producers can have confidence that PTN trials meet strict industry quality standards and are are statistically analysed and interpreted using published statical methodology from appropriately qualified biometricians.

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