SA Drought Hub Technical Report

Effects of simulated defoliation on the productivity and resilience of pasture legumes

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Contents

SA Drought Hub Technical Report	**2**
PROJECT SUMMARY	4
EXECUTIVE SUMMARY	5
PROJECT BACKGROUND AND OBJECTIVES	5
METHODOLOGY	7
RESULTS	9
CONCLUSION	15
REFERENCES	17
APPENDIX 1: MEL SUMMARY DATA	18

PROJECT SUMMARY

A simulated grazing experiment was conducted in Adelaide Hills to address the knowledge gaps that exists on the introduction of novel pasture legume cultivars and their responses to livestock grazing. Testing at satellite sites in the Murray Mallee and Eyre Peninsula were also proposed in the initial application but defoliation treatments were not feasible due to low spring rainfall resulting in low biomass production in both 2023 and 2024. Plant growth responses of eight improved pasture legume cultivars to continuous and periodic grazing was assessed at the Mt Crawford site. Several cultivars responded positively to continuous grazing in terms of biomass productivity, feed quality, plant greenness indices and increasing the length of the growing season. This project was originally proposed for one season but following an extension of the PODS (Pasture Optimisation for Drought Resilience) parent project from DAFF until December 2024, we were able to continue the defoliation trial for a second growing season.

In 2023, despite being an unusual year for pasture growth due to below average rainfall during the growing season, followed by late rain in spring and summer, the experiment resulted in a ground cover varying from 20-30%, dry matter biomass of 1.1 t/ha, and feed test results well above the minimum sheep requirements. In 2024, prolonged dry conditions in autumn followed by significantly below average rainfall in winter and spring presented challenges to pasture growth, ground cover and weed control.

Grazing treatments resulted in higher overall biomass yields/season and better feed values in terms of dry matter digestibility, crude protein and metabolizable energy, however, low pod/seed yield was concerning across most of the plots. In 2023, serradella cultivars 'Frano' and 'Margurita' continued to grow late in the season utilizing the out-of-season rainfall in November and December. Our experiment highlights the potential for inclusion of serradellas in the pasture mix of these medium rainfall zones to improve livestock productivity and address late season feed gaps.

EXECUTIVE SUMMARY

South Australia's medium to high rainfall zones have a long history of growing subterranean clovers with animals grazing either permanent pastures or fodder crops for livestock production. Many farms are focussing on high livestock production where improved pasture legumes and alternative feed options needs to be explored to sustain the feed production from pastures. In the last 30 years, a range of alternative annual legume species have been developed with some now widely grown. However, most of these improved pasture legume species have not been adequately assessed for their growth performance and grazing responses in South Australian conditions. These species have a range of traits that have the potential to lift production and high levels of hard seed aids persistence through drought.

In May 2023, a trial site was set up in Mt Crawford, Adelaide Hills to assess the growth performance of eight novel pasture legume cultivars and their responses to simulated continuous and rotational grazing. 24 mid-sized plots (6x10 m) were sown in a randomised controlled block design. Two separate experiments were run in these plots Ex1 in 2023 explored the response of these legumes to defoliation when the sward was kept as pure as possible. Ex2 in 2024 explored the performance of these legumes as a component of a mixed species sward. During each experiments cutting treatments (2 wk and 6 wk intervals) along with an uncut control were implemented in split plots. Changes in ground cover, dry matter biomass, and feed quality were measured over time during each season.

Frequent defoliation (2-week intervals) improved early biomass utilization but stressed plants under dry conditions, limiting growth, while less frequent defoliation allowed for more resilient growth, without sacrificing cumulative biomass or pasture composition. Metabolizable Energy (ME) and Crude Protein (CP) were highest early in the season, with frequent defoliation boosting protein content, though both dropped during mid-season as plants matured. Grazing value varied throughout the season, with early growth providing high-quality feed, mid-season supporting more grazing days due to higher biomass. Late-season rainfall in 2023 enhancing the value of French Serradella cultivars by producing high quality feed at late in the season.

This work is a part of the broader Pasture Optimization for Drought Solution (PODS) project. The evaluation included eight pasture cultivars, French serradella cv. Frano & Margurita, yellow serradella cv. SerraMax, Woolly pod vetch cv. RM4, burr medic cv. Scimitar, subterranean clover cv. Campeda, arrowleaf clover cv. Zulu II, and balansa clover cv. Vista, subjected to two grazing treatments, 2-week and 6-week intervals during the growing season in 2023. The three clover treatments Campeda, Zulu II and Vista, failed to establish early in the season, due to suspected error in sowing depth, and pest damage.

PROJECT BACKGROUND AND OBJECTIVES

Southern Australia has a long history of sowing annual pasture legume species that increase pasture and livestock production, and in the mixed farming areas, the yield of subsequent grain crops. Subterranean clover (*Trifollium subterraneum*) and annual medics (*Medicago* spp.) have been sown over large areas. Advances in plant breeding and research developed a range of improved cultivars and alternative annual legume species in the last 30 years with some now widely grown. These species have a range of traits that have the potential to lift

production and high levels of hard seed aids persistence through drought. However, some areas in SA have little or no experience with the alternative species.

The Adelaide Hills has relatively high rainfall with many farms focused on high livestock production with animals grazing either permanent pastures or fodder crops. Subterranean clover is the most widely grown legume species in the region and is highly tolerant of being closely grazed. The older cultivars of sub-clover result in significant pasture or animal underperformance mainly caused by higher levels of oestrogen that cause fertility issues, and susceptibility to diseases that lead to lower annual production. Improvements in growth and disease resistance of new improved cultivars contributed to the increasing gap between older and newer cultivars and in many places, farmers are trying to replace outclassed cultivars to increase livestock production potential (MLA, 2020).

Livestock production potential can be enhanced by both change in pasture composition and management practices that determine the quantity and quality of pasture on offer. Pasture quality is highest when plant is in the vegetative stage and progressively declines as the plants move into the reproductive phase and senescence. Pasture quality can vary between species, it is usually most similar at the vegetative phase and variability increases as plants progress through the reproductive phase at different rates {Thomas, 2010 #823}. The height to which species are grazed and the time interval between grazing can affect the pasture quality and total biomass production. Previous work on grazing practices had focussed on grasses, and pasture legumes common to high rainfall areas, or combinations of these plant types. Limited work is available for the alternative legume species on the effects of grazing management on production and quality. Likewise, minimal work takes drier growing conditions into account.

Based on this knowledge gap, a simulated grazing experiment was conducted, imposing two cutting frequencies on a range of annual pasture legume cultivars. As, pasture quantity and quality across the growing season are crucial in managing livestock performance, periodic assessment of pasture productivity and quality were conducted.

This project had the following hypotheses:

1. Novel hard seeded legume varieties will have longer growing season and/or greater responsiveness to unusual seasonal rainfall patterns than the current standard practice for the region (older varieties of subterranean clover)
2. Grazing treatments will increase cumulative available herbage over the growing season, and feed quality (higher energy, protein and digestibility)
3. Variation will be observed among cultivars of legumes in response to grazing management treatments

METHODOLOGY

Study Area

These experiments were conducted on a trial site located within a commercial paddock in Mt Crawford, SA (34°40'44"S, 139°00'24"E) (figure 1). Two experiments in consecutive growing seasons (winter/spring 2023 and 2024) were used to investigate the effects of different frequencies of simulated defoliation on annual hard seeded legume species. Average annual rainfall for the site 1994-2024 is 647.7mm {BOM, 2024 #934}. The trial paddock was a loamy sand, pH 6.32.

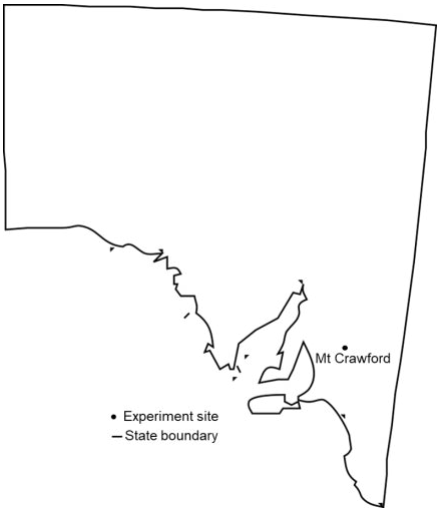


Figure 1: Location of the experiment site in Mt Crawford, Adelaide Hills.

Experiment 1

Eight hardseeded legume cultivars were selected: *Medicago polymorpha cv. Scimitar (SC), Ornithopus compressus cv. SerraMax (SM), O. sativus cv. Margurita (MA), O. sativus cv. Fran2o (FR), Trifolium michelianum cv. Vista(VI), T. subterraneum cv. Campeda (CA), T. vesiculosum cv. Zulu II (ZU), Vicia villosa ssp. eriocarpa cv. RM4 (RM)*. A subterranean clover was selected to represent standard practice in the region, Campeda was chosen as it has relatively high hard seed levels for the species. Woolly Pod Vetch, RM4, was selected as a comparison to an annual forage legume. The remaining cultivars were selected based on tolerance for acidic and/or sandy soil, deep roots and hard seed for increased drought resilience, and a variety of flowering times, as early flowering can improve reliability of seed set during a dry spring, but later flowering allows for a longer growing season, reducing the length of the summer/autumn feed gap.

Experiment 1 was sown on 17 May 2023 in twenty-four 6 x 10m plots. Each of the plots were sown at 40kh/ha and replicated 3 times in a randomised complete block design. Single superphosphate fertilizer was applied at 70kg/ha, delivering 6.16kg phosphorous/ha at seeding. Three cultivars (Campeda, Vista, Zulu II) failed to establish due to issues with seeding depth and pest damage early in the season. Two knockdown herbicides of Glyphosate 470 g/L K + MA @ 2.0 L/ha + Carfentrazone-ethyl 400 g/L @ 40 mL/ha were applied on 2/05/2023 and 17/05/2023 prior to sowing and a grass selective herbicide comprising of 350 ml/ha Clethodim 360, 180g/ha Factor, 25 g/ha Broadstrike 1 % Hasten was applied post emergence on 15/08/2024. Slug baits were applied post emergence on 29/06/2023 and insect control Pyrinex Super 500mL/ha was sprayed on 3/7/2023.

Following emergence counts in June 2023, the 24 main plots were divided into split plot defoliation treatments. Three treatments were applied: NIL – no defoliation, 2WK – plots cut every 2 weeks, 6WK – plots cut every 6wks. Cutting height was 3 cm, aiming to leave 800kg DM/ha residual. At each cutting cycle, ground cover was measured, and available herbage samples were collected prior to mowing the plots. Samples for feed quality testing were collected from 2WK and 6WK treatments every 6 weeks. For the NIL plots, sampling was conducted once in late spring to determine available herbage and nutritional quality, correlating with a crop being cut for hay. Samples were collected on their 2 or 6week schedules until most of the plot had senesced, and no further growth was observed. Where average plant height was below 6cm, no samples were taken.

Experiment 2

Dry conditions in Spring 2023 reduced pasture seed set and endangered persistence into 2024. Additionally, South Australia experienced unusually dry (decile 0) rainfall conditions in autumn 2024 and a very late break of season, with 21mm rainfall falling 30May-1Jun {BOM, 2024 #934}. In response to these seasonal challenges both seed and inoculating rhizobia were added to the plots prior to Experiment 2. On 28th May an additional 80kg/ha seed was broadcast into each of the plots, then raked to ensure seed/soil contact, three days prior to expected break of season rainfall. This seeding rate was selected based on expected levels of seed set for dryland pastures (300kg/ha for French serradella, 375kg/ha for Spineless burr medic), and seed softening of 20-50% {Howie, 2007 #939;Dear, 2008 #938}. This level of seed was chosen to overcome the adverse effects of the previous dry season and demonstrate how the pasture would perform if regenerating from a robust soil seed bank, it allowed our introduced species to be competitive against background species without spraying and removed the effect of the previous year's treatments to allow the split plots to be applied randomly for Experiment 2. Single superphosphate fertilizer was applied at 70kg/ha, delivering 6.16kg phosphorous/ha at seeding. The same eight varieties were maintained in the same twenty-four main plots as for Experiment 1, except for plot #6 where the landowner's pasture blend (JU) consisting of "Coopers Hillside Phalaris blend" (*Phalaris aquatica cv Holdfast GT, P. aquatica cv Advanced AT, Dactylis glomerata cv Summadorm, T. subterraneum cv. Campeda, T. subterraneum ssp. Yanninicum cv Monti, T. subterraneum ssp. Brachycalycinum cv Mintaro, T. subterraneum ssp. Brachycalycinum cv Mawson)* with added *O. sativus* c*v Fran2o*, *T. alexandrinum* and *T. resupinatum*. No herbicides were applied in 2024, so that pasture performance could be assessed in competition with background pasture species and weeds. The trial site experienced a high burden of annual grassy and broad leaf weeds, and significant volunteer subterranean clover (cv Dinninup). Snail and slug pellets were applied on 17/06/2024 and 16/7/2024, no other pests were observed, no other pesticides applied. The same three treatments were applied: NIL – no defoliation, 2WK – plots cut every 2 weeks, 6WK – plots cut every 6wks. When average plant height in the plot was under 15cm, plots were cut to 3cm, however, if average plant height in the plot exceeded 15cm, plots were cut to 6cm to leave an average residue of 1200kg DM/ha.

A petrol-powered push mower was used for both experiments, prior to use it was calibrated to ensure uniform cutting height. When the ground was uneven, cutting height was increased by 1cm to prevent soil scalping.

Plant greenness was measured with Normalised Difference Vegetation Index (NDVI) using the handheld GreenSeeker device (Trimble Inc, CA, USA). Ground cover was measured by analysing 3 photographs taken at a uniform height above ground (1m) with Canopeo software (Copyright © 2025 Canopeo App, Oklahoma State University).

Sample analysis

Biomass and feed quality samples were dried at 60°C and weighed, the feed quality samples were assessed for protein, fibre, carbohydrate and mineral fractions using near-infrared Spectroscopy (NIRS) (Forage Lab Australia, Bendigo East, VIC). Metabolizable Energy (ME) and Total Digestible Nutrients (TDN) was calculated by the laboratory using Weiss's Summative Equation {Weiss, 1998 #941}.

Data analysis

To allow direct comparison of the three treatments the season was split into three periods: early (germination to September), mid (October to mid November), and late (mid November to senescence). Observed biomass at cutting was converted to cumulative biomass/ha for each of the periods and for the entire growing season. Metabolizable energy (ME), crude protein (CP) and fibre fractions were assessed using a season weighted average. The relative importance of each feed test was calculated from proportion of the seasonal cumulative biomass that was collected at the time of sampling.

Results were analysed in R Studio (*RStudio Team (2020). RStudio: Integrated Development for R. RStudio, PBC, Boston, MA URL http://www.rstudio.com/)* using the biometry assist package {Nielsen, 2024 #935}. Significance was calculated using a linear mixed model.

RESULTS

Plant health, green canopy, and ground cover

Plant vitality, green canopy cover and ground cover were measured by NDVI, Canopeo and visual evaluation respectively.

In 2023, early establishment was poor due to issues with seeding depth and invertebrate pest management. Additionally, maintaining a pure legume sward by eliminating volunteers reduced total ground cover. This resulted in a mean ground cover of 24% (11-28%) in ungrazed plots. Ground cover was reduced in the 2WK treatment due to the intensive removal of biomass, ground cover in the 6WK treatment was not statistically different to control. However, the rate of recovery from cutting (to 3cm height) was much slower for infrequently cut plots (6WK) and control ('hay cut' in late October).

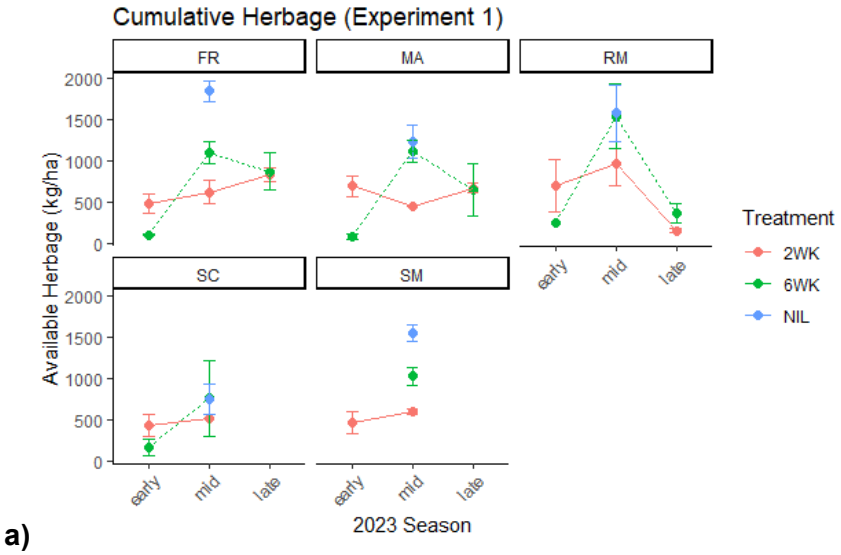
In 2024, both plant vitality and green canopy cover followed very similar patterns, being very high (closer to 100%) early in the season, dropping slightly (80-90%) at the mid-season as plants entered the reproductive stage, then dropping away sharply late in the season as plants senesced. Ground cover remained above 90% in all treatments and cultivars and treatments throughout the 2024 season, indicating that retaining 800kg DM/ha was sufficient to protect the soil surface (in the absence of live animal grazing).

Cumulative Herbage Mass

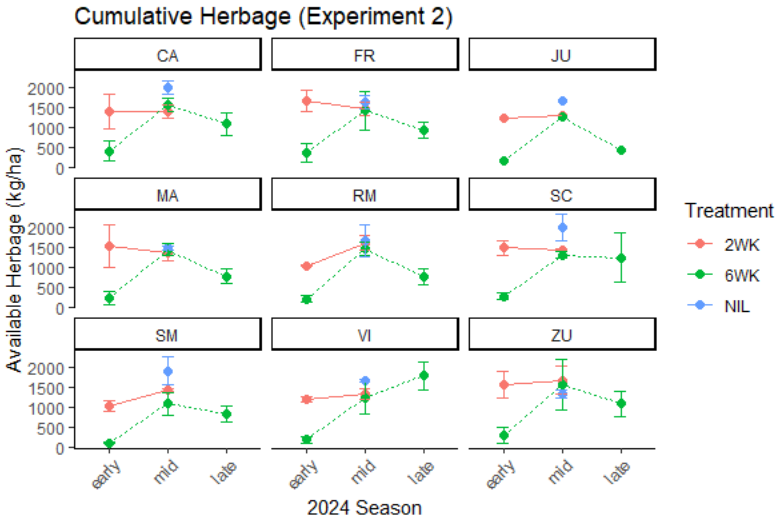
Absolute amounts of cumulative herbage mass between Ex1 and Ex2 were very different due to the difference in sward management. In 2023, all plots were sprayed to remove competing species, while in 2024 the target legume formed on average 27% of the pasture sward. Both years demonstrated an interaction between cultivar, defoliation frequency and point in the season (Figure 2). However, the patterns of this interaction differed between Experiments, likely due to a difference in rainfall pattern. Table 1 shows that in 2023 despite receiving 92% of the expected rainfall for the growing season, the pattern was unusual and rainfall in the middle of the season when legume growth is expected to be highest, was only 40%, which would have hampered growth. The 2024 season only received 70% of the expected rainfall, but it came in a more typical pattern.

Table 1: Rainfall records from Mt Crawford AWS for the 2023 and 2024 growing seasons {BOM, 2024 #934}.

Rainfall mm (%mean)	2023	2024	Mean (1994-2024)
Early (Apr-Jun)	274.2 (137%)	121.6 (61%)	199.8
Mid (Jul-Sep)	99.2 (40%)	184.8 (74%)	250.0
Late (Oct-Dec)	151.6 (128%)	93.4 (79%)	118.5
Total (Apr-Dec)	525.0 (92%)	399.8 (70%)	568.3



a)



b)

Figure 2: Cumulative Herbage observed across Experiment 1 (a) and Experiment 2 (b). CA = Campeda, FR = Frano, JU = Julian's Mix, MA = Margurita, RM = RM4 Vetch, SC = Scimitar, SM = SerraMax, VI = Vista, ZU = Zulu II

Frequent defoliation (2wk) consistent with continuous grazing allowed better utilisation of early biomass production, without adverse effect on mid-season biomass production or pasture composition. However, continued frequent defoliation under dry conditions in 2024 placed too much stress on plants, and they were unable to continue to grow late in the

season as observed in 2023. Less frequent defoliation consistent with rotational management did not utilise early feed as well, but these plots continue to grow until November. In 2023, rain late in the season allowed both French Serradellas to continue vegetative growth into summer.

Feed Quality

Metabolizable Energy (ME)

As expected, ME was highest in the vegetative growth phase early in the season. At this time most cultivars and treatments had a ME of 9-10MJ/kg DM in both years, the highest being Scimitar and Vista which reached ~10.3MJ/kg DM in 2024, and Scimitar with 10.7MJ/kg/DM in 2023. However, the effect of season was not significantly different between treatments and cultivars in 2023.

During the 2023 season the two French Serradellas, Frano and Margurita, had the highest performance across treatments, while the Yellow Serradella, SerraMax, was consistently the poorest performer (Figure 3). Frequent defoliation(2WK) was consistently the highest in energy, and NIL to poorest. Scimitar 2WK, shows very high ME, however this data comes from early in the season, while the other cultivars have data from later in the season bringing down their treatment averages.

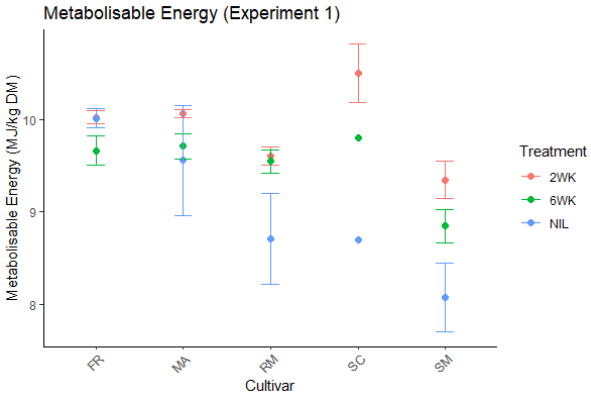


Figure 3: Metabolisable Energy during the 2023 season according to cultivar and defoliation frequency

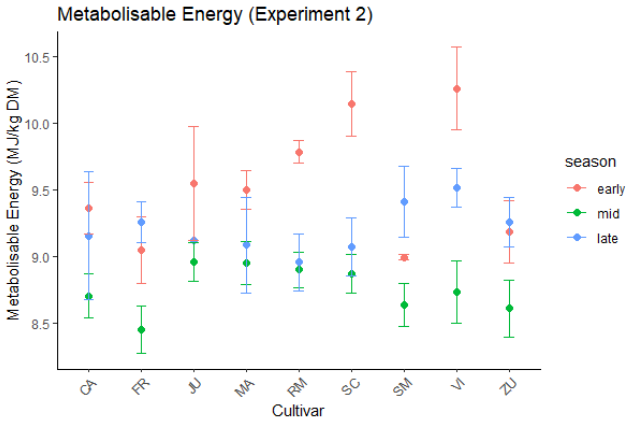


Figure 4: Metabolisable Energy at different points in the 2024 season according to legume cultivar

In 2024, the effect of season, and its interaction with cultivar on the mixed sward was more significant than defoliation frequency. Vista and Scimitar plots were highest in ME (Figure 4). For Scimitar, this is likely due to strong establishment, early in the season SC formed on average 45% of the sward, while the average for the trial at this time point was 30% of the target legume. This doesn't explain the performance of Vista which averaged 28% of the sward.

For several species the lowest ME was observed in the mid-season, this correlates with most plants in the sward having reached a reproductive stage. Once this mature material was removed, the late season growth was higher in quality.

Crude Protein

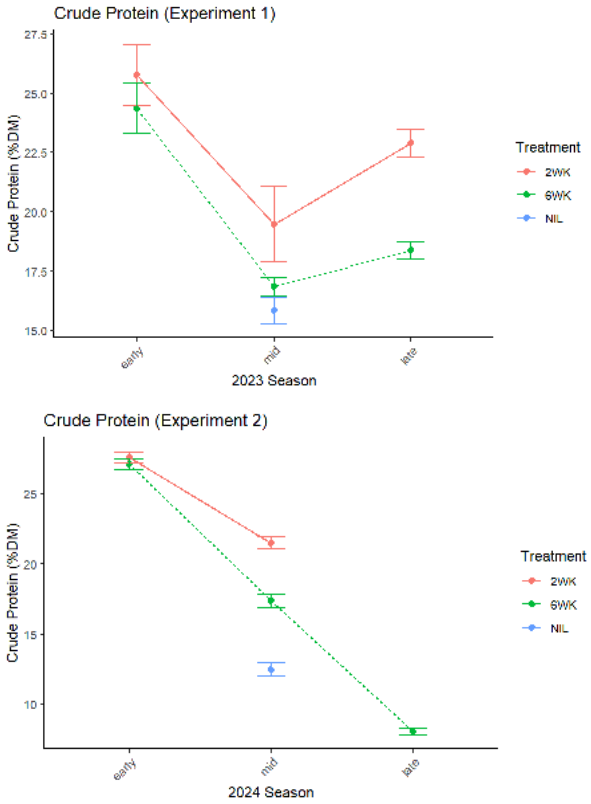


Figure 5: Crude Protein content of feed during the 2023 (top) and 2024 (bottom) seasons according to stage of the season and defoliation frequency

In both 2023 and 2024, no significant difference in Crude Protein was observed between legume cultivars, or mixed swards containing different legumes respectively.

Protein content was increased by defoliation treatments, with frequent defoliation giving the highest CP%, this relationship was more significant later in the season (Figure 5). Protein changed significantly across the season, being highest early in the season and dropping towards the middle of the season when rainfall was poor. In 2023 when significant late rainfall was received, new growth, higher in protein was observed. This rainfall was not received in 2024 so feed quality continued to drop.

Fibre

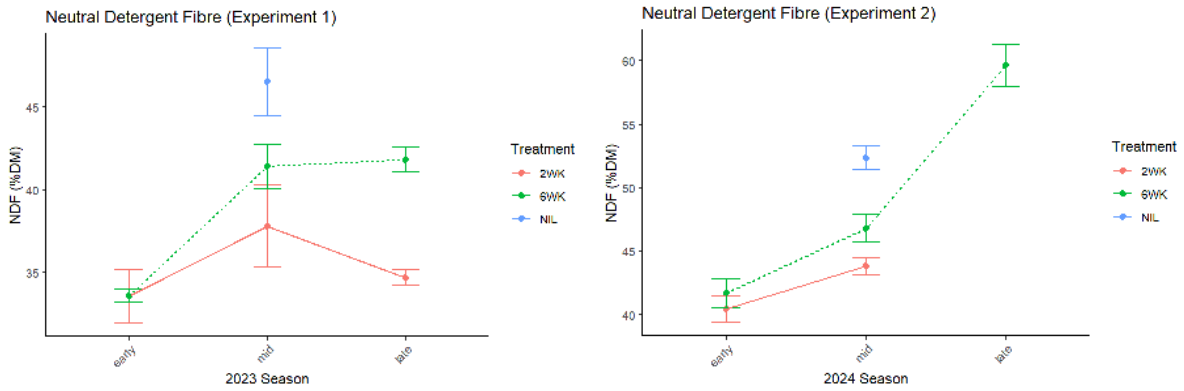


Figure 6: Neutral Detergent Fibre content of feed in 2023 (left) and 2024 (right) according to stage in the season and defoliation frequency

In 2023, FR, MA and RM were not significantly different in fibre content, SC was significantly lower, and SM significantly higher. In 2024, when the target legume formed on average 28% of the pasture sward, the effect of cultivar was not significant. Observed NDF levels were lower on average in 2023 than 2024 (Figure 6), this is likely reflective of higher growing season rainfall, and the fact that the target legumes, which are lower in fibre than annual grasses and weeds, were kept as a pure sward. In both years, fibre was lowest early in the season and increased later as plants matured, and increased frequency of defoliation was

associated with lower fibre content. In 2023, late season rainfall simulated growth that was relatively low in fibre for the time of year, this did not occur in 2024.

Grazing Value

Each of the above factors (ground cover, biomass, feed quality) gives some information about paddock performance and potential for livestock grazing. Estimating grazing value to develop a feed budget for livestock requires the consideration of several factors at once: quantity and quality of feed, and the size and physiological status of the animals being fed. Highly productive animals such as growing lambs, or lactating ewes require much higher feed quality than dry stock (NRC 2007).

Grazing value has been measured as the number of days/ha that grazing would be possible over the trial period (winter/spring), and the potential for weight gain/loss.
The number of grazing days possible is calculated by the following equation:

Grazing days/ha = available herbage/Voluntary Feed Intake + wastage

As such, it closely mirrors the biomass production in Figure (x). However, as voluntary feed intake is reduced when fibre content is high, pastures with lower digestibility but high biomass (ie Nil treatment) appear to be able to support more stock as each animal consumes less. In this case the total energy consumed drops, often below the maintenance energy requirement.
Potential weight gain is calculated based on the difference in energy consumed and energy spent, and the energy requirement for body weight gain according to {Freer, 2007 #940@@author-year}.

Potential gain = ME_{intake}-$ME_{required}$/energy content per kg of empty body weight gain

Figure 7 below demonstrates the average grazing value across the trial in 2023 where the legume sward was pure, with lower plant density and biomass but higher quality, which would allow animals to consume more than their maintenance energy requirement.

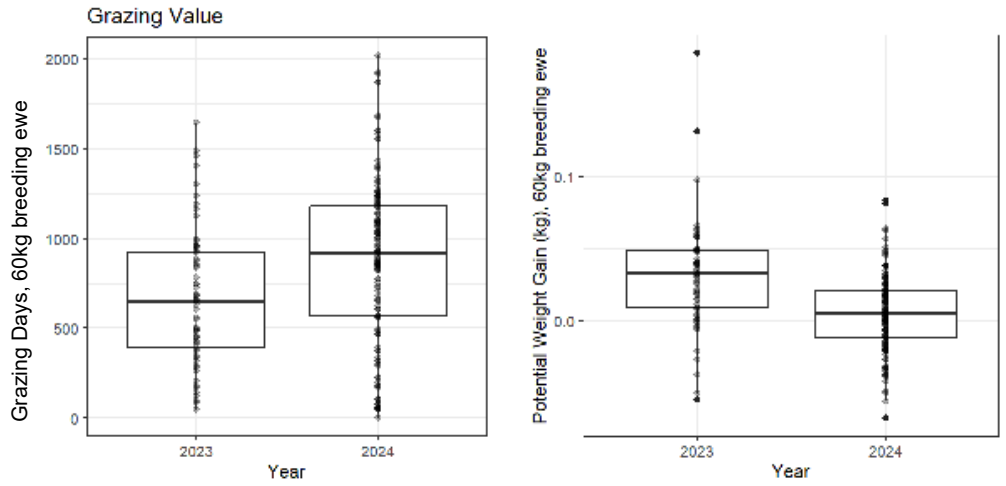


Figure 7: Mean Grazing Value of pastures between 2023 and 2024, showing total grazing days (left) and potential weight gain (right)

Grazing value varied predictably across the season, with the early season having the greatest potential for weight gain linked to the higher quality, and mid-season having more grazing days as it is more closely associated with biomass. Later in the season both biomass and quality decrease, which typically leads to lower overall grazing value. However, in 2023, late season rainfall stimulated vegetative growth in the French Serradella cultivars which had similar feed value to the early season growth. This high-quality feed late in the

season may have even more grazing value to producers as it occurs at a timepoint where feed is becoming scarce.

Figure 8 below summarises the mean grazing value of each of the cultivars in 2023. Frano is shown at a distinct advantage having provided the most beneficial combination of nutritional value and biomass production across all treatments. However, in 2024, when the target legume was a smaller proportion of the sward, cultivar did not have a significant effect on grazing value.

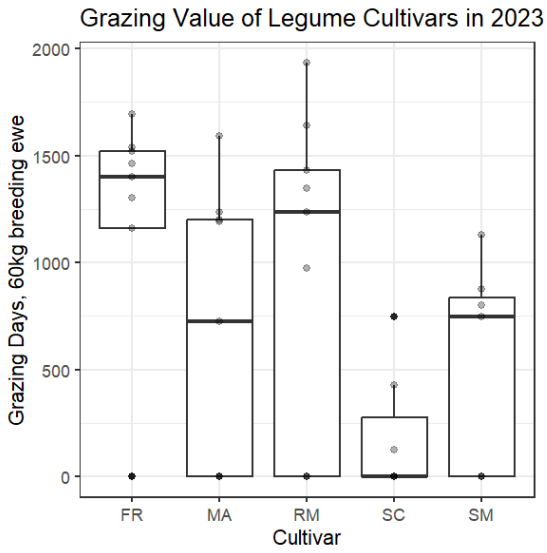


Figure 8: Mean Grazing Value of novel legume cultivars in 2023 (left) and 2024 (right)

In 2024, Grazing value was highest under 2WK defoliation early in the season for both 50kg dry ewes and 20kg late maturing lambs gaining 150g/day, when feed quantity was moderate, and feed quality was very high. This high-quality feed was able to support greater numbers of young stock due to lower quantity of feed consumed per animal. As the 2024 season progressed, a trade off between feed quality and quantity was observed. For example, in the uncut treatment available herbage was high in the middle of the season but quality was moderate, which resulted in high grazing value for dry stock, but low grazing value for growing lambs. However, the frequent defoliation treatment which allowed the highest grazing value associated with higher feed quality, resulted in loss of grazing value late in the season due to poor plant vitality caused by ongoing biomass removal under dry climatic conditions. The lack of significant cultivar effects on grazing value suggests that grazing frequency and timing are more influential management levers than legume type within a mixed sward in shaping animal carrying capacity, although cultivar selection may still enhance specific outcomes like late-season protein or energy supply.

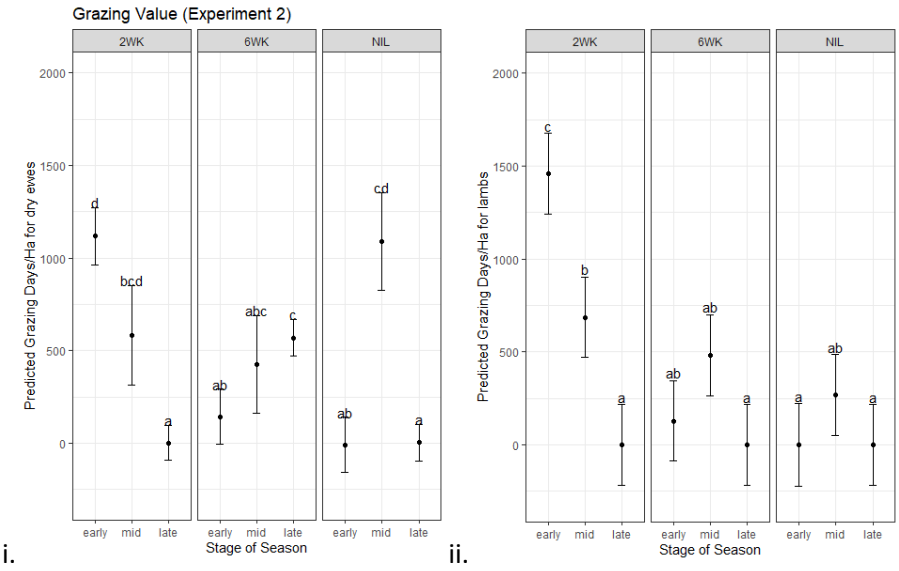


Figure 9: Effect of Stage of Season and Treatment on Grazing Value for 50kg dry sheep (i) and 20kg late maturing lambs (ii). Letters denote statistical significance (P<0.05)

This is due to a complexity in the interaction between season, treatment and cultivar as demonstrated in Figure 9 below. These graphs demonstrate that cultivar and grazing strategy must be adjusted to best fit the need for feed. For example, to maximise feed early in the season, a mixed sward containing medic (SC) or subclover (CA) being grazed constantly at moderate pressure may be best. However if late season feed was required, then a mixed sward containing Balansa clover (VI) or Arrowleaf clover (ZU) may be better.

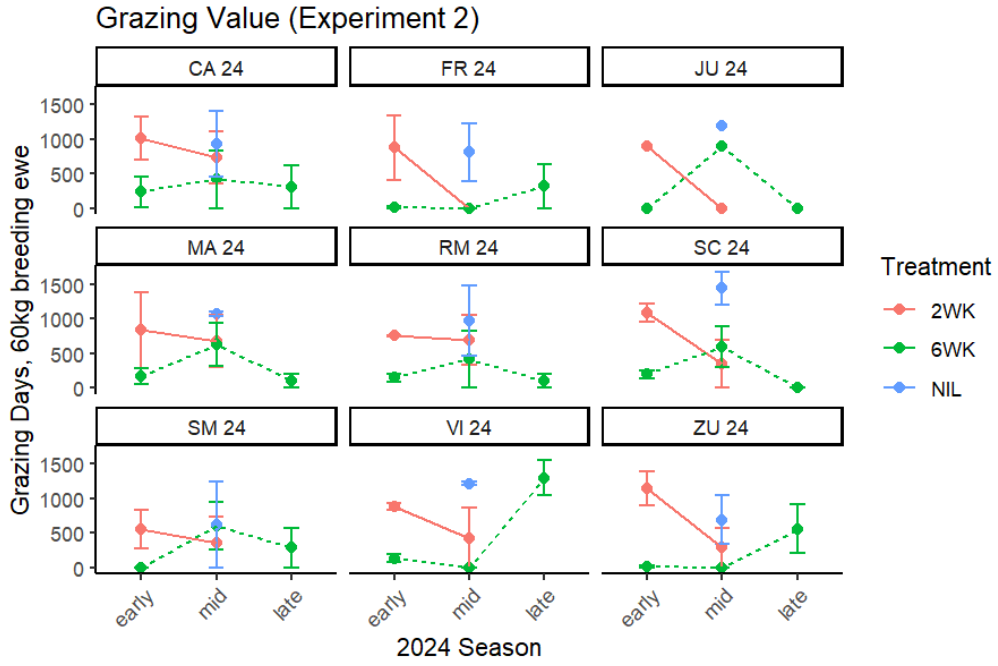


Figure 10: Grazing Value of novel legume cultivars according to stage in the season and defoliation frequency

CONCLUSION

The results from the 2023 and 2024 grazing trials show significant differences in herbage mass and feed quality, driven by varying sward management and rainfall patterns. In 2023,

unusual rainfall during the season altered the pattern of legume growth, while 2024 experienced a more typical pattern of rainfall, though far below average. Despite these differences, both years revealed interactions between cultivar, defoliation frequency, and seasonal timing.

Defoliation & Grazing Management:
Frequent defoliation (2WK) improved early biomass utilization but stressed plants under dry conditions, limiting growth (mid season 2023, late season 2024). Less frequent defoliation (6WK), as in rotational grazing, didn't capture early feed as effectively but allowed for continued growth into November. Late-season rainfall in 2023 supported French Serradellas, which continued to thrive into summer.

Feed Quality:
Metabolizable Energy (ME) was highest early in the season, with Scimitar and Vista performing best. Frequent defoliation boosted ME, especially with 2-week intervals. Crude Protein (CP) was also highest early in the season, dropping mid-season under dry conditions, though frequent defoliation helped maintain protein levels. Fibre content increased as plants matured, but late-season rainfall in 2023 lowered fibre levels, unlike in 2024.

Grazing Value:
Grazing value varied seasonally, with early-season growth offering high-quality feed for weight gain and mid-season supporting more grazing days due to higher biomass. Late-season rainfall in 2023 enhanced grazing value, particularly for French Serradella cultivars. To maximize early-season feed, a mixed sward with medic or subclover, grazed at moderate pressure, performed best, while Balansa or Arrowleaf clover worked better for late-season feed. Overall, the results highlight how grazing strategy and cultivar choice must be adapted to seasonal conditions and specific feed needs, which will vary between farms according to individual producer goals as well as environmental conditions.

The potential for future adoption of these findings is high, particularly through the integration of drought-resistant legume cultivars like Annual Medics, Arrowleaf Clover and French Serradella, which show promise in extending the growing season and filling feed gaps during dry spells. Farmers can utilise tactical grazing to optimize biomass production and feed quality, balancing pasture recovery with livestock nutrition. Further research into the effects of defoliation frequency, grazing timing, and cultivar selection under varying rainfall patterns and soil types will help refine management practices. Additionally, exploring how different legumes respond to climate variability could guide the selection of species best suited for changing conditions.

Educating producers will continue through the upcoming SIF and CIF funded workshops being delivered by the PODS team. This will help consolidate learning from our trials and broader pasture management during what has been a couple of tough seasons. Facilitated discussion will also address key constraints and barriers to implementation. Future research into the long term environmental and economic benefits of these practices, to farm productivity, soil health and biodiversity, could further promote widespread adoption, ensuring sustainable pasture management that benefits both farmers and the environment.

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