Final report

L.PDS.2004 PPS – Fescue; a low rainfall pasture tool?

Project code:L.PDS.2004

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Abstract

From demonstrations previously conducted, PPS concluded that winter active fescue (WAF) could be a productive and persistent perennial grass option for use in the below 550 mm rainfall zone.

WAF has been demonstrated to fulfil a role in perennial systems in Southern Victoria but its early heading trait and potential earlier loss of feed quality has meant that management issues have arisen.

The winter growth pattern of WAF appears to increase earlier in the <550mm rainfall zone in the Wimmera & Central regions of Victoria due to warmer soil temperatures & longer sunlight hours than those in the higher rainfall regions in SW Victoria.

Although WAF did not hold its critical feed values as long as phalaris, the differences were minor and would have little effect on overall farm production.

The demonstration showed that the use of Winter Active Fescue can improve production and flexibility in <550 mm rainfall zone grazing systems. The growth habit of the fescue appears to change from areas south of the divide by commencing its growth phase earlier.

Executive summary

Background

Approximately 40% of PPS member farms are located north of the Great Dividing Range in Central Western Victoria. The area, south of the Wimmera and Central plains, consists of light soils and the region typically has a short growing season due to low spring rainfall and high evaporation; this is becoming increasingly frequent with “bob tail” springs reducing production capacity. PPS has conducted small scale plant variety trials in the region and the results have shown that winter active fescues may have a role in increasing pasture production while at the same time reducing the risks of low spring rainfall.

Dry spring conditions in the region often cause a rapid utilisation of pasture feed followed by long periods of supplementary feeding; often in containment areas. The grazing of perennial species like phalaris through a dry spring can impose stresses that lead to plant losses in subsequent years. PPS considers that winter active fescue sown on part of the farm could increase overall dry matter production and also allow spelling of phalaris and other species to aid the build up of plant reserves before grazing later in the spring.

The addition of further perennial species on farm will assist in keeping adequate ground cover over summer. The use of winter active fescue is currently limited in the region and PPS believed that a successful demonstration could show its potential benefits to the pasture system.

Winter active fescues have been demonstrated to fulfil a role in perennial systems in Southern Victoria but their early heading trait and potential earlier loss of feed quality has meant that management issues have arisen and phalaris remains the favoured perennial grass variety in most cases.

From demonstrations previously conducted, PPS members concluded that winter active fescue could be a productive and persistent perennial grass option for use in below 550 mm rainfall zone. Although winter active fescue has performed well in the PPS Tottington pasture variety trial; it has not been widely adopted as a sown pasture variety in the region. PPS believes that this is in part due to winter active fescue's reputation of producing a bulk of feed which is underutilised and loses feed quality during spring. PPS aims to demonstrate that changing the grazing management of winter active fescue in lower rainfall areas and integrating it into the pasture systems on farm can increase pasture production and longevity of improved pastures.

PPS aimed to demonstrate the use of winter active fescues in these drier regions, measure its productivity and persistence under full scale paddock grazing and look at their potential to integrate into pasture systems.

Objectives

1. Demonstrate on five sites, that including winter active fescue as a proportion of the farm pasture area in the <550mm rainfall zone will increase production in individual paddocks by >50% and have the potential to increase overall farm dry matter production by an estimated 10 - 20% depending on the area of new pasture established.

2. Demonstrate the improved grazing management required to maintain perennial pastures in the region and improve producer knowledge and skills throughout the project. Produce best practice guidelines for the use of winter active fescue in the regions pasture systems.

3. Promote the demonstration results through a range of PPS extension activities including in the PPS quarterly newsletter and the PPS face book page.

4. Conducted a minimum of one information sessions/field days each year focusing on the demonstration results, including poster presentation at the PPS annual conference.

5. As a result of this project (assuming a positive outcome):
   40+ PPS members will have or will be planning to implement winter active fescue into their pasture system.
   Producers in other regions will have access to the demonstration results and many will have or be planning to use winter active fescue as a result of the project.

Methodology

Measurement of existing winter active fescue pastures.

Establish new winter active fescues for evaluation.

Assess effect of adding winter active fescue on other perennial pastures.

Results/key findings

Winter Active Fescue appears to fit well into perennial grazing systems in the <550mm zone.

The growth pattern of winter active fescue appears to increase earlier in the <550mm rainfall zone in the Wimmera & Central regions of Victoria due to warmer soil temperatures & longer sunlight hours than in the higher rainfall regions in SW Victoria.

Fescue did not hold its critical feed values as long as phalaris but the differences were minor and would have little effect on overall farm production.

Results from the current and previous PPS demonstrations shows that total dry matter production of the winter-active fescue cultivars compares favourably with winter-active phalaris cultivars. Previous PPS trials highlight that production is higher than Australian phalaris and Uplands cocksfoot.

Payback period for a fescue based pasture establishment was calculated to be 5 – 7 years at 2023 prices and costs.

Communication and Extension activities were affected by Covid restrictions as well the “La Nina” spring flooding in 2022. PPS believes that it achieved the project obligations but adoption has been delayed due to the communication and extension activities not taking place as early as planned.

Benefits to industry

The use of Winter Active Fescue in <550 mm rainfall zone grazing systems adds another dimension to grazing management. The growth habit of the fescue appears to change from areas south of the divide by commencing its growth phase earlier.

Future research and recommendations

PPS considers that there is now sufficient information on the use of winter active fescues in the <550 mm rainfall region of Western Victoria for producers and agronomists to make decisions on its use in pasture systems (Fig. 1).

The project results were compromised by the above average spring rainfall conditions experienced through the three years of the project. A longer period of funding may have allowed further relevant results to be obtained.
PPS notes that MLA has recognised this issue and has extended the PDS period from 3 to (up to) 6 years.

Figure 1: PPS fescue inspection “Overdale” Concongella site, Nov 2021

PDS key data summary table

Table 1: PDS key data summary table

Project Aim:
To demonstrate that winter active fescue can be a valuable pasture systems tool in the <550mm rainfall zone in Victoria.

	Comments		Unit
Production efficiency benefit (impact) Stocking rate – DSE, AE or LSU/ha	*dse/Ha increase in stocking rate over run down pasture*	5 dse/Ha annually	Dse/Ha
Increase in income	Increase of 8 dse/Ha over rundown pasture	$400	/ha
Additional costs (to achieve benefits)		$470	/ha
Net $ benefit (impact)	Calculated over ten years	**353 P.A.**	**/ha**
Number of core participants engaged in project		5	
Number of observer participants engaged in project	PPS members in <550 mm rainfall zone	75	
Core group no. ha		9,615	
Observer group no. ha	Approx	120,000	
Core group no. sheep		34,200	hd sheep
Observer group no. sheep	Approx	410,000	hd sheep
Core group no. cattle		0	hd cattle
Observer group no. cattle	Approx	250	hd cattle
% change in knowledge, skill & confidence – core	*Fescue use & management*	21%	
% change in knowledge, skill & confidence – observer	*Fescue use & management*	11%	
% practice change adoption – core	*Establish additional fescue pastures*	100%	
% practice change adoption – observers	*Establish fescue pastures*	15%	.
% of total ha managed that the benefit applies to	*% of potential farm mix suited to fescue pastures*	10%	
Key impact data			
Net $ benefit /ha (total ha managed)	**$353.00/ha**		
Gross Margin / Ha	**$400.00/ha**		

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1. Background

The Perennial Pasture Systems (PPS) is an independent farmer group which was formed in the Upper Wimmera region of Victoria in 2007.The group's aim is to push the boundaries of perennial pasture research and demonstration in the region and provide information on productive pasture management to members and the wider agricultural community.

PPS conducts several research and extension projects as well as conducting pasture workshops, paddock walks & field days at various times during the year, an annual study tour to inspect leading farms in other regions and an annual conference in September. The group has close contacts with Agriculture Victoria, CMA's and local government. PPS shares its information with other farm groups through its newsletters and website.

Approximately 40% (>50) of PPS member farms are located north of the Great Dividing Range in Central Western Victorian. The area, south of the Wimmera and Central plains, consists of light soils and the region typically has a short growing season due to low spring rainfall and high evaporation; this is becoming increasingly frequent with "bob tail" springs reducing production capacity.

PPS previously conducted small scale plant variety trials in the region and the results showed that winter active fescues may have a role in increasing pasture production while at the same time reducing the risks of low spring rainfall.

Currently dry spring conditions cause a rapid utilisation of pasture feed followed by long periods of supplementary feeding, often in containment areas. The grazing of perennial species like phalaris through a dry spring can impose stresses that lead to plant losses in subsequent years. PPS considers that winter active fescue sown on part of the farm could increase overall dry matter production and also allow spelling of phalaris and other species to aid the build-up of plant reserves before grazing later in the spring. The addition of further perennial species on farm will assist in keeping adequate ground cover over summer. The use of winter active fescue is currently limited in the region and PPS believes that a successful demonstration could show its potential benefits to the pasture system.

Winter active fescues have been demonstrated to fulfil a role in perennial systems in Southern Victoria but in that region, its rapid late winter growth and mid spring loss of feed quality has meant that management issues have arisen and phalaris remains the favoured grass variety in most cases. PPS demonstrated this outcome at a paired paddock project at a high rainfall site near Elmhurst. This was part of an MLA funded project (SO901) conducted from 2009 to 2012.

PPS members considered that the traits that winter active fescue exhibits may make it a useful perennial grass in the drier regions where its rapid spring early growth could be harvested by stock whilst at the same time allowing other pasture varieties to be rested to maximize growth to be utilised in later spring and summer. PPS set up the project to demonstrate its use in grazing systems of <550mm of annual rainfall.

2. Objectives

By March 2023; in the Stawell - St Arnaud region (assuming a successful demonstration).

1. Demonstrate on five sites, that including winter active fescue as a proportion of the farm pasture area in the <550mm rainfall zone will increase production in individual paddocks by >50% and have

the potential to increase overall farm dry matter production by an estimated 10 - 20% depending on the area of new pasture established. **Achieved**

2. Demonstrate the improved grazing management required to maintain perennial pastures in the region and improve producer knowledge and skills throughout the project. Produce best practice guidelines for the use of winter active fescue in the regions pasture systems. **Achieved**

3. Promote the demonstration results through a range of PPS extension activities including in the PPS quarterly newsletter and the PPS face book page. **Achieved**

4. Conducted a minimum of one information session/field day each year focusing on the demonstration results, including poster presentation at the PPS annual conference. **Achieved (in non-Covid years)**

5. As a result of this project (assuming a positive outcome):
40+ PPS members will have or will be planning to implement winter active fescue into their pasture system.
Producers in other regions will have access to the demonstration results and many will have or be planning to use winter active fescue as a result of the project. **Partly Achieved**

3. Methodology

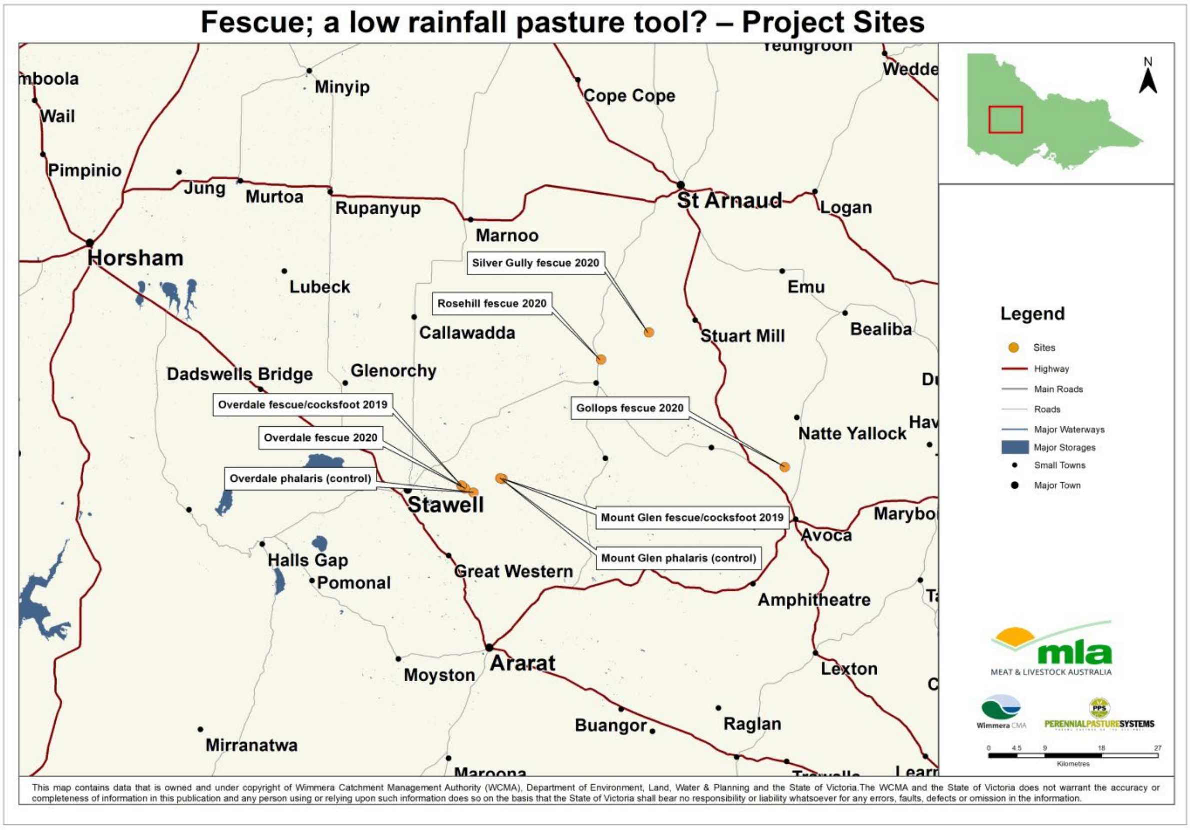
Table 2: Methodology

Appointed PPS project advisory group to oversee the demonstration. Appointed project consultant agronomist.
The advisory group and the agronomist established measuring and monitoring methods to be used consistently across the demonstration sites.
Established four X 10 Ha new winter active fescue pasture sites in autumn/winter 2020 in <550 mm rainfall region. Two established pastures were also measured for dry matter production and pasture composition. The pastures were established in 2019 with winter active fescue and uplands cocksfoot Commenced measurement of two existing winter active fescue sites in autumn/winter 2020 in <550 mm rainfall region.
Plant establishment counts conducted on newly established fescue pastures during spring 2020. Plant composition on fescue and control pastures recorded in early spring annually.
Feed quality of project sites measured throughout the demonstration. Feedtests determined feed quality of fescue and control pastures in early spring & mid spring and early summer to determine feed quality differences.
Dry matter production & stocking rate measured 2021 – 2022. Dry matter cuts taken as necessary throughout the growing season.

Stocking rates will be decided in consultation with the host farmers and will be determined by feed on offer to manage pasture for persistence as well as production.
Monitoring of phalaris pastures on the properties where fescue is established commenced in 2021 to assess management changes made possible by the addition of fescue pastures.
Plant persistence assessments commenced in 2021. Fescue pastures will be rotationally grazed and managed to prevent overgrazing using DM estimates and trigger points for destocking.
Extension activities commenced with PPS newsletter articles in 2020.
An economic analysis was conducted on the demonstration at the end of the 2022. All measurements will be collated and the final report produced.

The demonstration sites were located in the Southern Wimmera & North Central areas of Victoria (Fig. 2).

Figure 2: Location of Project Sites



3.1 Demo 1

3.1.1 Measurement of existing pastures

Two pastures were measured for dry matter production and pasture composition. The pastures were established in 2019 with winter active fescue and uplands cocksfoot; a mix that should be well suited to the <550 mm region.

Existing sites:

Table 3: Existing sites

Existing Sites		**Paddock**	**Date sown**
Overdale	Concongella	Rams	2019
Mount Glen	Joel South	Timber	2019

The two sites in the demonstration were established Flecha Fescue pastures at Mt Glen & Overdale, east of Stawell; both were sown in 2019 and included Uplands Cocksfoot and clovers. Holdfast GT Phalaris pastures sown in the same year were used as a comparison; the Overdale phalaris site had Uplands Cocksfoot included in the pasture establishment.

3.1.2 Establish new winter active fescues for evaluation

Four winter active fescue-based pastures were established in 2020 with appropriate legumes added to the pasture mix. Uplands cocksfoot was added to the pasture mix at the Gollops site.

Gollops was sown with Uplands Cocksfoot @10 kg/Ha fescue & 3 kg/Ha Uplands. The other three sites were sown @14 kg/Ha of fescue. All sites had sub clover included in the seed mix, Overdale also had Arrowleaf added.

3.1.3 Feed Quality

Herbage samples of individual species were taken from the trial paddocks during spring 2021 and 2022 and sent to the FEEDTEST laboratory at Werribee. They were analysed and the project reported on the key nutritional factors, being digestibility (%), energy (MJ ME/kg DM) and protein (%). Feed quality testing was not done prior to spring as the nutrition of the growing pastures is sufficient for stock needs, although quantity may be limiting requiring supplementary feeding.

Key indicators for sheep nutritional requirements were used as a baseline in the feed quality graphs.

3.1.4 Economic analysis

The economic analysis will assess the financial benefit of establishing a fescue-based pasture compared with a rundown pasture with unproductive species. The increase in production achieved from the fescue pasture, in DSE/ha terms, was used for the analysis.

3.2 Extension and communication

3.2.1 Deliverables from Communications Plan

Demonstrate the improved grazing management required to maintain perennial pastures in the region and improve producer knowledge and skills throughout the project. Produce best practice guidelines for the use of winter active fescue in the regions pasture systems.

Promote the demonstration results through a range of PPS extension activities including in the PPS quarterly newsletter and the PPS face book page.

Conduct a minimum of one information sessions/field days each year focusing on the demonstration results, including poster presentation at the PPS annual conference.

3.3 Monitoring and evaluation

Table 4: Monitoring and evaluation methodology and performance

Evaluation level [1]	Project Performance Measures	Evaluation Methods
Inputs – What did we do?	• 4 on farm demonstration sites in 2020 in the Upper Wimmera & Avon catchment regions of Victoria. Average site is 12 Ha. • 2 already established sites used in 2019 DM measurements. • Over 50 PPS members directly involved in observing demonstration sites; a further 150 will receive results from the demonstration.	• Records and documentation of all project activities, • Minutes of Steering Committee • Financial Statements • Soil tests • Pasture measurements (fescue & comparison phalaris pastures) Pasture establishment counts Pasture composition assessments Dry matter measurements Feed quality measurements Stocking rate measurements
Outputs - What did we do?	• Project progress reports to be issued to PPS members through PPS newsletter, closed face book page and website. • Other communication products such as case studies, producer guides • Results on dry matter production, animal performance and other measurements reported annually group members.	• Milestone reports submitted to MLA as required. • Feedback from PPS members during project. • Annual pasture result analysis by project advisor. • All data recorded from trial sites in central data base and milestone reports • Records and documentation of all project activities,

	• Sites included in PPS extension program e.g. field tours. • PPS produced a fact sheet at the completion of the project focusing on the use of fescue in drier regions	• Record stock movements and calculate stocking rates. • Analysis of benefits for existing perennial pastures and the whole farm system. • Names and numbers of attendees at field days recorded • Case studies • Production of a fact sheet at the completion of the project focusing on the use of fescue in drier regions
Changes in knowledge, attitudes and skills - How well did we do it?	• Anticipated increase in skills of producers hosting the sites. • Anticipated increase in skills of producers implementing improved pasture system management.	• Pre project baseline survey completed in autumn 2020. • Post project survey completed in early 2023.
Practice changes – Has it changed what people do?	• Expect increase in winter active fescue establishment after the project (assuming successful demo). • PPS expects 40+ members to implement winter active fescue into their pasture system. • Expected practice change in whole farm grazing system management.	• PPS annual pasture establishment survey • Anecdotal evidence from PPS members • Pre project baseline survey to be completed. • Post project survey to be completed in early 2023.
Benefits – Is anyone better off?	• Documented evidence of the value of winter active fescues in <550mm rainfall region. • Understanding of the key barriers / enablers of adoption of the practices	• Cost/benefit analysis of demonstration sites • Reports from Steering Committee on key learnings
General observations / outcomes – Is the industry better off?	• Subsequent adoption of annual pastures by broader number of producers • BCA of broader adoption through aspects such as:	• Survey and anecdotal evidence from the core producers • Observations of practice change by PPS Project Manager.

	○ Improved pasture systems in <550mm rainfall region by increasing late winter feed availability.	• Surveyed responses from PPS members 2 years after project (by MLA) • The PPS annual pasture survey document adoption of the management practices coming out of the demonstration.

3.4 Results

3.4.1 Demo 1- Measurement of existing pastures

Despite 2020 being an above rainfall year in most of Victoria, the Stawell region had below average rainfall (Fig. 3) which affected pasture growth. Clover and annual grass content varied between sites which can be seen in Fig. 4 and 5.

Figure 3: Stawell rainfall for 2020 compared with long-term average

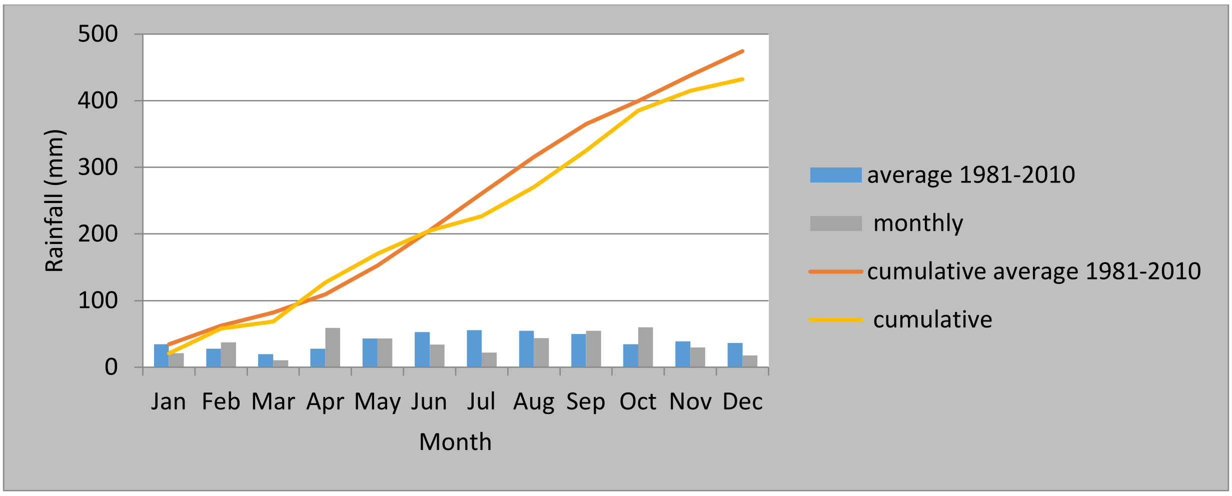


Figure 4: pasture composition of established sites Overdale

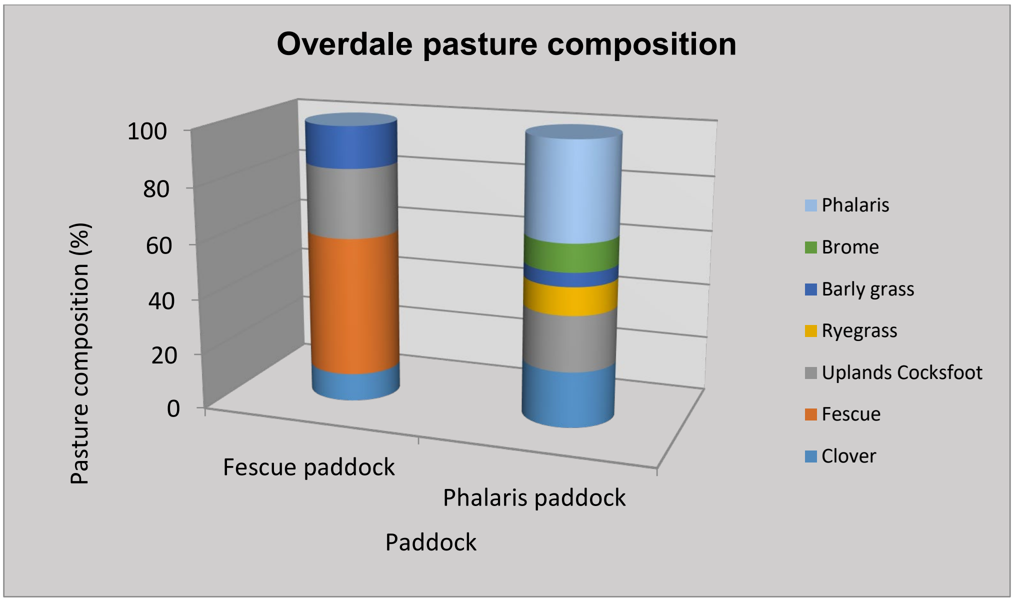
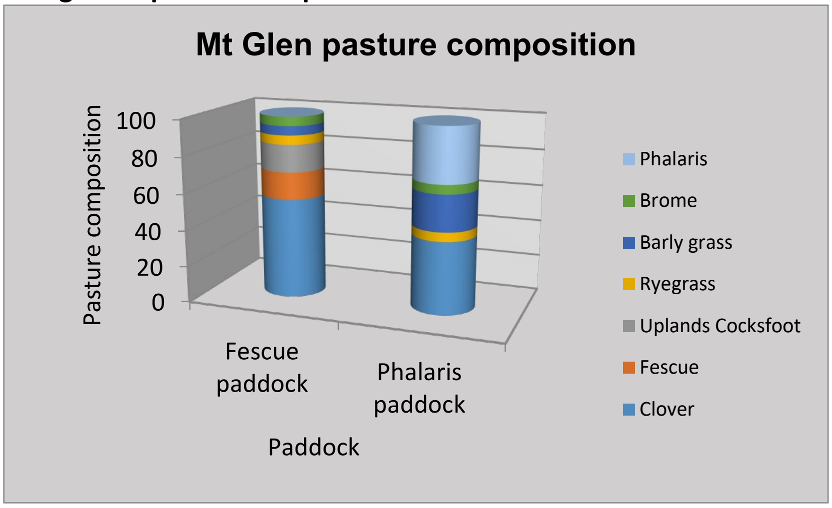


Figure 5: pasture composition of established sites Mount Glen



The Mt Glen sites are on alluvial sandy loam soils while the Overdale sites are on lighter sandy loam soil types with areas of gravel.

Table 5: 2020 Dry Matter comparison (2018 sown pastures)

	Mt Glen fescue/cf	**Mt Glen phalaris**	**Overdale fescue/cf**	**Overdale phalaris/cf**
25-Aug	889	863	1225	363
22-Oct	3749	2290	1987	961
18-Dec	987	685	1094	463
Total	**5625**	**3838**	**4306**	**1787**

While the two different site results are not directly comparable due to soil type, nutrient levels and pasture composition differences; they show that in 2018 the fescue-based paddocks produced more dry matter than the phalaris comparisons.

3.5 Demo 2

Pasture establishment results for the 4 new sites are shown in Table 6 and in Fig. 6.
The Rosehill & Silver Gully sites were affected by very dry conditions in July and competition from Wimmera ryegrass. While the average establishment counts of fescue were low at both the sites, they have areas of good plant numbers (Fig. 7). Ryegrass control was carried out in spring at both sites with slashing at Silver Gully & hay making at Rosehill (Fig. 8).

Table 6: Location of sites, sowing details and plant establishment in 2020

Site	Location	Weed Control	Sowing Date	Av Fescue establishment Plants / Sq Metre
Gollops	Avoca	Spraytop 19 & Knockdown 20	28th April	102
Overdale	Concongella	Crop 18,19 Knockdown 20	13th May	118
Rosehill	Paradise	Knockdown & cultivate 20	6th May	21
Silver Gully	Winjallok	Spraytop 19 & Knockdown 20	6th May	32

Figure 6: Range of fescue establishment counts (2020)

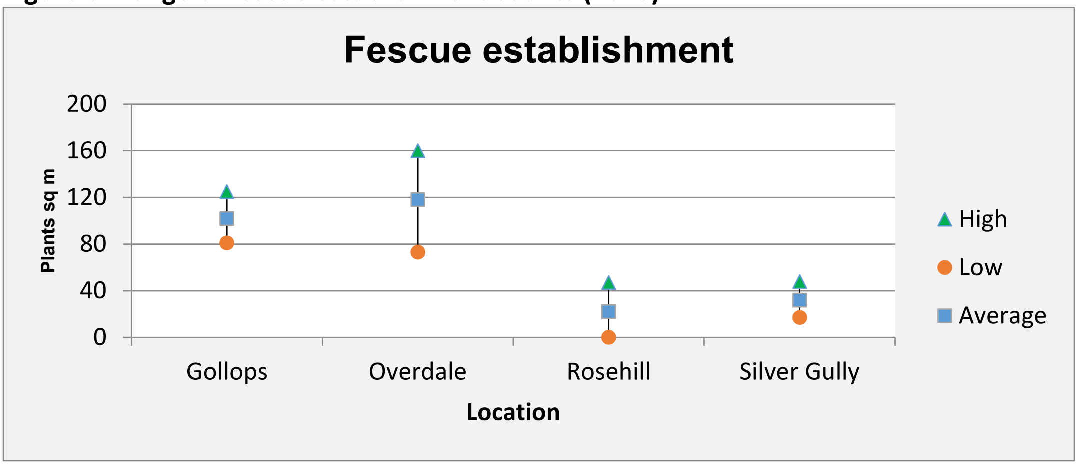


Figure 7: Fescue seedlings; Rosehill 17th July

Figure 8: Ryegrass control at Silver Gully, October 2020

Nitrogen was applied at the Overdale & Gollops sites, all sites were grazed during spring (Fig. 9). Grazing was controlled to allow for seed set & the build-up of carbohydrate reserves in tiller bases to improve persistence (Fig. 10).

Figure 9: Gollops 25th September 2020

Figure 10: Overdale 13th August 2020

3.5.1 Pasture Counts

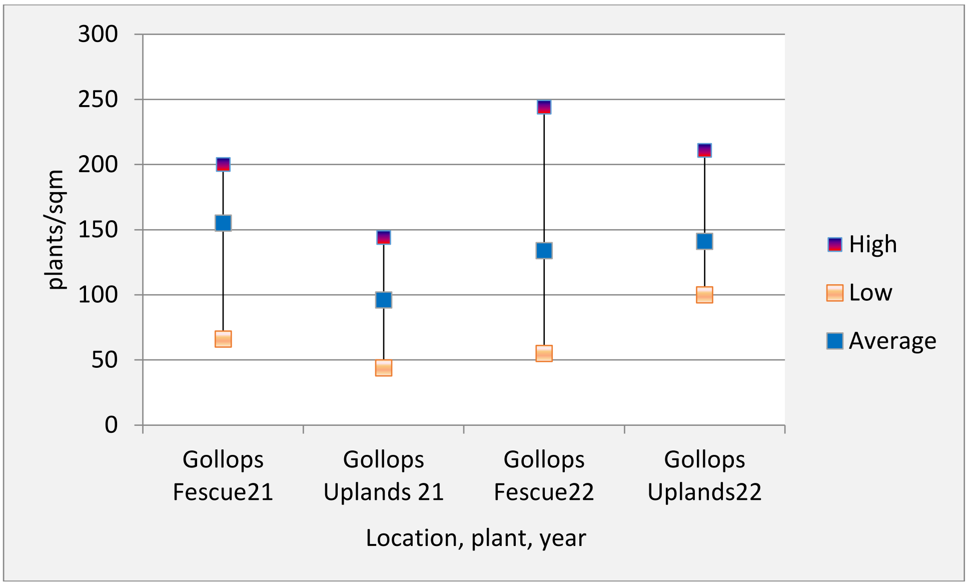
Counts of the sown grasses were conducted at Overdale in 2021 & Gollops in 2021 & 2022 (Table 7). The EverGraze intersecting points method was used.

Table 7: Fescue counts at Overdale 2021

Plant/sq/metre	310	133	238

Fescue & Uplands counts were conducted separately in the mixed grass establishment at Gollops (Fig. 11).

Figure 11: Spring plant counts Gollops 2021 & 2022



3.5.2 Pasture Composition

Fescue content ranged from 20% -60% in the new pastures in 2021 (Fig. 12)

The pasture composition of the Silver Gully, Overdale & Gollops sites were assessed in spring 2021 (Fig. 13 and 14). Two assessments were taken at Gollops as there were small areas of silver grass (vulpia spp.) & both areas were used in the feed quality measurements.

Two assessments were also taken in the Silver Gully fescue pasture with a urea treatment and a control used in the results.

The Rosehill pasture composition was not assessed due to poor establishment of fescue. The site was used to measure feed quality of individual grass species.

Figure 12: Project site pasture composition, Spring 2021

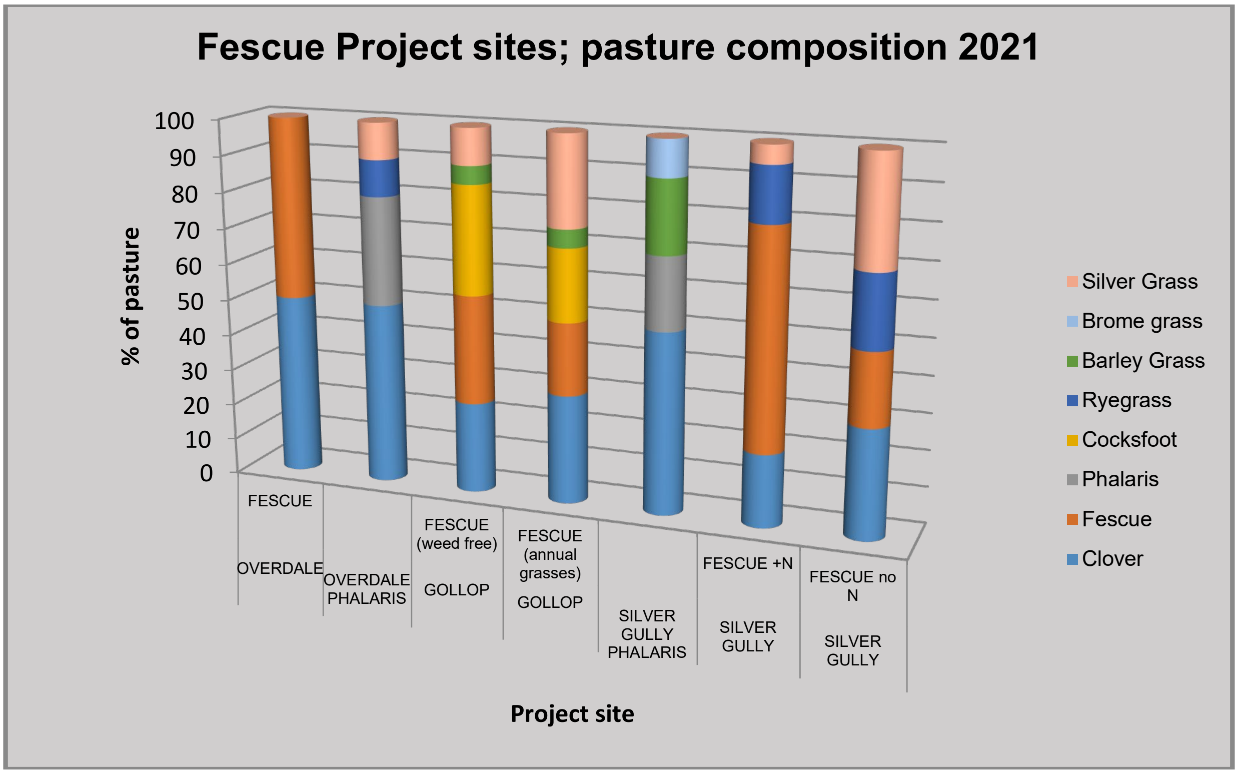


Figure 13: Overdale fescue

Figure 14: Overdale fescue

3.5.3 Soil tests

The fescue paddocks sown in 2020 were soil tested in autumn 2021 and the results are listed in Table 8. Results have been colour coded for interpretation – adequate (green), marginal (orange), low (red).

Table 8: Top soil test results (0-10cm) April 2021

Site	pH (water)	pH (CaCl2)	Phosphorus (Olsen) Mg/kg	Potassium Mg/kg	Sulphur Mg/kg	Aluminium Cmol/kg	Organic Carbon% (W&B)
Gollops	N/A	5.30	12	335	10	N/A	N/A
Overdale	5.85	5.31	7.6	139	44	0.1	2.67
Rosehill	5.45	4.61	12	154	7.6	1.5	2.75
Silver Gully	5.51	4.72	33	85	27	1.3	1.86

3.5.4 Feed Quality

The pasture results are concentrated on crude protein, energy & digestibility. Protein & energy requirements; 50 kg dry sheep & 25 kg weaners are used in the results. The digestibility levels used are – high quality >65% and low quality <55% which are taken from FeedTest^{tm} information.

Please Note *- The observations and comments on the feed quality of the sampled pastures are those of the PPS Project Manager and further information should be sourced before utilising the results.*

3.5.5 Summary

2020, 2021 and 2022 were influenced by “La Nina” springs which meant that feed growth continued later into spring than average. PPS has commenced a feed quality project under the MLA PDS program which will likely provide feed quality information for drier spring conditions over the course of the project.

It should be noted that the feed quality values are for individual grass species, not the entire pasture. Paddocks with good clover or clover burr content mixed with the grass held feed value for longer. Total pasture tests are included in the 2021 & 2022 results. Selective grazing by sheep can result in them securing adequate nutrition so feed quality results are only a guide to overall pasture quality.

Grazing pressure also makes a difference in these wetter years depending on whether the grasses have been grazed to still be vegetative or has run to head.

3.6 Results

3.6.1 Metabolisable Energy 2020

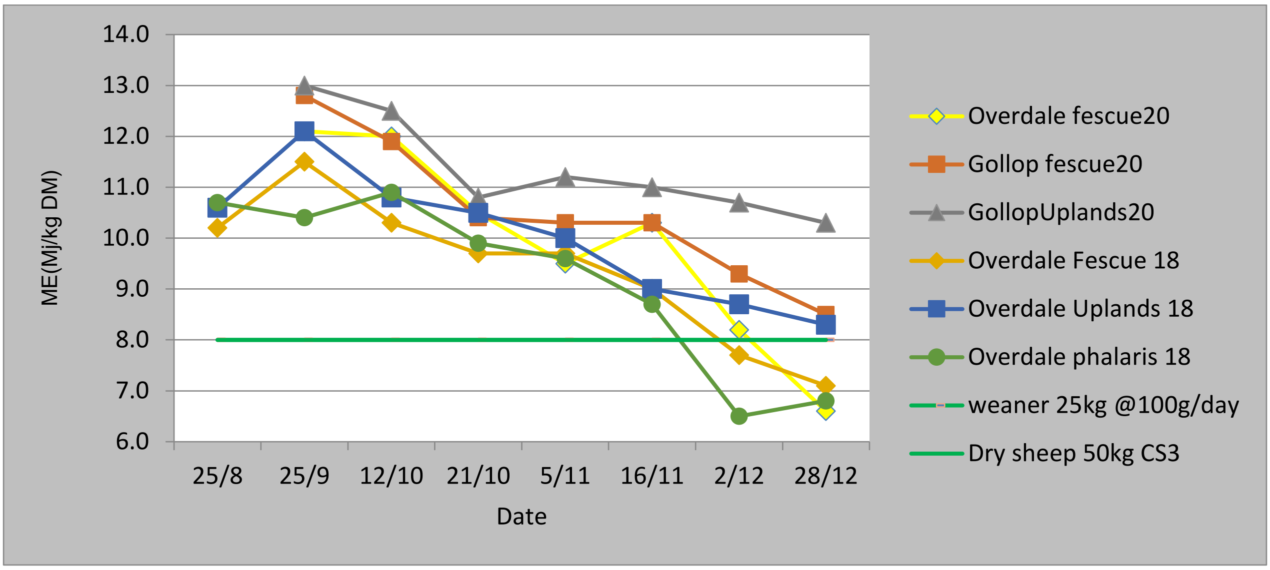
All cultivars were lightly grazed except for the Uplands at Gollops; sample collection was difficult due to the vigour of the fescue which made separation tedious. The Uplands was collected from areas of moderate grazing.

The Gollops site held more soil moisture in spring than the Overdale site and this is reflected in the test results. It should be noted that only the grass cultivars were tested; paddocks also contained dry clover which would have improved the overall feed quality.

The energy levels declined more rapidly at the Overdale sites reflecting the lower soil moisture when compared to Gollops. The fescue results were comparable to the phalaris suggesting no penalty in energy value between the varieties in 2020 (Fig. 15)

The minimum energy content of pasture required by dry sheep and weaner sheep to maintain weight is 8 MJ ME/kg DM. This benchmark (AgVic 2018) is indicated by the horizontal light green line in Fig. 15.

Figure 15: Metabolisable energy of pasture at Demo sites (2020)

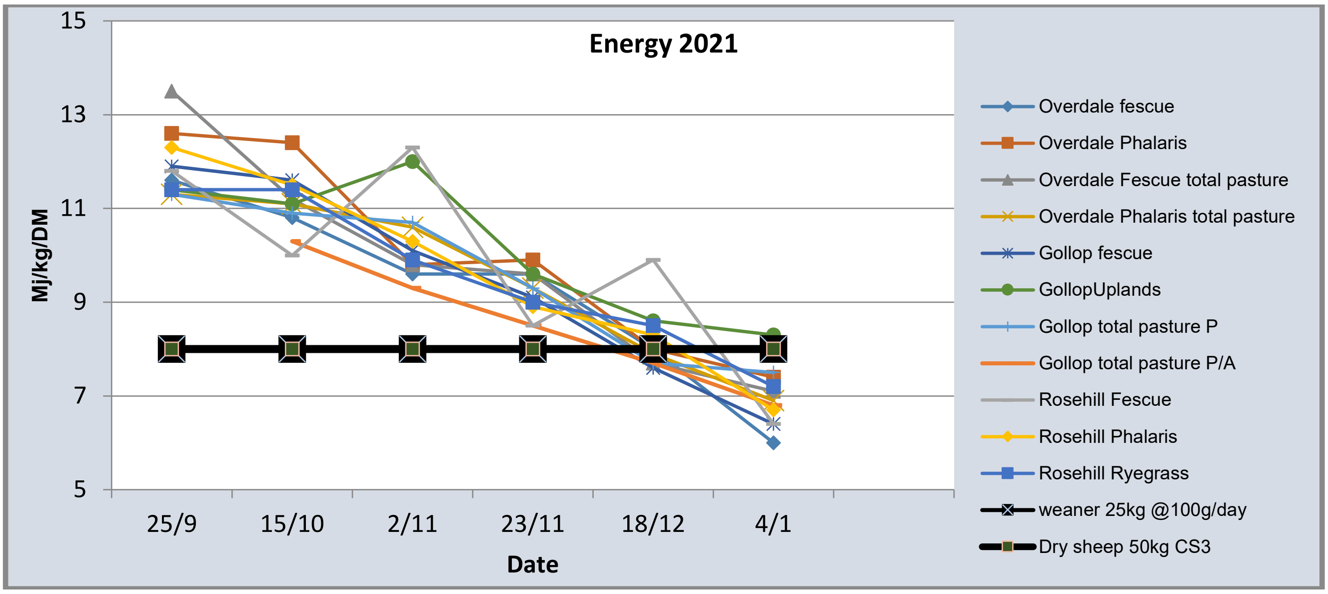


3.6.2 Metabolisable Energy 2021

2021 had an early autumn break and above average rainfall which meant that perennial grasses held their feed value longer than usual. All the project pastures were in full rotational grazing programs.

The energy levels of all samples fell progressively throughout spring & early summer. The fescue levels declined at a faster rate than phalaris, uplands cocksfoot or Wimmera ryegrass but the differences were not great. The Rosehill fescue produced variable energy results & did not decline on an even level (Fig. 16).

Figure 16: Metabolisable energy of pasture at Demo sites (2021)

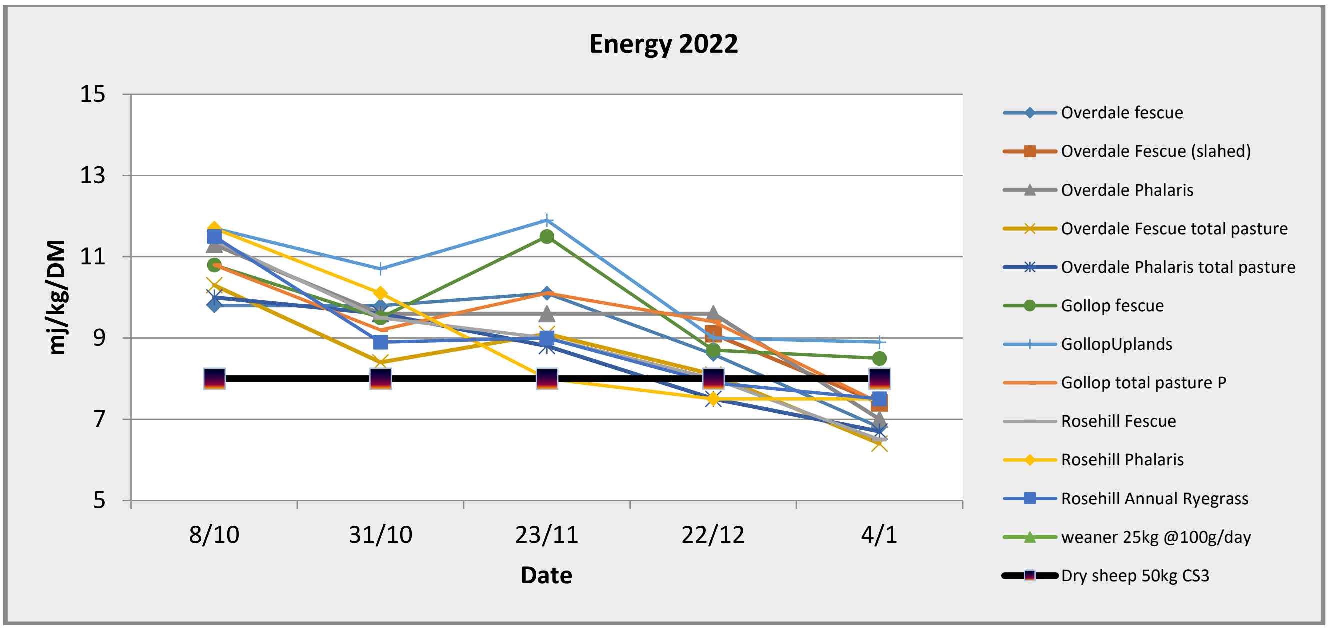


3.6.3 Metabolisable Energy 2022

2022 was even wetter than 2021 with near record annual totals and resulted in perennial grasses retaining green material well into December in the below 550 mm rainfall zone. Rotational grazing continued on all project pastures but by late spring, all had an excess of spring growth.

Energy levels stayed above the critical 8 MJ/kg/DM level for around ten days longer than 2021 (Fig. 17). The Gollops fescue and uplands were still providing enough energy for sheep on January 4th.

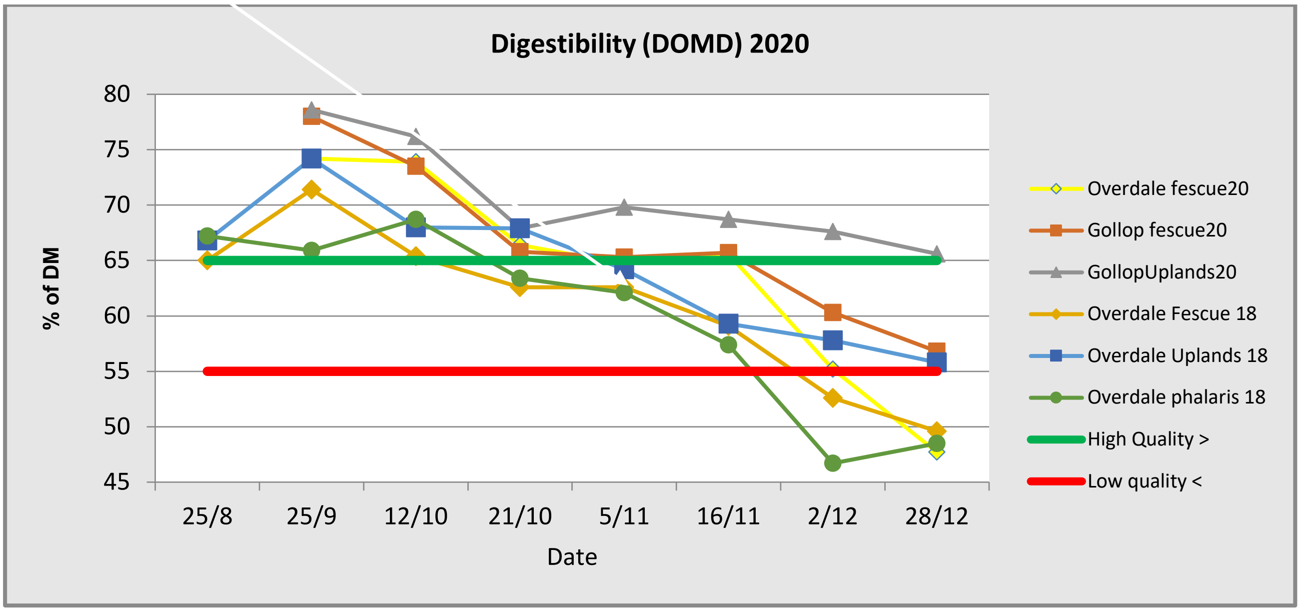
Figure 17: Metabolisable energy of pasture at Demo sites (2022)



3.6.4 Digestibility 2020

The digestibility of all grass species, except for the Gollop Uplands, declined rapidly during late spring and early summer expected as the plants went into reproductive phase (Fig. 18). The decline in fescue digestibility was not noticeably quicker than the phalaris tested.

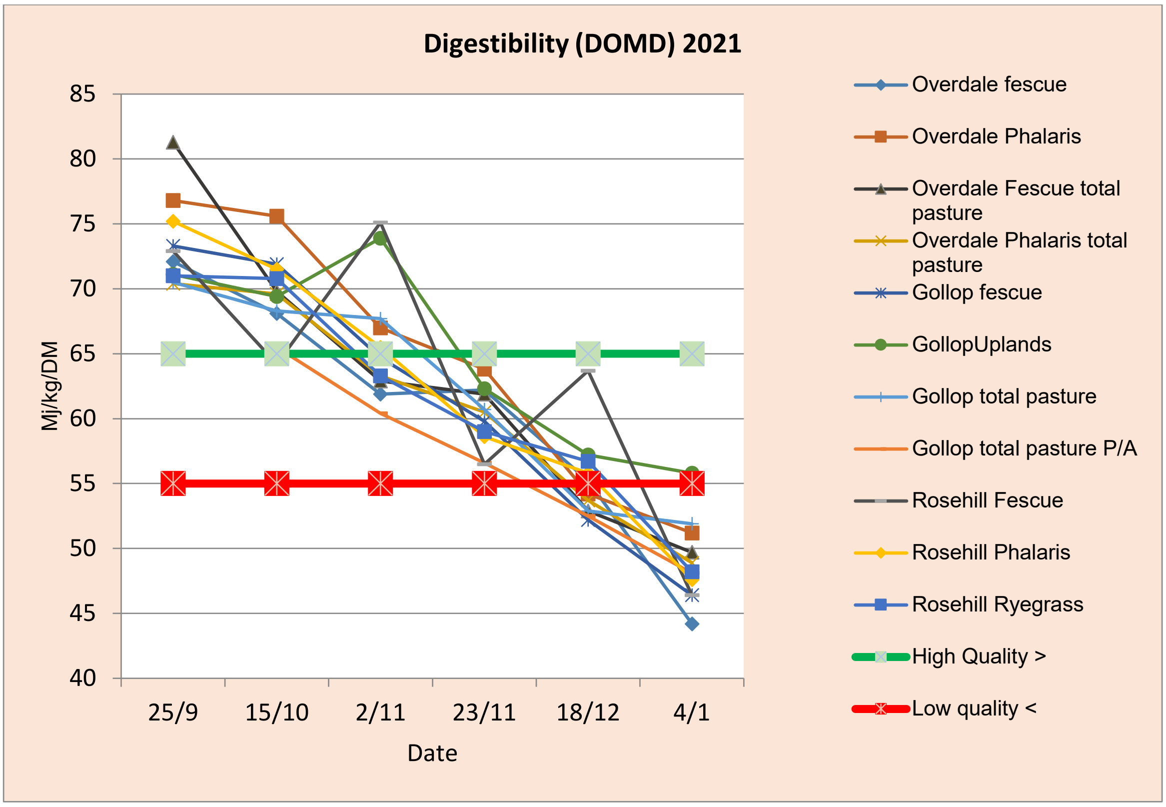
Figure 18: 2020 demo sites digestibility test results



3.6.5 Digestibility 2021

The fescue at Rosehill again produced variable digestibility results as it did for energy and protein (Fig. 19). All other samples declined in digestibility at a fairly even rate. The fescue samples ended with lower digestibility than the other samples by early January but all were below the critical low quality level.

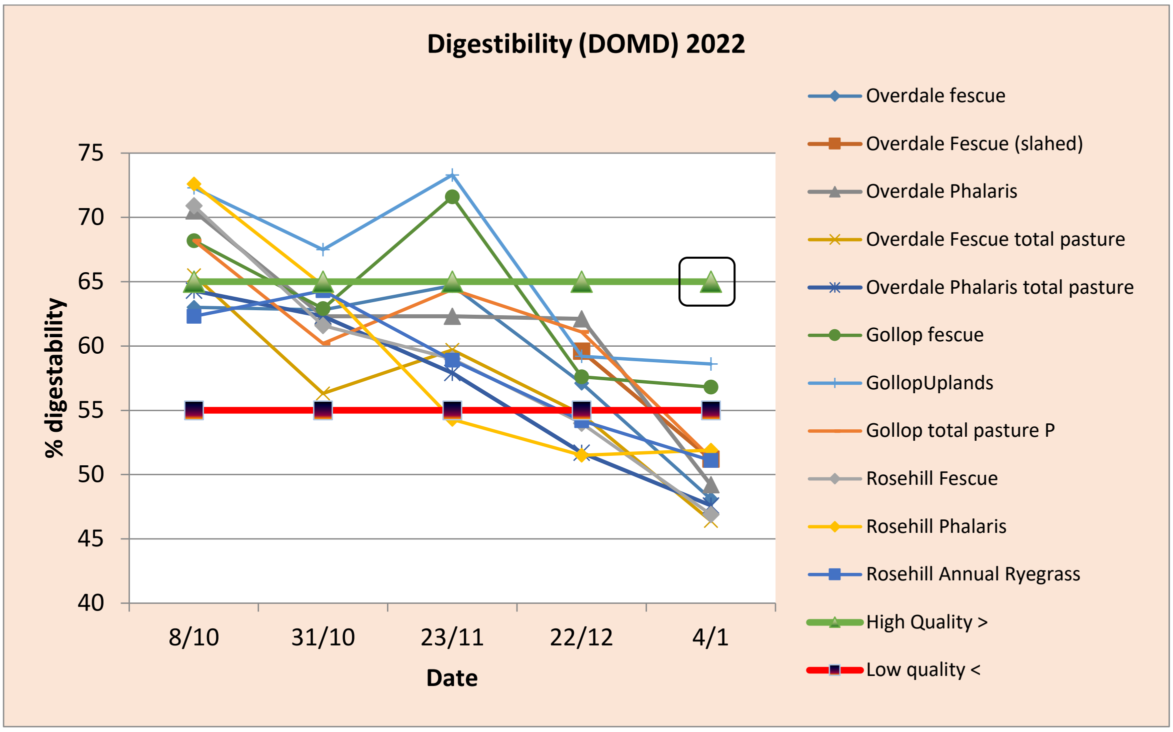
Figure 19: digestibility test results 2021



3.6.6 Digestibility 2022

The Rosehill site was allowed to run to seed to allow deeper root growth from the perennial species thereby reducing digestibility fairy quickly (Fig. 20). The Gollops fescue and uplands were above low-quality digestibility in early January.

Figure 20: digestibility test results 2022

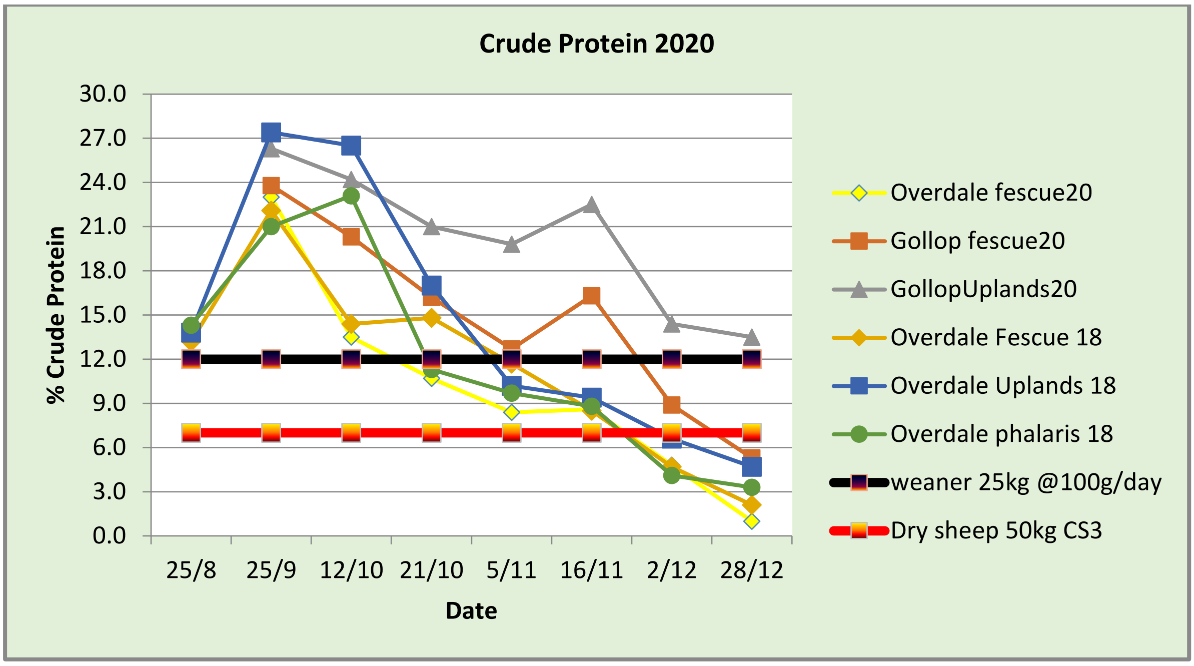


3.6.7 Protein 2020

The minimum protein content of pasture required by dry sheep and weaner sheep to maintain weight is 7% and 12%, respectively. These benchmarks (AgVic 2018) are indicated by the horizontal lines in Fig. 21-23

The protein of the Demo pastures decined, as expected, during spring and by early December for all grasses except the Uplands at Gollops was below the requirement for weaner sheep. By late December only the Gollops Uplands had suffient protein for grown sheep. At Overdale, where both fescue and phalaris were measured the protein value of the phalaris and Uplands cocksfoot declined at a slighly faster rate than the fescue by early November but the protein levels were similar after that.

Figure 21: 2020 demo sites protein test results



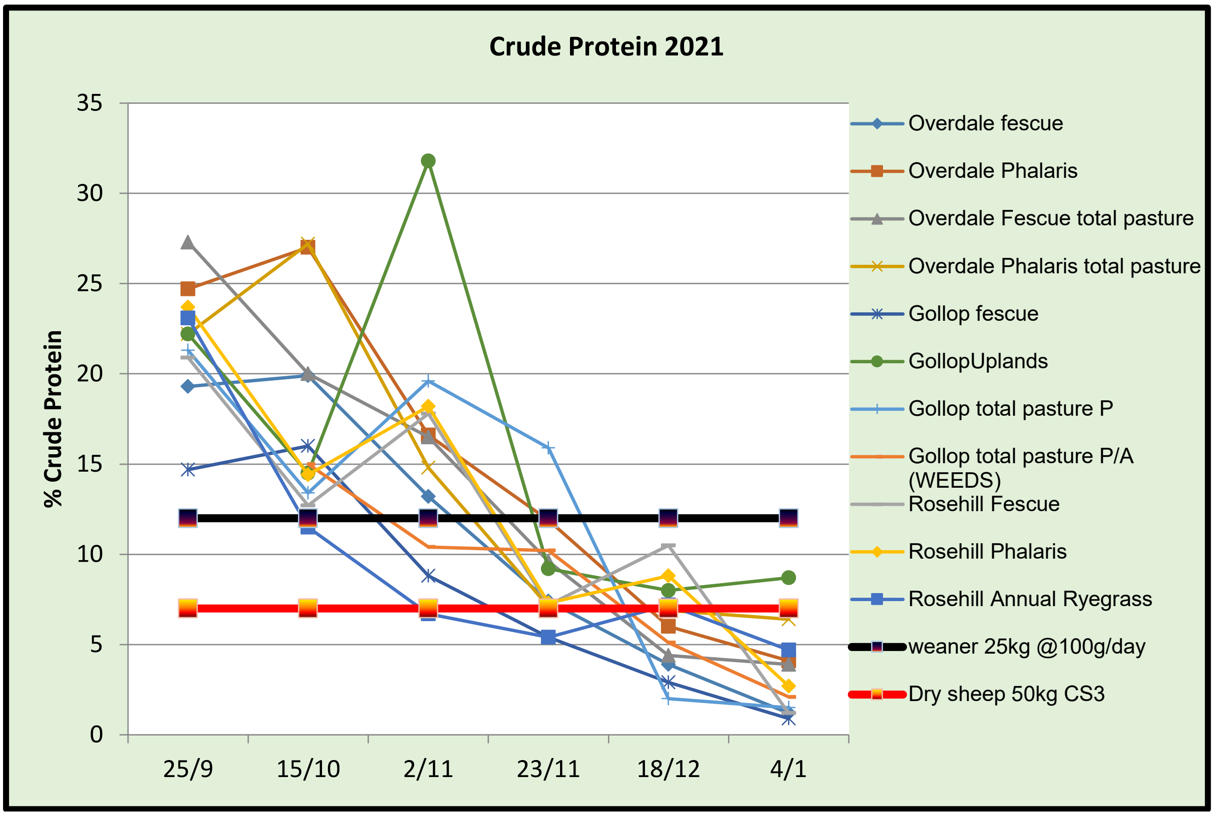
3.6.8 Protein 2021

The protein levels for all varieties fell during November except for the Nov 10th test on Gollops Uplands which had a protein level of 31.8% (Fig. 22). The sample was retested by FeedTest™ using a different method and returned the same result.

The protein level at all sites was below that required for weaner sheep by December and levels continued to fall with only Gollops Uplands having high enough crude protein for dry sheep by early January.

The fescue samples recorded variable protein results with Gollops declining rapidly, Overdale declined at a slower rate than Gollops but at a faster rate than the Overdale phalaris. The Rosehill fescue produced variable protein results and did not decline on an even level; it was the highest protein of all samples in the 18th December tests.

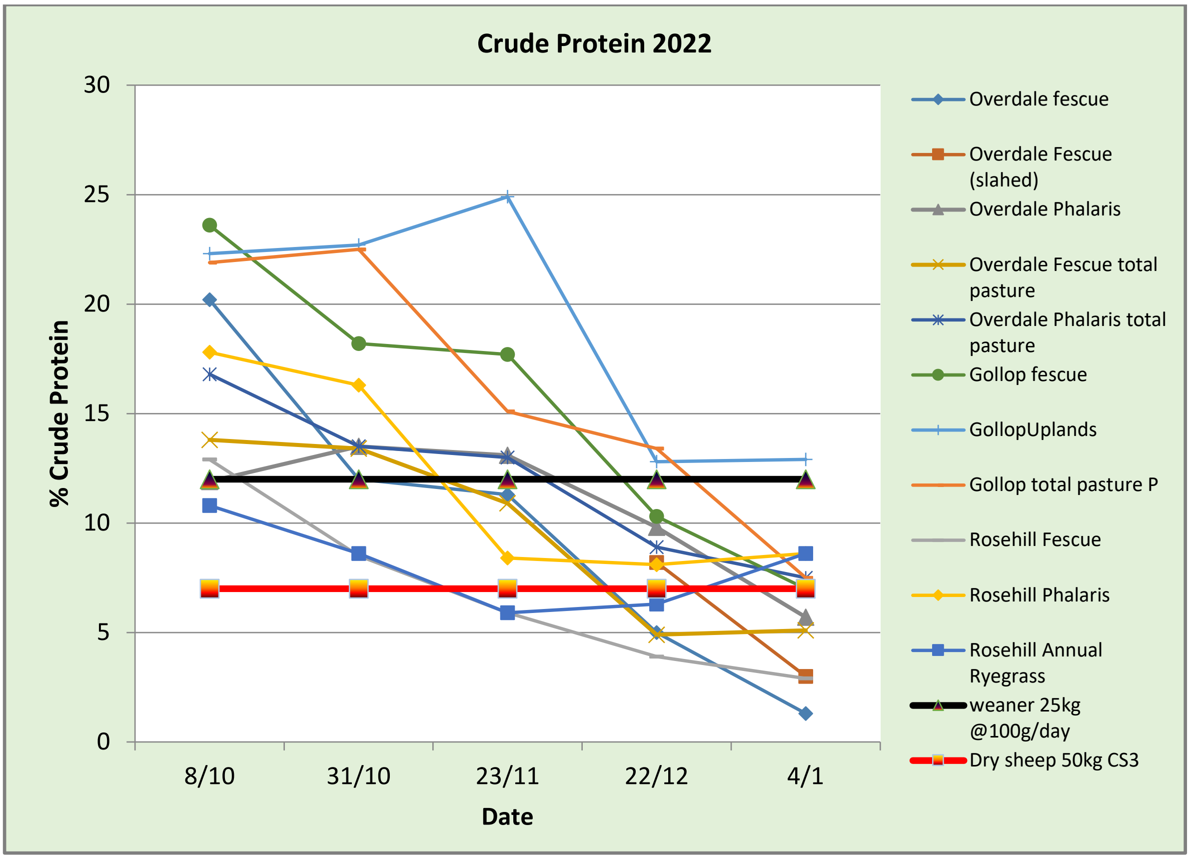
Figure 22: protein test results 2021



3.6.9 Protein 2022

Only the Gollops Uplands and Total Pasture Mix was providing sufficient for weaners by the 22nd of December, the total pasture went below the required level by early January but the Uplands Cocksfoot which had been grazed heavily was still above the critical level (Fig. 23). Protein levels were falling close to or below critical protein levels for all sheep by early January 2023.

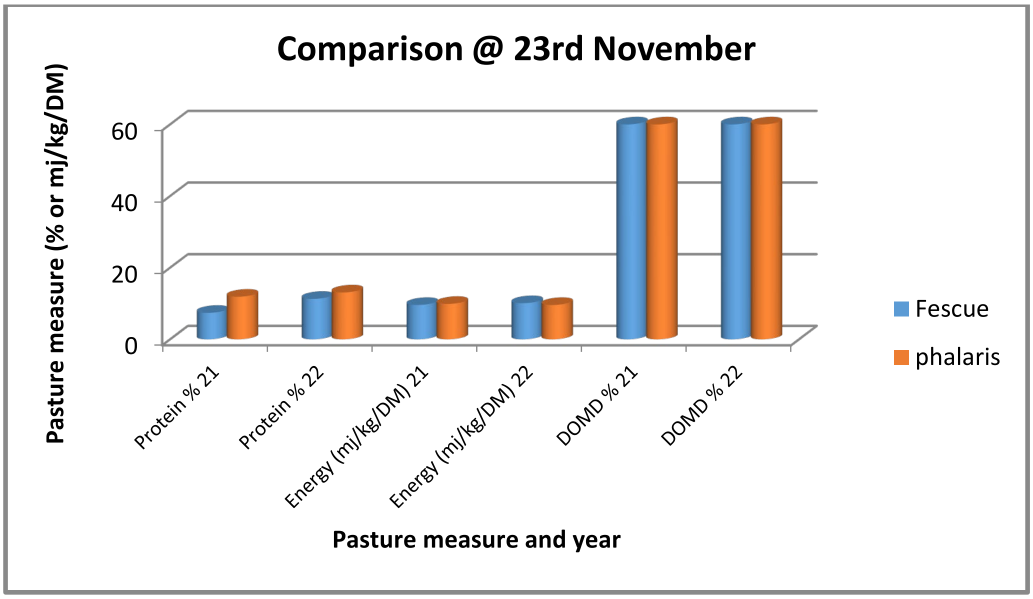
Figure 23: protein test results 2022



Although there are variations between years, the results show that fescue is only slightly inferior to phalaris in the <550mm rainfall environment (Fig. 24). The differences would have only minor impacts on stock production.

This is illustrated in Fig. 24 where results from late November 2021 & 2022 at Overdale are compared showing little difference in digestibility and energy but a slight advantage in protein % in the phalaris.

Figure 24: Comparison of feed test results (fescue and phalaris) late season 2021 and 2022

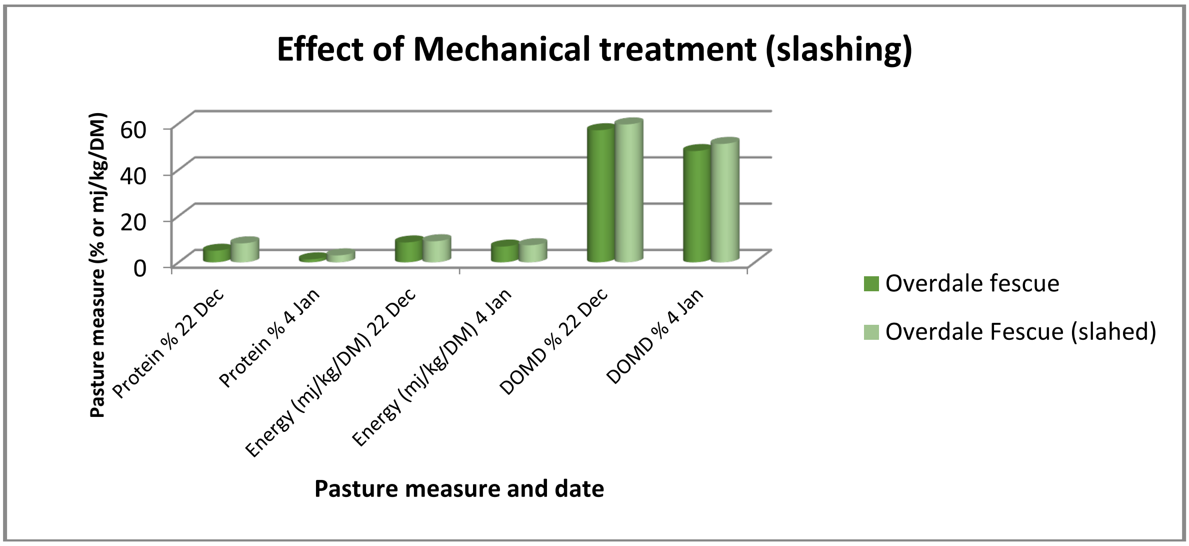


3.6.10 Effect of mechanical management of fescue

PPS member, Mal Nicholson, slashed a section of the Concongella fescue at the end of the wet spring in 2022 at the request of the Project Manager. The slashed area did hold its feed value for longer than the rest of the paddock but grazing it may have been detrimental to the fescue's persistence (Fig. 25).

Concongella is a very dry site and the pasture dried off quickly in late December, the effect of slashing (or heavy grazing) may be prolonged in a different soil type.

Figure 25: effect of slashing on feed quality at Concongella site 2022



3.6.11 Dry Matter Production

3.6.11.1 Seasonal Conditions

La Nina conditions developed in all three years of the project. 2021 was one the best growing seasons on record with a late March autumn break & adequate soil moisture through to late November at all the demonstration sites.

2022 was one of the wettest years on record in the region and, with the exception of flooded or waterlogged paddocks, pasture growth was close to maximum potential (Fig. 26 - 28).

Figure 26: Avoca rainfall 2021 & 2022, Gollops site is approx 10 km north of Avoca

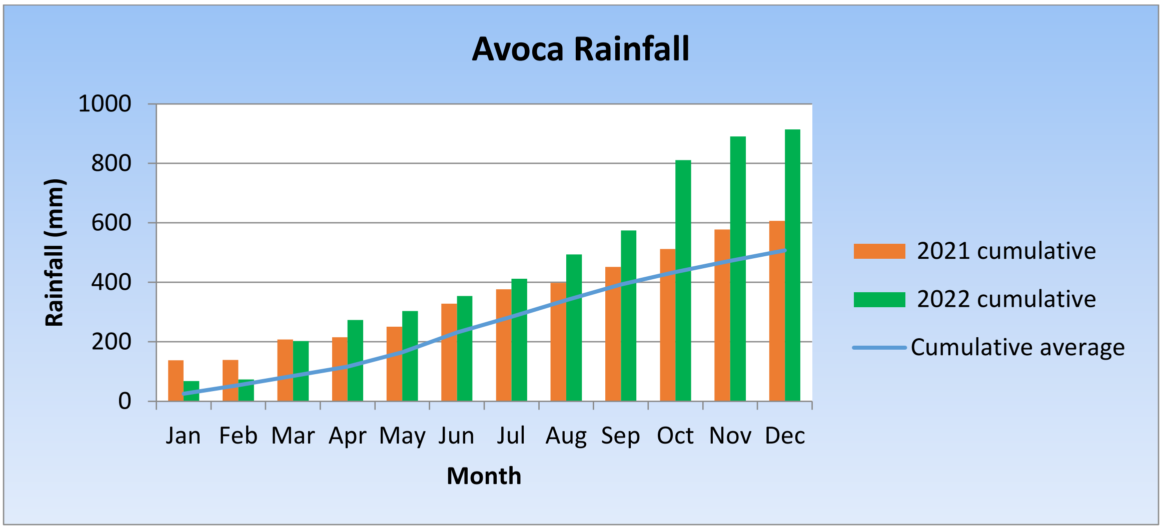
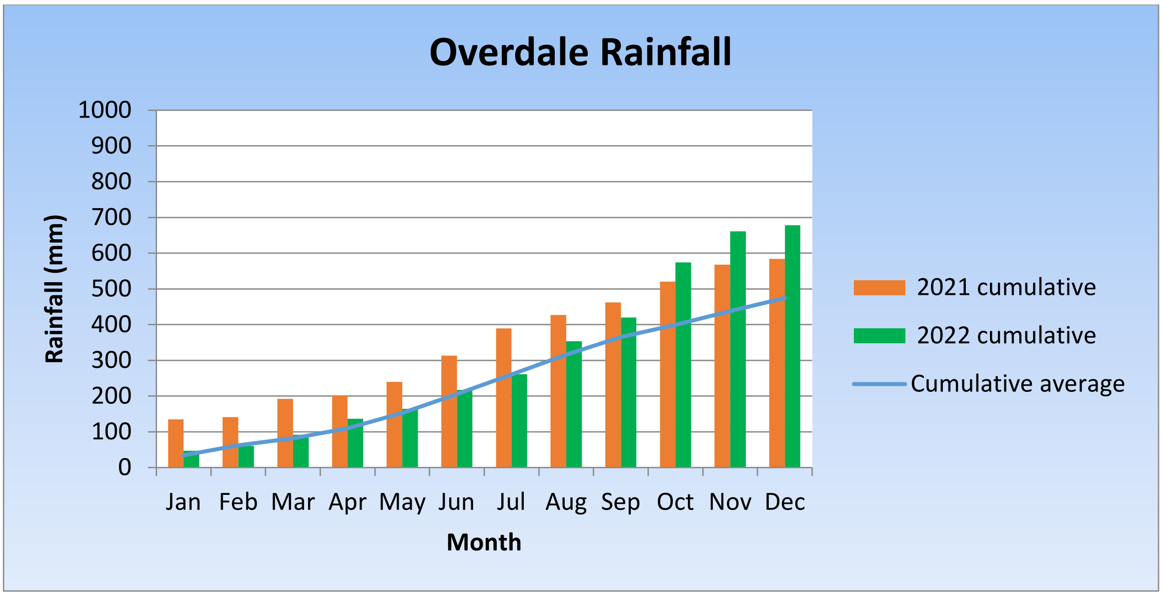
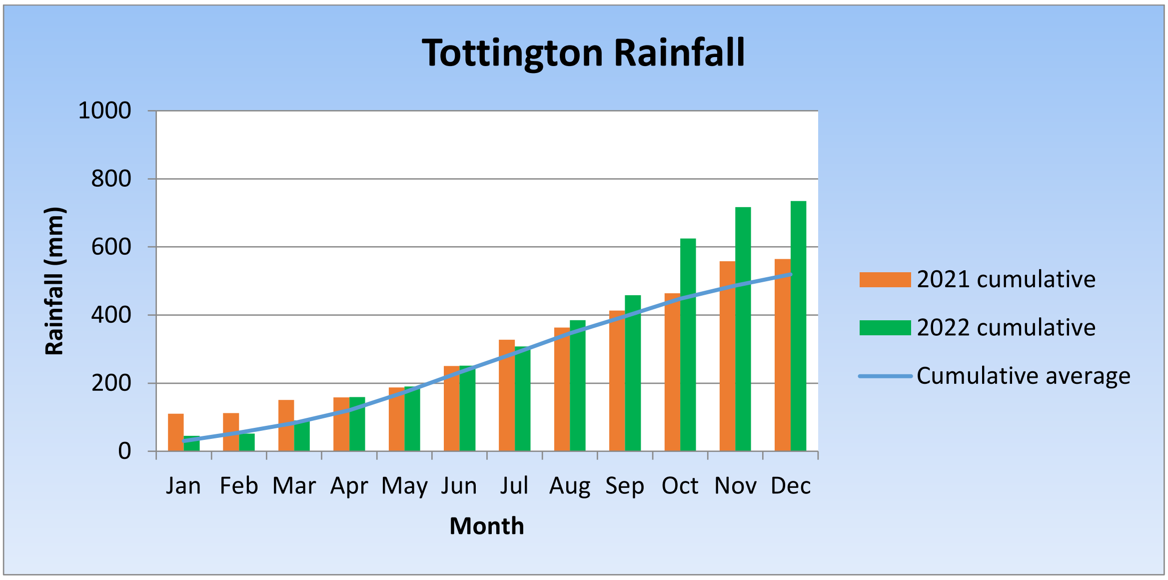


Figure 27: Overdale rainfall 2021 & 2022 (average is from Stawell Airport; 12 km west)



Overdale rainfall measurements supplied by site host, Sue Holden

Figure 28: Tottington rainfall 2021& 2022



The Rosehill site is approx 10 km south of Tottington and the Silver Gully site is approx 8 km SSE. The Tottington weather site is a manual BOM rainfall site & is diligently monitored by PPS members Tom & Jenny Small.

3.6.11.2 Dry Matter Production

A summary of dry matter production for the 4 sites, for 2021 and 2022, is shown in Fig. 29 and 30

Three of the sites established in 2020 were measured for dry matter production and two of the sites had a comparison phalaris based pasture measured as well. The Rosehill site wasn't measured for dry matter production due to the annual ryegrass issues which would have compromised DM results. The site provided a useful comparison between varieties for feed quality testing.

The Silver Gully and Gollops sites have clay loamy soil; the Overdale sites have a sandy loam with a high gravel content which has the tendency to lose soil moisture rapidly.

The Silver Gully results need to be taken in context, as the sites are quite different, the fescue site is on a sandy loam while the phalaris is on a loamy soil. It should also be noted that the phalaris pasture is a quite exceptional stand, one of the best in the PPS group. The Silver Gully phalaris can be can be used as an approximate comparison to the Avoca fescue site.

Dry Matter was measured by mowing plots protected from grazing by pasture cages then drying and weighing the measured samples.

Note; the December 2021 dry matter measurement at Gollops was an estimate after lambs, which were very healthy on the fescue/cocksfoot pasture, managed to move the pasture cages and graze under them.

As there were grazing management differences at the sites, a theoretical maximum potential stocking rate has been calculated using assuming 70% utilisation of pasture grown and 1DSE consuming 1 kg/DM per day over 365 days (Fig. 31).

Figure 29: Pasture Dry Matter production (kg DM/ha)2021

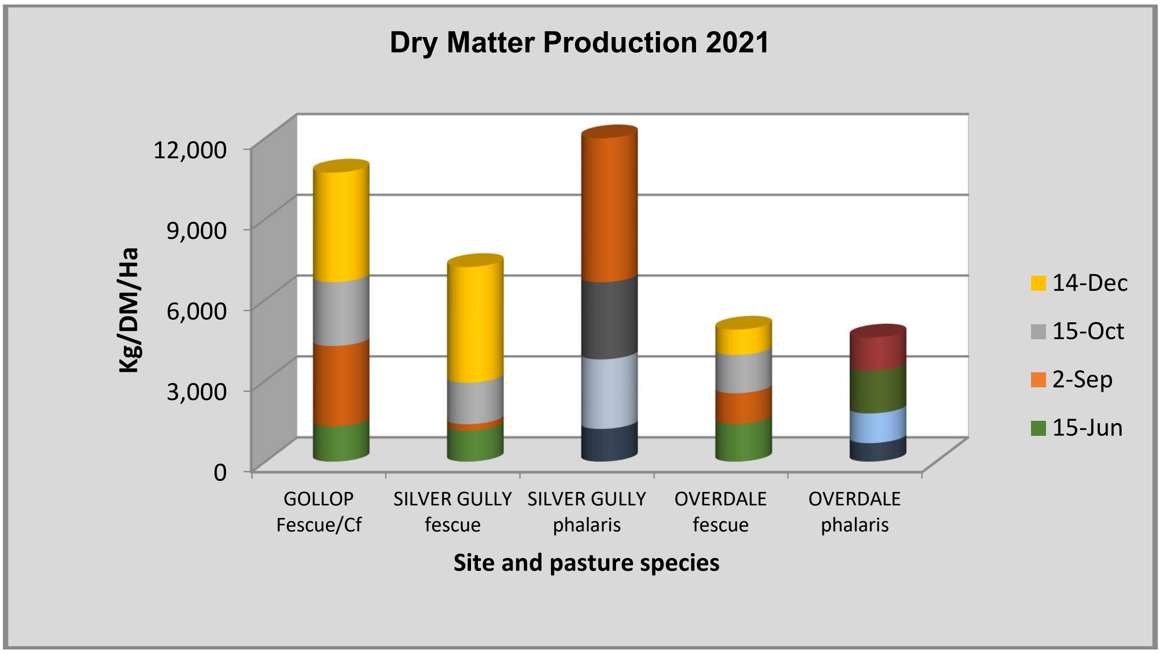


Figure 30: Dry Matter production 2021

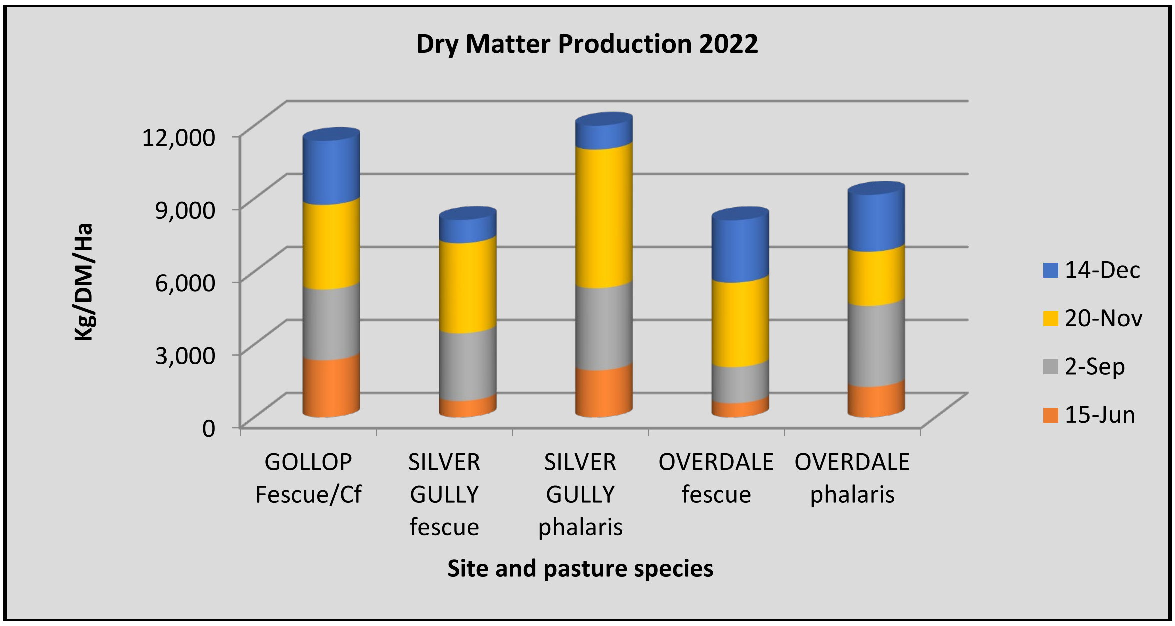
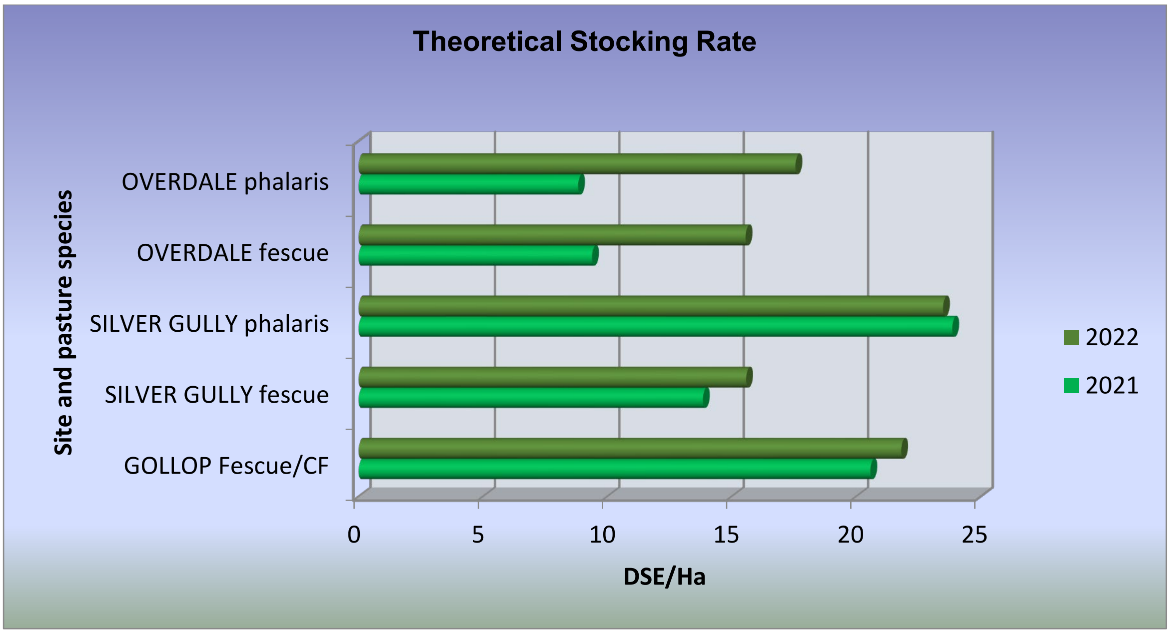


Figure 31: Theoretical stocking rates



The results show that Flecha fescue can produce dry matter results comparable to phalaris under good conditions as can be seen by the Gollops fescue and Silver Gully phalaris results (Fig. 32 and 33). The Silver Gully fescue growth was restricted by low P and K levels as noted in Table 8: Top soil test results (0-10cm) April 2021

The Overdale pasture dry matter results on the tough, gravelly paddocks were much lower but showed very little difference between the fescue and the phalaris based pastures.

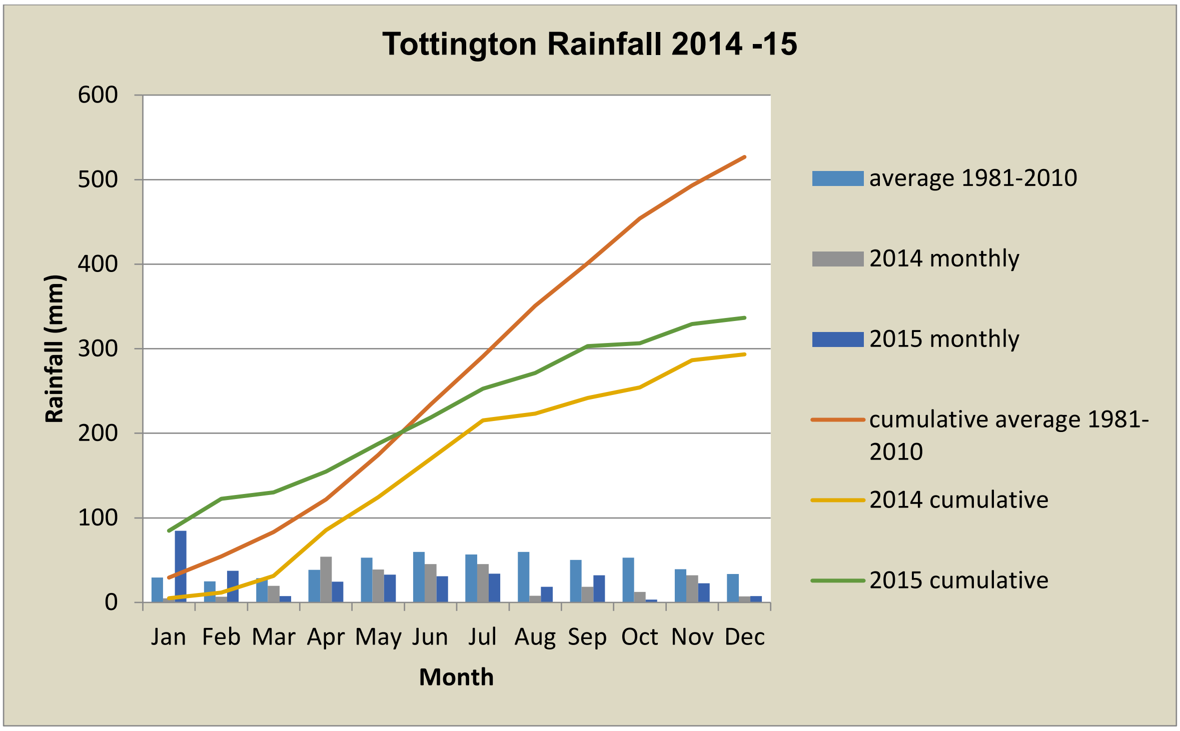
Figure 32: Silver Gully fescue, October 2021

Figure 33: Silver Gully phalaris pasture, October 2021

3.6.11.3 Previous Demonstrations

The winter active fescues, Resolute and Flecha, were included in two PPS pasture variety trial sites north of the great divide and the results showed good production and persistence results. One of the sites, established in 2014 was in the, deceivingly named, Paradise area and the rainfall graph below shows the first two years of the trial (Fig. 34).

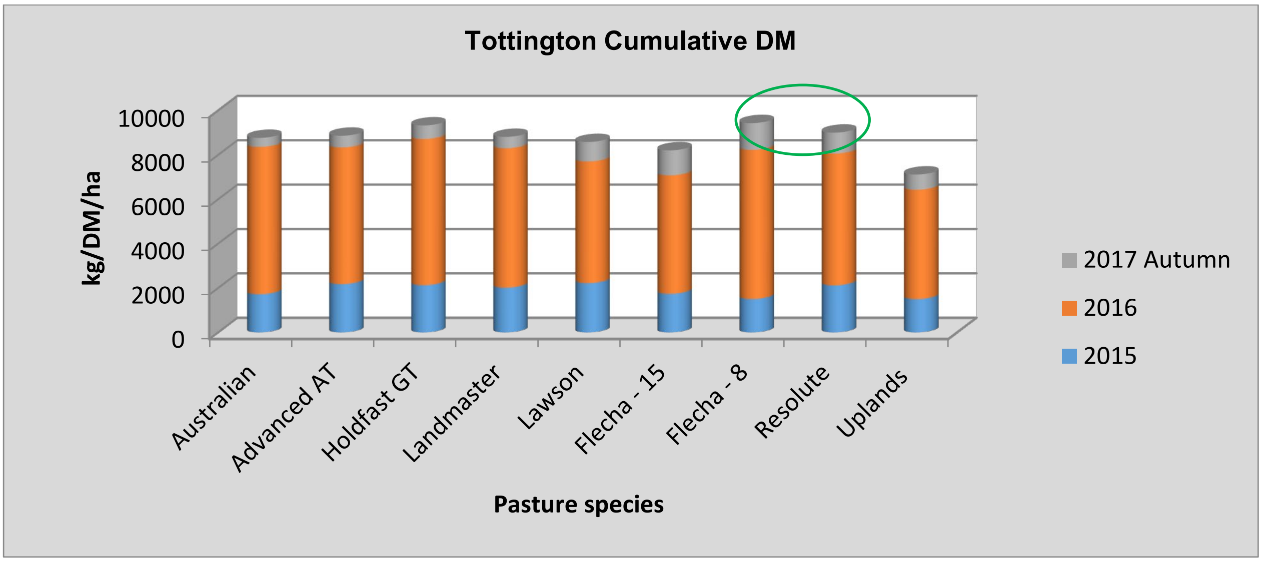
Figure 34: Tottington rainfall 2014 -2015



Dry matter cuts were taken from the site from 2015 – 2017 and the results are shown in Fig. 35. The figure shows that Flecha and Resolute winter active fescue had dry matter production at a similar level to the phalaris cultivars (Australian II, Advanced AT, Holdfast GT, Landmaster & Lawson) and was superior to Uplands Cocksfoot.

Note two sowing rates (8kg/Ha & 15 kg/Ha) were used for Flecha at Tottington.

Figure 35: Dry Matter results, Tottington

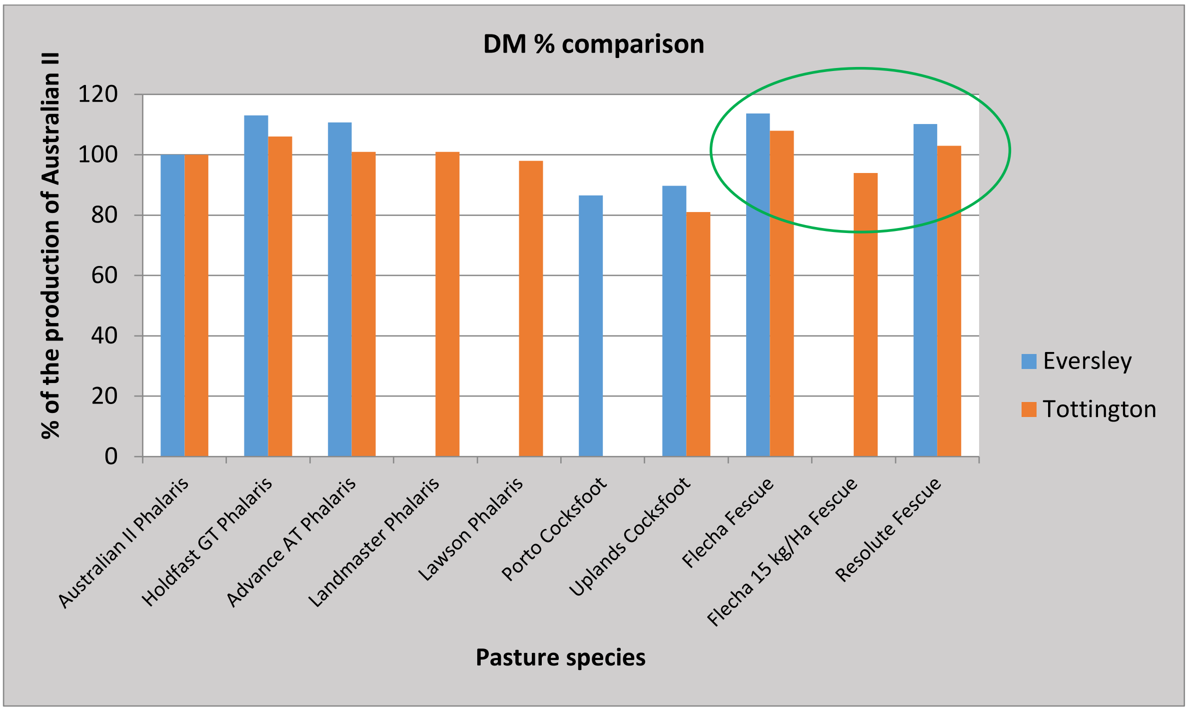


The other site is at Eversley and has granite sand/loamy soil; the dry matter measurements taken in the three years from 2013 to 2015 showed that both Resolute & Flecha had similar total dry matter production to Holdfast GT & Advanced AT phalaris and that they all outperformed Australia II Phalaris (Fig. 36 and 37). The cocksfoot cultivars had poorer production than Australian II. Fig. 38 shows the dry matter results from both trials expressed as a percentage of the production of Australian II.

Figure 36: PPS Eversley Pasture Trial site 2012

Figure 37: Tottington Pasture Trial site 2014

Figure 38: DM results from PPS Pasture Variety Trials (Eversley 2013 – 2015 & Tottington 2015 – 2017



3.6.11.4 Soil Temperature

Observations made during the demonstration showed that the pattern of winter active fescue growth differed to that normally observed in the more "traditional" areas where fescue is grown. They are south of the Great Divide in higher rainfall area, usually in heavier soil types. The growth in those areas is very slow during winter but increases rapidly in early spring and can smother other desirable species such as clover. The large amount of spring growth is often in excess of stock capacity to consume it and can senesce rapidly.

In the lower rainfall areas where the demonstration took place, the growth of fescue seemed more even and it grew throughout winter providing a more even supply of feed for stock. It still made large amounts of spring growth but not the excessive amounts seen south of the divide.

PPS considers that the higher soil temperatures, higher ambient temperatures, lighter soils and increased hours of sunlight all contribute to the fescue growth habits in the demonstration when compared to southern growing regions. An example of winter 2022 soil temperatures measured by the PPS Soil Moisture Probe Cross Region Partnership Project show the difference between two sites north and two sites south of the Great Divide (Fig. 43).

The PPS soil moisture probe project is supported by GHCMA, NCCMA & WCMA through funding from the National Landcare Program (Fig. 39 – 42).

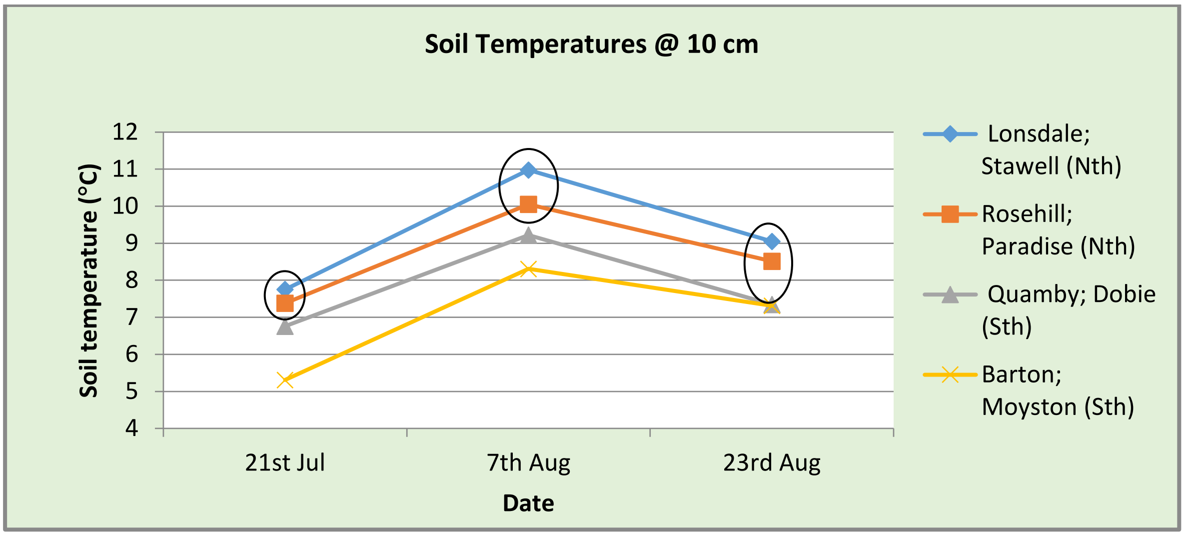
Figure 39: National Landcare Program logo

Figure 40: GHCMA logo

Figure 41: WCMA logo

Figure 42: NCCMA logo

Figure 43: winter soil temperature comparison 2022



3.7 Demo 3

3.7.1 Assess effect of adding winter active fescue on other perennial pastures.

PPS aimed to evaluate the effect of adding fescue to pasture systems in the <550mm rainfall region. The addition of fescue with its late winter growth habit should allow producers to rest other perennials such as phalaris, allowing them to produce spring feed and improve root growth. PPS believes that, in addition to increasing overall feed availability, the system should improve the overall persistence of perennial pastures on farm.

The three years of the project coincided with above average growing conditions which, while conducive to productive pasture production, did not allow for the substitution of fescue for phalaris pastures as all pastures needed to stay in rotations for pasture management.

While the demonstration was unable to assess the effect of adding winter active fescue on other perennial pastures,

discussions with the host farmers have shown confidence in the value of the fescue-based pastures adding to the persistence and production of other perennial pastures.

Heavy grazing of fescue in late winter will allow phalaris based and other perennial pastures to be spelled and allow them to add leaf and root mass which should set them up to better utilise spring moisture and produce more dry matter. This would also have the effect of increasing ground cover over summer and may add to the persistence of these pastures.

3.7.2 Safe Grazing

Fescue does not cause issues such as staggers or sudden death in sheep. This means that they could be used for 'safe' grazing at times of the year when there is a risk of phalaris toxicity (staggers or sudden death) or perennial ryegrass staggers.

Below is an extract from McKinnon Group newsletter (2009) by Lisa Warn on fescue grazing in relation to animal grazing risks.

"One benefit of fescue is that it does not cause animal health problems in sheep or cattle. So, producers who have had problems with toxicity on perennial ryegrass or phalaris, might see a Mediterranean fescue as a safer alternative. Some earlier varieties of fescue used in Australia (Alta, Kentucky-31) may contain wild endophyte and can cause fescue toxicity and fescue foot. These conditions are more common in the U.S.A where fescue with wild endophyte had been widely sown. Currently available fescue varieties have nil endophyte (e.g. Resolute) or Max P endophyte (e.g. Flecha MaxP Quantum II) which is safe for sheep or cattle. Presence of endophyte improves the persistence of the Continental fescues, but is not essential for the survival of the Mediterranean fescues in the environments they are used in. Note: Turf varieties of fescue do contain harmful endophyte- if grazed can cause fescue toxicity.

Mediterranean fescues with Max P endophyte have been linked to toxicity in horses (Equine oedema). Don't include these varieties in pasture on which horses will graze or be fed hay".

A further article on horses and fescue from the March 2023 newsletter by PPS member, agronomist Emma Goodall is included as appendix 10 to this report.

3.7.3 Persistence

The relatively short period of the PDS demonstration and the favourable growing seasons did not put any stress on the persistence of the fescue pastures but results from previous comparative demonstration by PPS in the <550 mm rainfall zone have found it to rate highly.

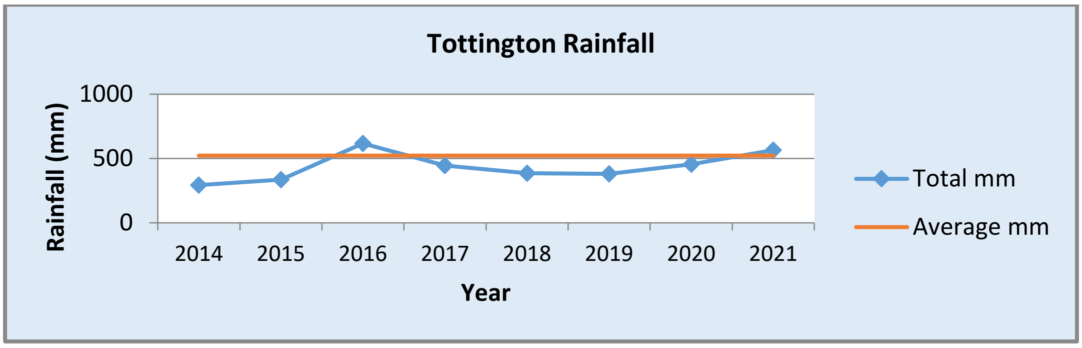
Two small replicated pasture demonstration trials were measured visually for persistence estimating the percentage of surviving plants for each cultivar.

3.7.3.1 Tottington

The Tottington site is south of St Arnaud on the Avon River plain; it was established in the very dry year of 2014.

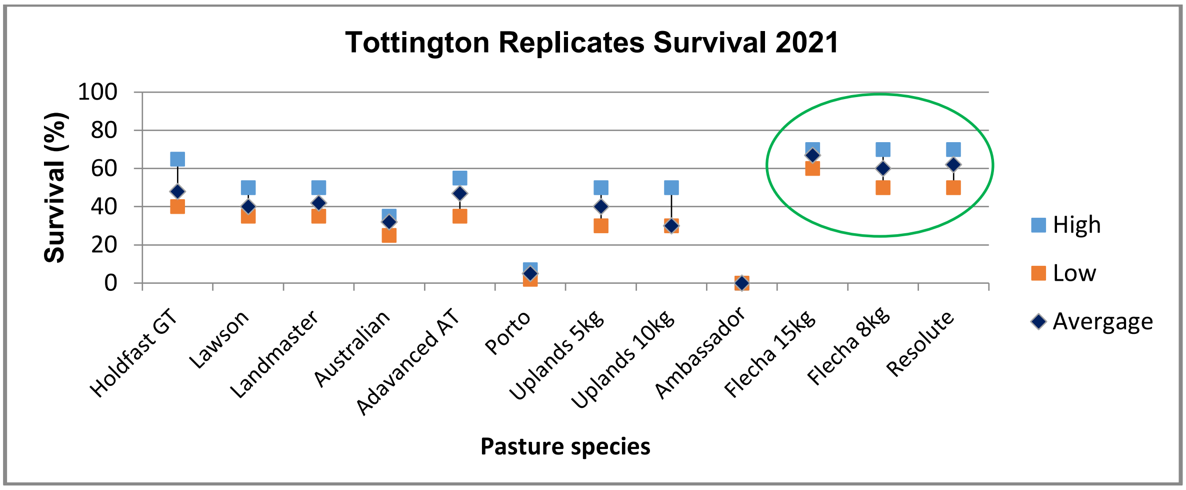
It has an average rainfall of 522.8mm but only reached that twice in the period of measurement (2014 – 2021) (Fig. 44).

Figure 44: Tottington rainfall 2014 - 2021



Plant persistence observations made in 2021 made 7 years after sowing show that the three replicates of fescue are the most persistent in the demonstration.

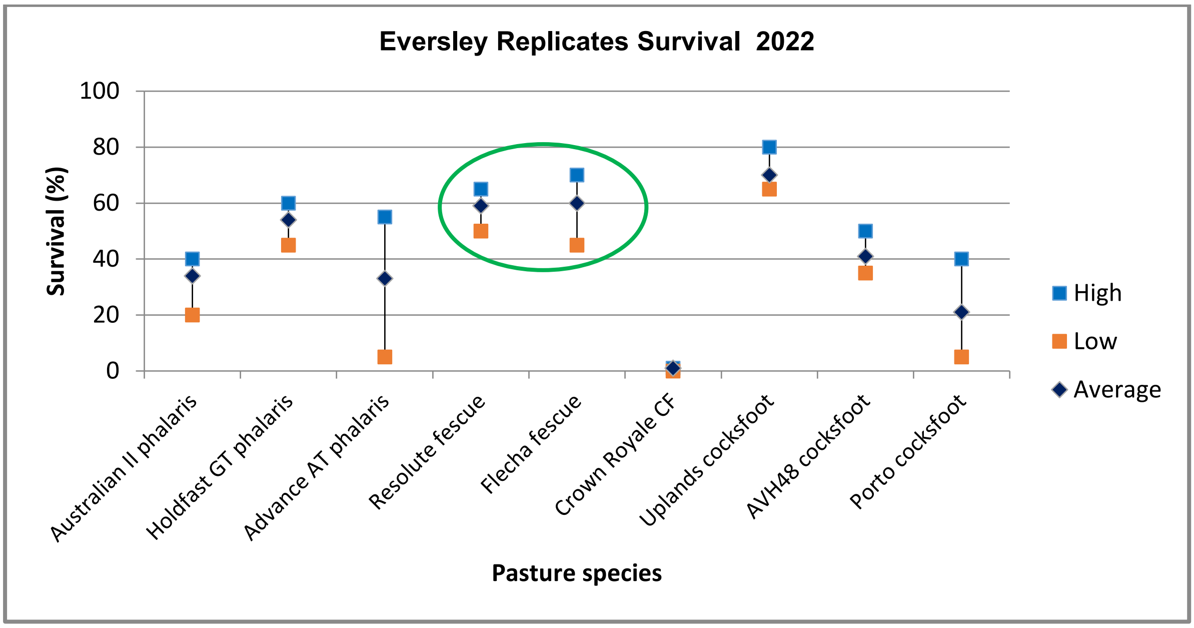
Figure 45: plant survival estimates (shown as a % of initial plant numbers that established), Tottington



3.7.3.2 Eversley

The Eversley site, situated in a 550mm rainfall zone 22 km NE of Ararat, was established in 2012. It was assessed in 2022 & after ten years the results showed Uplands cocksfoot as the most persistent with the two fescue cultivars being the next highest in persistence.

Figure 46: plant survival estimates (shown as a % of initial plant numbers that established), Eversley



3.7.4 Lambing Shelter

Two of the host sites (Avoca & Concongella) used the stem residue as lambing shelter being prepared to sacrifice some growth potential to leave a dry residue that lasted into the next lambing season (Fig. 47). Both sites reported anecdotal evidence that ewes used the residue for shelter during lambing.

PPS considers that this may provide another opportunity to utilise the growth habit of fescue. PPS is looking at using mowing and/or mulching fescue pastures as a way of managing excess growth of fescue; rows could be left intact to form hedges for lambing shelter. This method was used in trial work during the EverGraze project at Hamilton.

Figure 47: Lamb sheltering in grass hedge during EverGraze Project.

3.7.5 Economic analysis

An economic analysis of using fescue in a pasture improvement program was undertaken by project consultant, Lisa Warn.

The economic analysis used the discounted cash flow method to calculate a Net Present Value and an Internal Rate of Return. The cash flows were the additional net income as a result of improving the pasture. The results are summarised in Table 9.

3.7.5.1 Assumptions:

- A perennial pasture (phalaris or fescue) was compared with a typical annual pasture, that it replaced, for a 100 ha paddock.
- Gross margin for sheep enterprise on both pasture types was $50/DSE
- Cost of pasture establishment was $350/ha
- Cost of extra livestock purchased was $120/DSE
- Sown pasture was not grazed for 6 months after sowing (year 1).
- Annual pasture - average stocking rate was 7 DSE/ha
- Improved pasture - stocking rate achieved was 15 DSE/ha (by year 3). This figure was based on estimates for carrying capacity from dry matter cuts taken from the fescue demo paddocks (Fig 25 on page 28).
- A sensitivity analysis was also conducted to look at the impact of several different stocking rates.

Table 9: Measures used to assess economics of pasture improvement, for 3 different stocking rates

Measurement	Improved pasture 10 DSE/ha	Improved pasture 15 DSE/ha	Improved pasture 20 DSE/ha
Net present Value (NPV)	$ 90,881	$ 272,167	$ 453,496

Internal Rate of Return (IRR)	23.9 %	41.4 %	53.2 %
Peak Debt	- $55,201	-$ 78,437	-$101,673
Year of peak debt	2	2	2
Break-even year	7	5	5

Pasture improvement generated good returns on the capital invested for the 3 scenarios. The larger the improvement in stocking rate that is made (compared with the annual pasture) the higher the IRR and the faster the payback time. The peak debt increased as the stocking rate increased due to the extra capital required to purchase more stock.

3.8 Extension and communication

Note changes to Comms plan in blue text; not completed activities in red text.

Table 10: Schedule of extension and communication

Activity	Responsibility	Target Audience	Key messages and must-have elements	Timing	Estimated reach
PPS newsletter	PPS project manager	Primary & secondary	Introduction to project; site information;	June 20 Completed March, June & September 2020 newsletters	188 copies to member farms, around 300 people. 325 copies to other contacts – interstate & NZ farmers, Ag Vic & CMA staff, MLA contacts.
PPS Annual Conference	PPS project manager	Primary & secondary	Poster at conference with an outline of the project.	3rd Sept 20 Not completed; conference cancelled due to COVID 19	110 producers, agronomists and agribusiness staff
PPS "closed" Face book page	PPS project manager	Primary	Photos of sites with brief project updates	Continuous	252 (as at 6/2/23) facebook group members
Producer Guides / Case Studies	PPS project manager	Primary& secondary	Case studies of some of the host farmers.	2021 - 2023	On website
PPS end of year farm tour	PPS project manager	Primary & secondary	Site inspections	Nov 20 Restricted due to COVID 19	10 PPS management committee
Interim Report	PPS project manager	Primary	Yearly results report	April 21 Completed Feb 21	188 copies sent to member farms, around 300 people. + PPS website

PPS newsletter	PPS project manager	Primary & secondary	Summary of year 1 results	Jun 21	188 copies to member farms, around 300 people. 325 copies to other contacts – interstate & NZ farmers, Ag Vic & CMA staff, MLA contacts.
PPS Annual Conference	PPS project manager	Primary & secondary	Project update – poster display Conference had to be held online due to covid restrictions. Project report was included in conference book which was posted to members & sponsors	~~Sep 21~~ Oct 21	110 producers, agronomists and agribusiness staff Conference book to 200+ members and sponsors.
PPS spring farm tour	PPS project manager	Primary & secondary	Site inspections Overdale site	~~Oct 21~~ 26th Nov 21 Completed	50 PPS member producers
BWBL group inspection	Neil James BWBL	Secondary	Inspection at Avoca Site	9th Dec 21 Completed	15 BWBL members. Pyrenees (Avoca) Bestwool /Bestlamb group.
Interim Report	PPS project manager	Primary	Yearly results report	April 22 Completed Feb 22	188 copies sent to member farms, around 300 people. + PPS website
PPS feed quality project	PPS project manager	Primary	Feed Quality project Fescue project Feedtests used in project report.	Feb 22 Completed	188 copies sent to member farms, around 300 people. + PPS website
PPS newsletter	PPS project manager	Primary & secondary	Summary of year 2 results	Jun 22 Completed	188 copies to member farms, around 300 people. 325 copies to other contacts – interstate & NZ farmers, Ag Vic & CMA staff, MLA contacts.
PPS spring farm tour	PPS project manager	Primary & secondary	Site inspection Gollops	~~Sep 22~~ Nov 22	10 PPS member producers
PPS Annual Conference	PPS project manager	Primary & secondary	Project update – poster display	~~Sep 22~~ Aug 22 Completed	110 producers, agronomists and agribusiness staff
Site Tour - unconfirmed	PPS project manager	Primary & secondary	Project presentation & site visit	Spring 22 Not completed due to wet conditions	Local Landcare groups
PPS newsletter	PPS project manager	Primary & secondary	Paddock results update	March 23 Completed	188 copies to member farms, around 300 people. 325 copies to other contacts – interstate & NZ farmers, Ag Vic & CMA staff, MLA contacts.

MLA Feedback article	PPS Project Manager	Primary& secondary	500 word feature article.	January 23 Not completed; no request from MLA as yet.	Primary& secondary

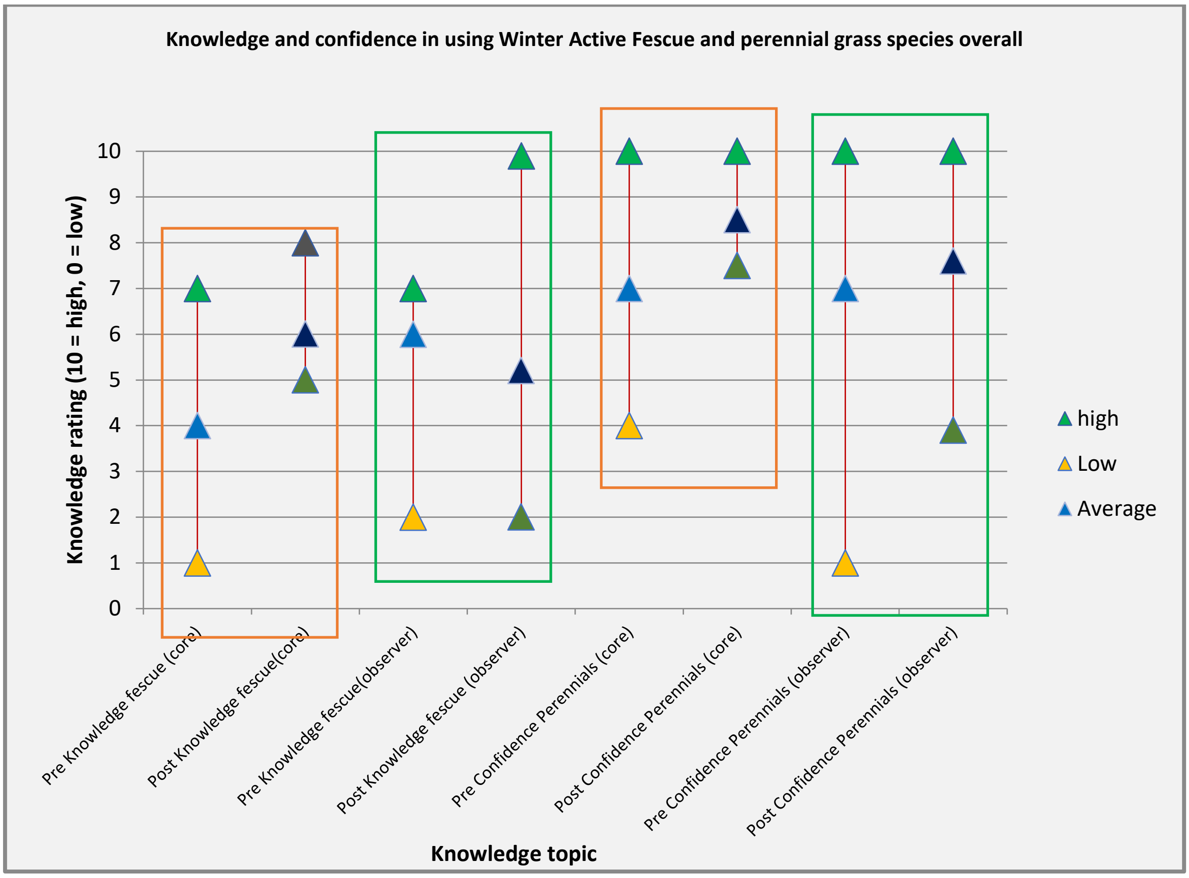
3.9 Monitoring and evaluation

3.9.1 Knowledge and Confidence

A pre and post evaluation survey was completed by PPS members in the <550 mm zone. Knowledge and confidence in using Winter Active Fescue and perennial grass species overall was measured and the results are seen in Fig. 48; (10 = high, 0 = low).

The knowledge of the use of winter active fescue, not surprisingly increased in the core (host) farmers. The knowledge of some of the observer group increased but overall it did not improve (note; the pre and post observer responses are not exactly the same people as others chose to respond post project).

Figure 48: Pre and Post project survey responses



The post survey "knowledge of fescue" responses from the observer group might be attributable to the interruptions to the communications program due to Covid restrictions.

The "confidence in the use of perennial pastures" showed an increase in the average responses which is a positive outcome from the project.

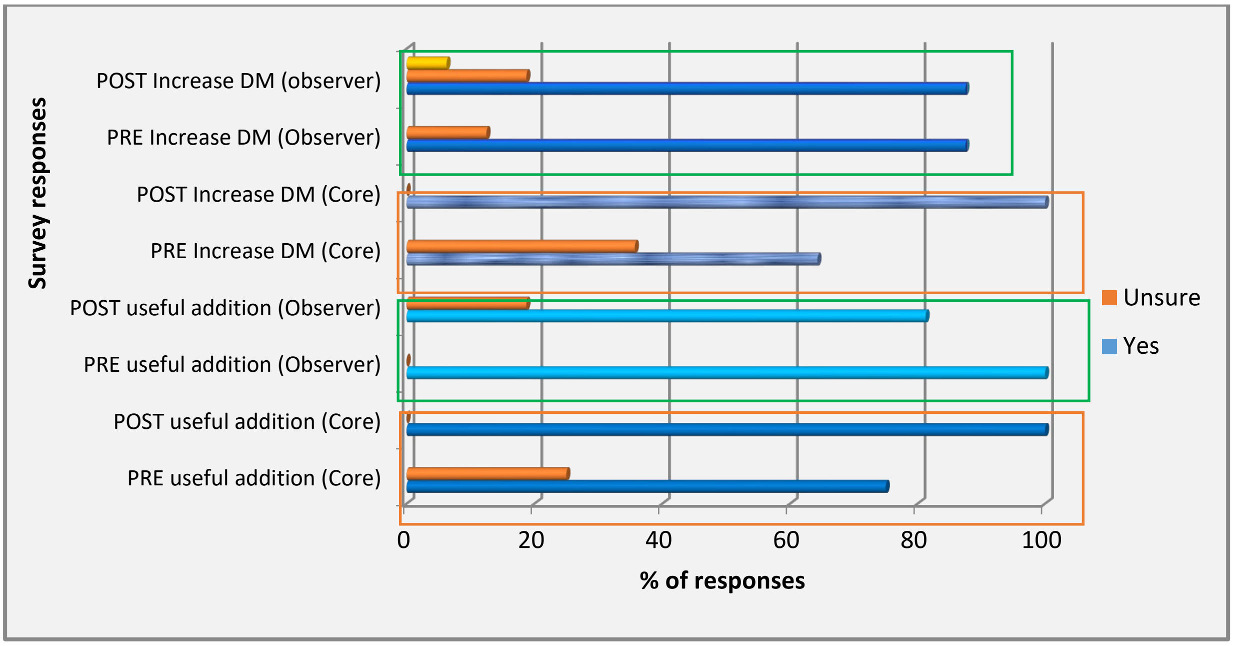
3.9.2 Attitude

The surveys also tested the attitudes of producers towards the use of winter active fescue being a useful addition to the grazing systems and whether producers thought that it would add to the dry matter production on farm (Fig. 49).

The core group showed a positive response to both questions post project but the observer group were less sure of fescue being a useful addition and had a small increase in uncertainty of an increase in dry matter. Again, this may reflect the interruptions to the communication of the project and the lack of pasture inspections imposed by Covid restrictions.

Responses are shown as % of the total.

Figure 49: Attitude responses Pre & Post Project

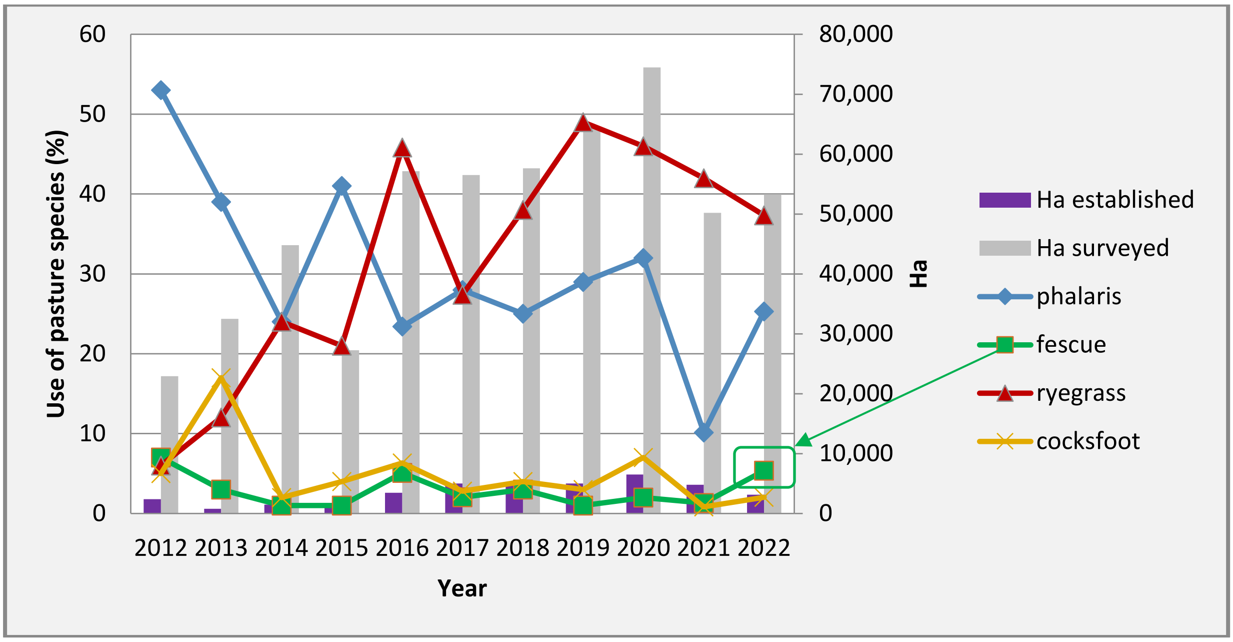


3.9.3 Adoption

Prior to the project 29% of respondents had used winter active fescue in their farm system; this rose to 44% post project. This is reflected in the PPS annual pasture survey, which has been conducted since 2012, see Fig. 50.

The use of fescue in the grass component of the total of new establishments averaged 2.7% prior to and during the project (2012 – 2021) but rose significantly to 7.7% in 2022. Much of the rise in fescue use can be attributed to the core producers in the project.

Figure 50: PPS pasture survey 2012 – 2022



The fescue post survey respondents farm 30,840 Ha with 80,000 sheep and 600 cattle. Most also have cropping as a major component of their farm system.

4. Conclusion

PPS expects that the use of WAF will increase as more members see the benefit of its use. The communication of its attributes has been affected by the Covid restrictions preventing on farm inspections in 2021 and most of 2022.

4.1 Key Findings

Winter Active Fescue appears to fit well into perennial grazing systems in the <550mm zone.

The growth pattern of winter active fescue appears to increase earlier in the <550mm rainfall zone in the Wimmera & Central regions of Victoria due to warmer soil temperatures & longer sunlight hours than in the higher rainfall regions in SW Victoria.

Fescue did not hold its critical feed values as long as phalaris but the differences were minor and would have little effect on overall farm production.

Fescue feed quality was almost comparable with phalaris during the reasonably wet springs. It will be interesting to compare results in drier seasons.

Supplementary feeding may need to start earlier on fescue pastures.

Fescue (& other perennial grasses) feed quality can be maintained by heavy grazing in spring but it may increase the risk of long-term plant persistence. Summer dormancy and survival of phalaris and fescue is optimised if these plants are allowed to undergo stem elongation, have seed-head emergence and reach the flowering stage. Heavy grazing can occur after that, while feed quality is still moderate, if there is concern there will be too much rank feed carried over into late summer.

Winter active fescue can be successfully sown with Uplands Cocksfoot which will improve the feed quality of the total pasture in some years (probably those with wet springs).

Winter active fescue can be comparable to winter growth of Holdfast GT and overall production can be similar in some soil types.

Dry matter production of fescue was inferior to phalaris in lighter soil types but exceeded cocksfoot in PPS Pasture Varity Trials (2012 – 2017).

Results from the current and previous PPS demonstrations shows that total dry matter production of the winter-active fescue cultivars compares favourably with winter-active phalaris cultivars. Previous PPS trials highlight that production is higher than Australian phalaris and Uplands cocksfoot.

There are no known sheep or cattle animal health risks/diseases associated with grazing fescue or cocksfoot
Early sown fescue pastures can be grazed with caution; it is important to avoid overgrazing and affect long term persistence of the pasture.

Previous PPS trials also show that winter active fescue can be as persistent as Holdfast GT phalaris, Australian II phalaris and Uplands cocksfoot.

Grazing plans to utilise rapid fescue growth need to be implemented.

PPS research on Phalaris Persistence has shown that persistence is increased in paddocks <20 Hectares.
PPS hypothesises that a similar result will be found in long term fescue pastures.

Figure 51: The Gollops site was fenced into two 9 Ha paddocks after pasture establishment.

Figure 52: Gollops site with stock

PPS hypothesises that ensuring that multiple stresses do not affect fescue stands will ensure long term persistence. This hypothesis is based on the PPS Phalaris Persistence Project (MLA PRS B.FDP.0051) which refers to research from Dr's Richard Simpson & Richard Culvenor from CSIRO.

Fescue pastures may be able to be adapted to include shelter for new born lambs.

Endophyte in fescue can cause health issues in horses in some cases; this is addressed in Appendix 10 by agronomist & PPS member, Emma Goodall; Elders, Ballarat.

PPS believes that there are still barriers to adoption of fescue in the <550mm rainfall zone; the inability to conduct pasture inspections by members during Covid restrictions contributed to this. Members who have established fescue pastures have continued to do so with enthusiasm, so maybe small paddock sowings on other member farms may increase confidence in winter active fescue as a management option.

PPS will continue to monitor and report on the fescue pastures in this project.

4.2 Benefits to industry

The use of Winter Active Fescue in <550 mm rainfall zone grazing systems adds another dimension to grazing management. The growth habit of the fescue appears to change from areas south of the divide by commencing its growth phase earlier, probably due to greater sunlight and higher soil temperatures.

Winter Active Fescue may provide safe alternative pasture where there are cases of phalaris or ryegrass staggers on farm.

Winter Active Fescue/clover pastures on part of the farm compliment phalaris/clover based pasture systems giving additional grazing options.

The addition of Uplands Cocksfoot to fescue pastures looks to be another option for pasture selection in the <550mm rainfall zone.

Winter Active Fescue with or without Uplands Cocksfoot is relatively easy to establish provided proper weed control and fertility requirements are addressed prior to sowing.

The fescue pastures may provide an option for lambing shelter along with improved pasture.

Winter Active Fescue pastures provide the advantages of other perennials in increasing carrying capacity when compared to run down annual pastures. They also improve water use efficiency, ground cover and reduced nitrate leaching.

5. References:

Culvenor R.A and Simpson R.J. (2014) Persistence traits in perennial grasses; the case of phalaris (Phalaris aqutica L.) CSIRO

Goodall E (2023) Horses and Fescue Pastures; paper written for PPS newsletter 3/23

McCaskill M and Saul G (2008) Perennial grass hedges provide shelter at lambing; EverGraze Project

PPS (2013) Pasture Variety Sites 2009 – 2012; MLA Project code SO901

PPS (2017) Phalaris Persistence; MLA Project Code; B.FDP.0051

Victorian Government Department of Economic Development, Jobs, Transport and Resources (2018) - Drought Feeding and Management of Sheep; A Guide for Farmers and Land Managers

Warn L (2009) Where does fescue fit; McKinnon Group Newsletter

Warn L (2020) Winter Active Fescue Pasture Management Protocol; paper commissioned for L.PDS 2004

6. Acknowledgements

Host farms;

- Gollops; Avoca
- Mount Glen; Joel South
- Overdale; Concongella
- Rosehill; Paradise
- Silver Gully; Winjallok

Project advisory group - PPS members: Travis Fernandes, Mathew Hall, Matt Kindred, Mal Nicholson, Tim Sweeney

PPS project manager - Rob Shea

Project advisor - Lisa Warn; Lisa Warn Ag Consulting.

Project assistance – Debbie Shea; PPS, Tess McDougall; Ag Vic, Michael Grant; Stephen Pasture Seeds

MLA PDS Co-ordinator – Russell Pattinson

Rainfall records – Sue Holden (Overdale), Tom & Jenny Small (Tottington)

Horses and Fescue Pastures Appendix 10 - Emma Goodall; Elders Ballarat (*agronomist (BSc Agriculture) (BEquineSc))*

Feed Quality Testing Advice – Joanne Warnes; Feedtest

7. Appendix

7.1Project MER

Update 1/3/23; minor changes in red

Perennial Pastures Systems; L.PDS.2004 - Fescue; a low rainfall pasture tool?

Aim; To demonstrate that winter active fescue can be a valuable pasture systems tool in the <550mm rainfall zone in Victoria..

Evaluation level[1]	Project Performance Measures	Evaluation Methods	Progress
Inputs – What did we do? *Describe the planned and expected inputs involved in your*	• 4 on farm demonstration sites established in 2019 (2) & 2020 (2) in the Upper Wimmera & Avon	• Records and documentation of all project activities,	• All records being kept

[1] Note: The headings in column 1 are also listed in the PDS Final Report template.

project, including *funds, resources, development & projects structures*	catchment regions of Victoria. Average site is 12 Ha. • 1 already established site used in 2019 DM measurements. • Over 50 PPS members directly involved in observing demonstration sites; a further 150 will receive results from the demonstration. The members who will benefit from the demonstration results manage over 400,000 sheep. • Project advisory group to be appointed, project to be managed by PPS Project Manager. Project technical advisor appointed. • Investment MLA = \$35,892. PPS members in kind contribution = \$26,500	• Minutes of Steering Committee • Financial Statements • Soil tests • Pasture measurements (fescue & comparison phalaris pastures) Pasture establishment counts Pasture composition assessments Dry matter measurements Feed quality measurements Stocking rate measurements	
Outputs - What did we do? *Describe the outputs planned/expected from your project, including engagement activities & products from demonstration sites*	• Project progress reports to be issued to PPS members through PPS newsletter, closed face book page and website. • Other communication products such as case studies, producer guides • Project updates to wider farming	• Milestone reports submitted to MLA as required. • Feedback from PPS members during project. • Annual pasture result analysis by project advisor.	• All demonstration site results being kept

	sector when appropriate. • Results on dry matter production, animal performance and other measurements to be reported annually in interim reports to group members. • Sites included in PPS extension program e.g. field tours. • PPS will produce a fact sheet at the completion of the project focusing on the use of fescue in drier regions	• All data recorded from trial sites in central data base and milestone reports • Records and documentation of all project activities, • Record stock movements and calculate stocking rates. • Analysis of benefits for existing perennial pastures and the whole farm system. • Names and numbers of attendees at field days recorded • Case studies	Due to different rotational grazing at sites & large difference in soil types, calculated potential stocking rates are being used in reports. • Paddock walk 26/11/21; 50 in attendance. • Case studies not yet completed as too early
Changes in knowledge, attitudes and skills - How well did we do it? *Describe the changes in KASA that you are planning to achieve.*	• Anticipated increase in skills of producers hosting the sites through targeted grazing times and increased animal performance measurement. • Anticipated increase in skills of producers observing the sites and implementing improved pasture system management.	• Pre project baseline survey to be completed in autumn 2020. • Post project survey to be completed in early 2023.	• Pre-project survey completed

Practice changes – Has it changed what people do? *Describe the practice changes that you are expecting to achieve by the end of your project*	• Expect increase in winter active fescue establishment after the project project (assuming successful demo). • PPS expects 40+ members to implement winter active fescue into their pasture system. • Expected practice change in whole farm grazing system management. • Further adoption at completion of project if positive results on the farm system are demonstrated.	• PPS annual pasture establishment survey • Anecdotal evidence from PPS members • Pre project baseline survey to be completed. • Post project survey to be completed in early 2023. • Production of a fact sheet at the completion of the project focusing on the use of fescue in drier regions	• Pre-project survey completed
Benefits – Is anyone better off? *Describe the benefits that you are expecting to achieve as a result of the project*	• Documented evidence of the value of winter active fescues in <550mm rainfall region. • Understanding of the key barriers / enablers of adoption of the practices	• Cost/benefit analysis of demonstration sites • Reports from Steering Committee on key learnings	• (not yet; too early) • Years 1 & 2 reported in results reports.
General observations / outcomes – Is the industry better off?	• Subsequent adoption of annual pastures by broader number of producers • BCA of broader adoption through aspects such as: ○ Improved pasture systems in <550mm rainfall region by increasing	• Survey and anecdotal evidence from the core producers • Observations of practice change by PPS Project Manager. • Surveyed responses from PPS members 2	• (not yet; too early) • 2022 data to be collected this spring

	late winter feed availability. ○ Improved forage systems should assist producers in the drier region of the upper Wimmera to alter lambing/calving times, weaning dates and allow early turn off of lambs and cattle. ○ Earlier turn-off of sale stock will reduce the farm stocking rate over summer and have a positive impact on ground cover in tough seasons.	years after project (by MLA) • Broader BCA (by MLA) • The PPS annual pasture survey document adoption of the management practices coming out of the demonstration.	

7.2 Project Comms

Communications Plan: Producer Demonstration Sites
October 2017
Project name: Perennial Pastures Systems; L.PDS.2004 – Fescue; a low rainfall pasture tool?
Project overview: To demonstrate that winter active fescue can be a valuable pasture systems tool in the <550mm rainfall zone in Victoria.

MLA Program Manager	Alana McEwan (Russell Pattinson – PDS national coordinator)
Project objectives	By March 2023; in the Stawell - St Arnaud region (assuming a successful demonstration). 1. Demonstrate on five sites, that including winter active fescue as a proportion of the farm pasture area in the <550mm rainfall zone will increase production in individual paddocks by >50% and have the potential to increase overall farm dry matter production by an estimated 10 - 20% depending on the area of new pasture established. Higher gains are possible if a greater

	proportion of the farm has perennial pastures established in the longer term. As a result of this project (assuming a positive outcome): • 40+ PPS members will have or will be planning to implement winter active fescue into their pasture system. • Producers in other regions will have access to the demonstration results and many will have or be planning to use winter active fescue as a result of the project. This outcome is not quantifiable as PPS will not necessarily be able to confirm the feedback.
What were/are the deliverables from the project?	Demonstrate the improved grazing management required to maintain perennial pastures in the region and improve producer knowledge and skills throughout the project. Produce best practice guidelines for the use of winter active fescue in the regions pasture systems. Promote the demonstration results through a range of PPS extension activities including in the PPS quarterly newsletter and the PPS face book page. Conduct a minimum of one information sessions/field days each year focusing on the demonstration results, including poster presentation at the PPS annual conference.
What are the 'outcomes' for producers?	• Anticipated increase in skills of producers hosting the sites through targeted grazing times and increased animal performance measurement. • Anticipated increase in skills of producers observing the sites and implementing improved pasture system management. • Expect increase in perennial pasture establishment during and after project. • Expected practice change in whole farm grazing system management.
Measure of success of communication plan and / or activities(KPIs and how measured)	• Pre and post projects surveys • Documenting increases in implementing the system through the annual PPS pasture establishment survey. • Case studies

Primary audience (include regions/species)	PPS group members
Secondary audience (include regions/species)	Other farmers who attend PPS conference, MLA pasture update, PPS field days. Visiting farmer groups.

Communications Plan / Activities

Activity	Responsibility	Target Audience	Key messages and must-have elements	Timing	Estimated reach
PPS newsletter	PPS project manager	Primary & secondary	Introduction to project; site information; advisory group member details	June 20	188 copies to member farms, around 300 people. 325 copies to other contacts – interstate & NZ farmers, Ag Vic & CMA staff, MLA contacts.
PPS Annual Conference	PPS project manager & PPS management committee member Duncan Thomas	Primary & secondary	Poster at conference with an outline of the project.	~~3rd Sept 20~~ ~~Conference cancelled Covid~~	110 producers, agronomists and agribusiness staff
Producer Guides / Case Studies	PPS project manager	Primary& secondary	Case studies of some of the host farmers.	2021 - 2023	On website To be completed early 2023
PPS end of year farm tour	PPS project manager	Primary & secondary	Site inspections	~~Sep 20 Postponed; Covid~~	50 PPS member producers
Interim Report	PPS project manager	Primary	Yearly results report	April 21	188 copies sent to member farms, around 300 people. + PPS website
PPS newsletter	PPS project manager	Primary & secondary	Summary of year 1 results	Jun 21	188 copies to member farms, around 300 people. 325 copies to other contacts – interstate & NZ farmers, Ag Vic & CMA staff, MLA contacts.

PPS Annual Conference	PPS project manager	Primary & secondary	Project update – poster display	~~Sep 21~~ On Line, so no posters	110 producers, agronomists and agribusiness staff
PPS spring farm tour	PPS project manager	Primary & secondary	Site inspections	~~Sept 1~~ Cancelled	50 PPS member producers
PPS spring farm tour	PPS project manager	Primary & secondary	Site inspection; Overdale, Concongella	26 Nov 21	50 PPS member producers
PPS newsletter	PPS project manager	Primary & secondary	Paddock results update	Jun 22	205 copies to member farms, around 300 people. 387 copies to other contacts – interstate & NZ farmers, Ag Vic & CMA staff, MLA contacts.
Interim Report	PPS project manager	Primary	Yearly results report	April 22	188 copies sent to member farms, around 300 people. + PPS website
PPS newsletter	PPS project manager	Primary & secondary	Summary of year 2 results	Jun 22	188 copies to member farms, around 300 people. 325 copies to other contacts – interstate & NZ farmers, Ag Vic & CMA staff, MLA contacts.
PPS Annual Conference	PPS project manager	Primary & secondary	Project update – poster display	Aug 23 2022	110 producers, agronomists and agribusiness staff
Site Visit - Overdale	PPS project manager	Primary	Site visit	Aug 24 2022	Project Consultant, Lisa Warn & Richard Hayes; researcher NSW DPI.
~~Site Tour - unconfirmed~~	~~PPS project manager~~	~~Primary & secondary~~	~~Project presentation & site visit~~	~~Spring 22~~	~~Local Landcare groups~~
PPS spring farm tour	PPS project manager	Primary & secondary	Site inspections	Oct 22	12 PPS member producers
PPS newsletter	PPS project manager	Primary & secondary	Paddock results update	March 23	188 copies to member farms, around 300 people.

					325 copies to other contacts – interstate & NZ farmers, Ag Vic & CMA staff, MLA contacts.
~~Feedback article ??~~	~~PPS Project Manager~~	~~Primary& secondary~~	~~500 word feature article.~~	~~January 23~~ Not requested	~~Primary& secondary~~

7.3Case Study: Gallops, Avoca

FESCUE; a low rainfall pasture tool? *Case study; Gollops; Avoca*

PPS FESCUE PROJECT; L.PDS.2004 - *(2020 – 2023)*

FESCUE; A LOW RAINFALL PASTURE TOOL?

Aim; *to demonstrate that winter active fescue can be a valuable pasture systems tool in the <550mm rainfall zone in Victoria.*

Case study; Gollops; Avoca

Comment;

"It seems the best way to get adoption of winter active fescue in <550 mm zone is for producers to try a paddock of it themselves. Those who have are going back for more."

In 2019, Stephen Pasture Seeds (now DLF) Pasture Rep, Michael Grant suggested a dryland mix might be a good fit for a new pasture at Lloyd & Lorraine Gollops, north-east of Avoca. Lloyd went along with the idea and it hasn't stopped raining since.

The paddock selected is in the Ordovician foothills of the Pyrenees Ranges around 10kms north-east of Avoca. The pasture had declined and was dominated by soft brome (Bromus hordeaceus) and silver (vulpia spp) grasses.
Pre sowing weed control was carried out with a Spraytop in Spring 2019 and a weed knockdown spray in Autumn 2020. The new pasture was direct drilled with an Agro Drill on the 28th of April, 2020.

Project Background

Approximately 40% of PPS member farms are located north of the Great Dividing Range in Central Western Victoria. The area, south of the Wimmera and Central plains, consists of light soils and the region typically has a short growing season due to low spring rainfall and high evaporation; this is becoming increasingly frequent with "bob tail" springs reducing production capacity. PPS considers that winter active fescue sown on part of the farm could increase overall dry matter production and allow spelling of Phalaris and other species to aid the build up of plant reserves before grazing later in the spring. The addition of further perennial species on farm will assist in keeping adequate ground cover over summer.

Winter active fescues have been demonstrated to fulfill a role in perennial systems in Southern Victoria but their early heading trait and potential earlier loss of feed quality has meant that management issues have arisen.

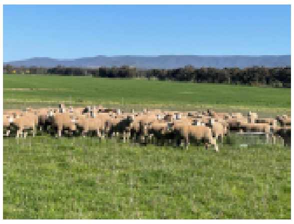
From the trials previously conducted, PPS members concluded that winter active fescue could be a productive and persistent perennial grass option for use in below 550 mm rainfall zone, where Phalaris has historically been used with success.

PPS members considered that the traits that winter active fescue exhibits may allow it to produce earlier growth in the north of the Great Divide where winter soil temperatures are higher and there is more sunlight in the colder months.

Along with the production increase achieved by replacing low performing annuals with high production perennials, there is the well documented improvement in land management through reduced run off, increased ground cover, improved water use efficiency and reduced risk of nitrate leaching.

Left; Pasture at Gollops, Avoca

Right; Lambs checking pasture cages at project site.



Gollops FDS site
Gollops was sown with Fletcha Fescue @ 10kg/Ha, Uplands Cocksfoot @3kg/Ha and Riverina and Urana Sub clovers @ 4 kg/Ha each after an early autumn break. The grasses established at an impressive average of 102 plants per Sq metre.
The pasture grew rapidly in the warm, moist autumn soils and Lloyd Gollop didn't hold back, starting grazing after about eight weeks. The grass and clover handled the grazing due to the great season and the strategic management of rotational grazing.

Years 2 & 3
Gollop's dryland mix pasture again avoided an autumn test in 2021 when Lloyd and Lorraine dialled up a late February autumn break. They had a repeat in 2022 when a third La Nina visited Central Victoria.
With no moisture stress and no nutrient issues (pH 5.30 CaCl, Olsen P of 12 and adequate P and K) the pasture was able to produce large amounts of feed in both years. An application of N each winter helped too.

Dry matter measurements in 2021 and 2022 showed that the pasture produced in excess of ten tonnes DM/Ha in each year. The stocking rate calculations showed more than 20 dse/Ha could be maintained through the rotational grazing management on the site.

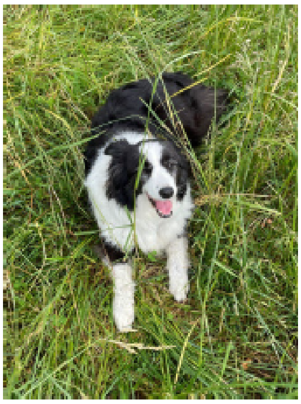
Above; Lloyd Gollop (right) pointing out a few fescue facts to PPS Management Committee member, Mal Nicholson (left) and PPS President, Matt Kindred (centre).

Subdivision of Paddock
The site was subdivided in 2021 in line with findings from the PPS Phalaris Persistence Project, an MLA PRS project completed in 2017. A positive correlation was found in Phalaris frequency with decreasing paddock size. The results showed that Phalaris pastures over 20 Ha in size have a lower persistence rating than those under 20 Ha. It is possible that this effect could be the same for other perennial grass based pastures. Lloyd and Lorraine fenced the Avoca site into two paddocks which has aided grazing management and will possibly enhance the persistence of the Fletcha fescue and the Uplands cocksfoot. The Phalaris persistence report can be found the PPS website.
www.perennialpasturesystems.com.au

Feed Quality
One of the barriers to the adoption of winter active fescue is its tendency to produce large amounts of spring feed and then go into its reproductive stage quickly reducing feed quality. PPS has feed quality tested fescue, cocksfoot and phalaris as part of this project along with a separate feed quality project that was conducted in 2021.

The results have shown that fescue drops below high digestibility criteria before other perennials tested; its protein and energy levels differ little from phalaris pastures. An interesting finding is that the Uplands cocksfoot at Gollops has maintained its feed quality for longer than both phalaris and fescue. The full details of these results can be found on the PPS website under the feed quality and fescue projects.

Dry Seasons
While the consecutive La Nina's have not tested the persistence of the fescue/uplands pasture; ongoing PPS Pasture Variety trials at Tottington and Eversley in similar type climatic conditions suggest that if correctly managed, both winter active fescue and Uplands cockfoot can be as persistent as Phalaris. Planned rotational grazing, control of excess fescue growth in the spring and adequate soil nutrient status should ensure a strong perennial pasture persisting for many years. Fescue grazing guidelines prepared by project consultant, Lisa Warn are included as an appendix in the full PDS 2021 report, available on the PPS website.



Above; Mogwai checking pasture growth.

For further information; contact PPS Project Manager:- Mobile, 0438 521357 Email, yadin061@tpg.com.au

The PPS website can be found at:-
www.perennialpasturesystems.com.au

7.4Case Study: Overdale, Concongella

FESCUE; a low rainfall pasture tool? *Case study; Overdale; Concongella*

PPS FESCUE PROJECT; L.PDS.2004 - *(2020 – 2023)*

FESCUE; A LOW RAINFALL PASTURE TOOL?
Aim; *to demonstrate that winter active fescue can be a valuable pasture systems tool in the <550mm rainfall zone in Victoria.*

Case study; Overdale; Concongella

Comment;
"It seems the best way to get adoption of winter active fescue in <550 mm zone is for producers to try a paddock of it themselves. Those who have are going back for more."

The Overdale farm at Concongella, 10 kms east of Stawell, has long been recognized for its land management and pasture improvement; many farm visits have been made by producers, Landcare groups and people interested in soil protection. Overdale has thousands of trees planted on the hill country and large soil conservation projects have been completed over the years to mitigate the risk of wind and/or water erosion. George and Kath Holden implemented large pasture improvement programs. George is proud and passionate about his Phalaris pastures. In the past few years, the management of Overdale has been handed over to daughter Sue and her husband, Mal Nicholson.

The management succession slowed down a bit a few years ago when Mal decided to trial GA (gibberellic acid) on one of George's favourite Phalaris pastures. GA is produced in plants naturally, promoting growth through leaf elongation and can be synthesized to spray onto plants in winter. The treatment causes temporary yellowing of leaves as the leaf elongation outpaces photosynthesis for a few days. Kath and George had a few days away and on return, George asked Mal for an update and a drive around, unfortunately the Phalaris still had a yellow colour and George had some strong questions about the perceived ruination of the pasture. Mal's position as joint manager (and maybe son in law) looked a bit shaky until the green returned and the Phalaris produced some great winter feed.

Sue and Mal introduced winter active fescue into the Overdale system in 2019 with much less drama!

Background
Approximately 40% of PPS member farms are located north of the Great Dividing Range in Central Western Victoria. The area, south of the Wimmera and Central plains, consists of light soils and the region typically has a short growing season due to low spring rainfall and high evaporation; this is becoming increasingly frequent with "bob tail" springs reducing production capacity. PPS considers that winter active fescue sown on part of the farm could increase overall dry matter production and also allow spelling of Phalaris and other species to aid the build up of plant reserves before grazing later in the spring. The addition of further perennial species on farm will assist in keeping adequate ground cover over summer.

Winter active fescues have been demonstrated to fulfill a role in perennial systems in Southern Victoria but their early heading trait and potential earlier loss of feed quality has meant that management issues have arisen. From the trials previously conducted, PPS members concluded that winter active fescue could be a productive and persistent perennial grass option for use in below 550 mm rainfall zone, where Phalaris has historically been used with success.
PPS members considered that the traits that winter active fescue exhibits may allow it to produce earlier growth in the north of the Great Divide where winter soil temperatures are higher and there is more sunlight in the colder months.

Along with the production increase achieved by replacing low performing annuals with high production perennials, there is the well documented improvement in land management through reduced run off, increased ground cover, improved water use efficiency and reduced risk of nitrate leaching.

Overdale PDS Site
The fescue sown in 2019 included Uplands cocksfoot and performed well as its purpose was to handle heavy grazing in a paddock near the Overdale woolshed, when large numbers of sheep come in for shearing and other husbandry operations. While the grasses performed well, the clover component was low, something Sue and Mal are working on to address. A decision was made to continue on with the winter active fescues and in 2020 they struck gold with it.

Overdale has two paddocks across the road from the woolshed which could easily double as a gravel pit (no gold struck); the thin soil looks about as hostile to permanent perennial pasture as you could find anywhere. Add its lack of water holding ability and you would think that you had a large unproductive area that you could do little with.

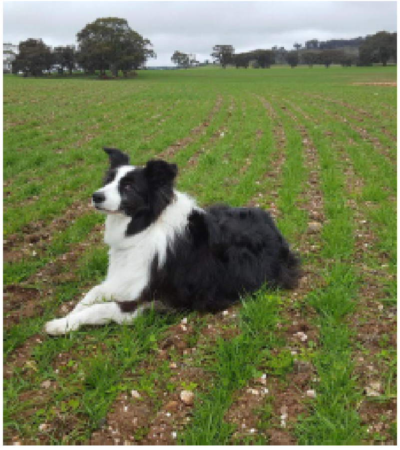
Not so at Overdale, in 2019 the eastern paddock was sown to Holdfast GT Phalaris, sub and Arrowleaf clovers; a very good establishment combined with precise first season management has resulted in a pasture with great feed and permanent ground cover. It was now time for the Fletcha fescue which was sown on 13th May 2020 again with the same mix of clovers; we were now in La Nina time and the pasture established at an average of 118 fescue plants per square meter. The fescue and clovers grew well into the spring and handled stud ram lambs well into summer.

Production & Quality
Direct comparisons can be made between the fescue and the Phalaris at Overdale thanks to the pastures being adjacent. In 2021, the second of the three La Nina years, dry matter production was similar in both pastures with around 5 tonnes DM/Ha being produced in each of the hostile soil types.

Crude protein dropped early in the fescue being below dry sheep requirements by 26th November, the Phalaris didn't go below that until 18th December. Energy levels for both grasses were above the 8 MI/kg/DM needed for sheep until early January while the fescue maintained its digestibility above low levels for longer than the Phalaris. It should be noted that only the grasses were measured/tested and the dry clover residue wasn't taken into account.

Dry Seasons
While the consecutive La Nina seasons have not tested the persistence of the fescue/uplands pasture; ongoing PPS Pasture Variety trials at Tottington and Eversley in similar type climatic conditions suggest, if correctly managed, that both winter active fescue and Uplands cocksfoot can be as persistent as Phalaris.

Planned rotational grazing, control of excess fescue growth in spring ad adequate soil nutrient status should ensure a strong perennial pasture persisting for many years. Fescue grazing guideline prepared by Project Consultant, Lisa Warn are included as an appendix in the 2021 PDS report, available on the PPS website.



Above; Mogwai getting comfortable on the newly established Fletcha fescue pasture.

For further information; contact PPS Project Manager:- Mobile, 0438 521357 Email, yadin061@tpg.com.au

The PPS website can be found at:- www.perennialpasturesystems.com.au

7.5Winter Active Fescue Pasture Management Tool

Winter Active Fescue Pasture Management Protocol; *Lisa Warn, Lisa Warn Ag Consulting Pty Ltd. Project technical advisor.*

PPS FESCUE PROJECT: L.PDS.2004

FESCUE: A LOW RAINFALL PASTURE TOOL?

Aim: ***to demonstrate that winter active fescue can be a valuable pasture systems tool in the <550mm rainfall zone in Victoria.***

Pasture Management Protocol

By Lisa Warn, Lisa Warn Ag Consulting Pty Ltd.
Project technical advisor.

Grazing management

Rotational grazing allows plants to be rested between grazings. This allows plants to replenish carbohydrate reserves in their tiller bases (in crown of plant), improve the size of the root system and produce more leaf area for the next grazing event. Over time, the perennial plants increase in size which increases total pasture (kg DM/ha) grown over the year, will provide better ground cover and reduce invasion of weeds. Native perennial grasses and annual grass species (eg. annual ryegrass ryegrass) will also benefit from rotational grazing.

Rest periods

The length of the rest period varies with the time of the year.

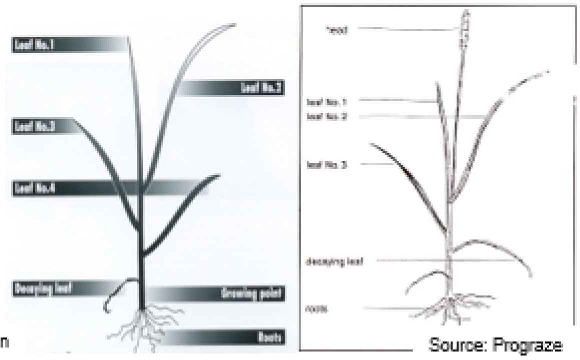
<u>From autumn to early spring:</u>
To decide when a pasture is ready to graze, the best indicator to use is the number of leaves per tiller that have regrown on the perennial grass. Once the full number of leaves have grown back per tiller, the oldest leaf will start to die. At this point the plant has replenished its maximum levels of carbohydrate reserves, so it is ready for the next grazing.

The target for perennial ryegrass and **fescue** is 3 leaves per tiller and for **phalaris** and cocksfoot it is four (Figure 1). Cocksfoot can sustain up to 5 live leaves per tiller before the oldest leaf starts to die off but grazing at the 4-leaf stage achieves a good balance between adequate rest and good feed quality. Leaf regrowth rates are driven by temperature (&moisture) not by soil fertility.

Pasture availability/Feed on offer (kg DM/ha) is another indicator that can be used to decide when a paddock is ready to graze. This works well where all paddocks in the rotation have similar species and high soil fertility. If paddocks have very different fertility levels, the paddocks will have different levels of pasture available (kg DM/ha) when they are at the appropriate leaf stage.

Some typical rest periods for paddocks, between grazings, as a guide are:

- Autumn: 30-40 days
- Winter: 40-50 days
- Spring: 18-22 days (OR can set stock for lambing)
- Summer: 70 + days (depends if get rain or not)



Source: Watson Source: Prograze

Figure 1. Autumn-early spring: Leaf stage is an indicator of when perennial grasses are ready to graze. **Phalaris** (left) has 4 live leaves per tiller and perennial ryegrass and **fescue** have three.

From mid-spring to early summer:

Once the grasses move from the vegetative phase to the reproductive phase, leaf stage is not relevant to deciding when to graze.

For newly sown pastures, the priority is to allow the perennial grasses to run to head and flower before grazing off. If old perennial pastures have become rundown, due to overgrazing or dry conditions, allowing them to run to head in spring will improve their summer survival and growth the following year.
Phalaris usually starts to undergo stem initiation (can feel the nodes at the base of the plant) around mid-October. Rest for around 6-weeks after that to allow stem elongation and flowering to occur.
Fescue (Mediterranean/winter active) usually runs to head around a month before Phalaris.

For established pastures with good plant numbers and plant size, the priority at this time of year when growth rates are high is maintaining feed quality for as long as possible. The rest period can be shortened. The aim is for stock to trim up the pasture and maintain even utilisation, but not eat pasture down low at each grazing.

From mid-summer to the autumn break:

After the pastures have hayed off, the priority is to evenly graze the pasture off before the autumn break. The rotation can be slowed down. If the non-growth period is December to April (150 days) aiming for 2 grazings of each paddock during that time to utilise the dead feed, hence the suggested 75 days rest period. If there is some summer rain and pasture growth, this rest period can be reviewed.

Grazing duration

During the growing season, grazing a paddock for a week or less, will reduce the risk of re-grazing the newly emerging shoots (which start to grow 2-3 days after initial grazing), and this will also improve the overall pasture growth rates.

Grazing height

In dairy systems, leaving a high pasture mass residual (at least 3 cm) after grazing has been shown to increase perennial ryegrass growth rates and persistence. However, on sheep/beef farms trying to leave this amount of pasture residual after grazing is not always practical, particularly just after the autumn break. Also, different species have difference tolerances to grazing depending on their growth habit and position of growing points. For phalaris, fescue or cocksfoot pasture a more achievable target could be 1-2 cm (500-800 kg DM/ha) residual in autumn-winter. A higher pasture residual needs to be left moving into spring (eg. 4-5cm/1200-1400 kg DM/ha) and early summer (8-10cm/1800-2000 kg DM/ha). The aim is to have the dead feed eaten down to around 1000 kg DM/ha at the time of the autumn- break to allow good clover germination.

7.6PPS Newsletter – June 2020

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7.7PPS Newsletter – September 2020

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7.8PPS Newsletter – June 2021

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7.9PPS Newsletter – June 2022

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7.10- Horses and Fescue Pastures - Emma Goodall; Elders Ballarat (agronomist (BSc Agriculture) (BEquineSc)

<u>Horses and Fescue Pastures</u>

Fescue grasses (*Festuca arundinacea*) of both summer active and summer dormant varieties, appear to be agronomically robust grasses for a wide range of enterprises due to environmental adaptiveness tolerating hot, dry periods as well as periods of water logging with a deep rooting system, frost tolerance, moderate to high levels of dry matter production and moderate to high nutritional levels (West et al 1993). However, whilst initially thought of as a "silver bullet" the species (Gunter & Beck 2004) and its interaction with endophyte presents significant challenges to all livestock managers, and particularly to horse owners and managers.

Beyond the discovery of the Epichloë coenophiala endophyte in the 1970's (Morgan-Jones & Gams 1982) and the implication on overall livestock toxicosis, further research in the late 1980's quantified the direct causation of significant reproductive issues in pregnant mares (Monroe et al 1988). There is limited understanding of the effects of fescue toxicity on stallions and geldings (Smith, Schwer & Keene 2009). Whilst fescue's were implicated in the huge losses (approx. $300M USD) of Mare Reproductive Loss Syndrome (MLRS) in the 2000-2001 American thoroughbred breeding season, this was later disproven (linked to caterpillar incursion) however significant concern and confusion remains within the wider horse community around animal safety grazing fescues.

It was widely assumed the clinical effects including prolonged gestation, thickened placentas, large, weak foals, dystocia, and agalactia (Porter & Thompson 1992) were limited to the summer active (Continental) types. The presence of wild type endophyte conferring the plants benefits of heat tolerance and plant persistence in hot summer environments (Rogers, Walker & Young 2016). Where summer-dormant tall fescue types avoid these periods by going dormant, reduced or nil endophyte infection was assumed to not provide any additional drought tolerance (Gunter & Beck 2004). More recently however, novel endophytes that are safe for cattle, have been implicated the presentation of Equine Fescue Oedema (EFO) in summer dormant (Mediterranean) types (Bourke, Hunt & Watson 2009). Unlike the Continental types, where the Epichloë coenophiala endophyte produces the known animal toxin ergovaline (Raman 2019), the Mediterranean/novel endophyte can produce the pyrrolizidine alkaloid, N-acetyl norloline (Bourke, Hunt & Watson 2009) and indole-diterpenes such as terpendole C (Rogers, Walker & Young 2016), however the toxic principles are currently unresolved.
Recent work suggests the presentation of hypoproteinaemia and haemoconcentration, occurs due to leakage of plasma proteins into the gastrointestinal tract (Munday et al 2017). This presents clinical symptoms including subcutaneous oedema of the head, neck, chest and abdomen as well as depression and inappetence (Bourke, Hunt & Watson 2009). These symptoms differ somewhat from the symptoms of Osteodystrophia fibrosa, commonly known as "big head" – a secondary hyperparathyroidism, caused by grazing sub/tropical C4 grasses containing oxalates resulting in a severe Calcium deficiency, where enlarged and deformed bone appearance is restricted to the face, and presents with increased occurrence of lameness and fractures (Ospina, Doncel & Garcia 2014).

Continental, summer active fescues are strongly contraindicated for horse paddocks by all reputable seed companies due to the well documented risks. Ensuring nil endophyte status of Mediterranean, summer dormant fescue being sown into horse paddocks is critical to minimise animal health risks (Munday et al 2017). Unlike the United States, ensuring complete destruction of an endophyte infested stand, in order to be allow establishment of new stand of tall fescue that is not toxic is a reduced issue in Australia (Hopkins et al 2011). Where fescue toxicosis is suspected, the mare should be removed from infected pastures and hay a minimum of 30 days prior to the foaling date (Orsini & Divers 2012). Where removal is not possible veterinary intervention and the use of a dopamine antagonist, approximately 10 to 14 days before the expected foaling date to minimise the impact of agalactia (Orsini & Divers 2012).

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7.11Feed Quality Requirements used for feed test results

A summary of feed quality requirements was obtained from “Drought Feeding and Management of Sheep; A Guide for Farmers and Land Managers 2018”; published by the Victorian Government Department of Economic Development, Jobs, Transport and Resources, April 2018.

Table 6; Energy & protein requirements for sheep. Source; Agriculture Victoria

Table 3.1: Energy and protein requirements of a range of classes of sheep.

Class of stock	Live weight (kg) and Condition Score (CS)	DSE rating	Energy requirement MJ ME/day	Approximate protein requirement CP (%)
Adult dry sheep (wether or ewe dry or early stages of pregnancy)	40 kg CS 2	0.7	6	
	45 kg CS 2	0.8	6.5	
	50 kg CS 2	0.9	7	
	50 kg CS 3	1	8	6-8
	60 kg CS 3	1.1	9	
Ewes Pregnant last 4 weeks before lambing (single)	45 kg CS 2	1.2	10	
	50 kg CS 2	1.5	12	8-10
	60 kg CS 3	1.8	14.5	
Ewes With lamb at foot (single)	45 kg CS 2	1.8	15	
	50 kg CS 3	2.2	18.5	12–14
	60 kg CS 3	2.6	21.5	
Weaners	15 kg (growing at 100 g/day) 15 kg (growing at 200 g/day)	0.8 1.2	6.5 10	16 18–20
	25 kg (growing at 0 g/day) 25 kg (growing at 100 g/day)	0.7 1.0	6 8	9–12 12–14
	35 kg (growing at 0 g/day) 35 kg (growing at more than 200 g/day)	0.8 2.5	6.5 21	9–11 15–18

Note that weather and other conditions can change energy requirements (see Chapter 4 – Feeding sheep - how much and how often).