



Creating landscape-scale change through drought resilient pasture systems

Challenge on the Monaro

Lucerne is a primary legume grown successfully in pasture systems across the Monaro when soil type allows. Lucerne systems are very productive, particularly in response to summer rainfall, but may not adequately address the need for forage during the winter feed-gap. A rapid production cycle over summer is ideal for a finishing enterprise however it can deplete soil moisture reserves going into a cold winter, thereby impacting pasture growth over our traditional feed-gap period.

The challenge on the Monaro is how to best manage lucerne growth profiles to conserve soil moisture at strategic times of the year i.e. how to select dormancy rated varieties which best suit our enterprise demands while maintaining long-term persistence.

Trial establishment

The key question the trial set out to answer was: What degree of winter dormancy in a lucerne variety best suits the unique climate of the Monaro (very cool winters and significant summer rainfall), to achieve herbage production during key feed gaps that is balanced with long term persistence? In other words, the trial set out to determine which dormancy rating is best suited to use the rainfall in our wetter, summer months and shut down during our drier months.

Data from this demonstration will give producers added confidence when making decisions on species selection in relation to managing soil moisture profiles and balancing summer/winter feed production.



Farm Snapshot

Owners: Andrew and Zoe Rolfe

Location: Nimmitabel, New South Wales

Trial establishment: sown in 2021 by Hugh Graham and the team from S&W Seed Company

Trial duration: June 2022 to June 2024



Table 1: Pastures sown in September 2021

Each plot size approx. 10 m X 1.5 m with 4 replications.

Winter Dormancy Rating	Variety	Sowing Rate (kg/ha)
Winter Dormant (1-3)	Q31	15
Semi-Winter Dormant (4-5)	L56	15
	L56 (bare sown)	15
	Silverland 5	15
Winter Active (6-7)	GTL60*	15
	L71	15
	L70	15
	Silverosa 7	15
	Exp. var #1	15
	SW6330	15
	Exp. var #2	15
	Aurora GS*	15
	Stamina GT6	15
	SARDI 7 Series #2	15
	Exp. var #3	15
Highly Winter Active (8-10)	Silversky 9	15
	SW9720	15

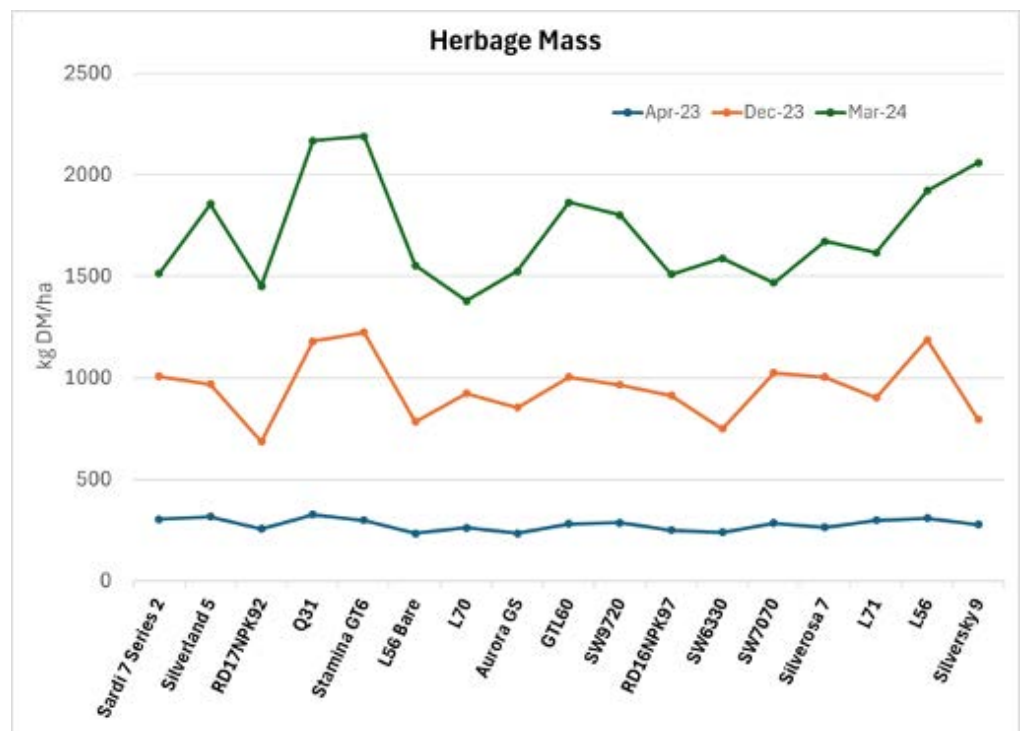
Data collected from 2023–2024:

- Germination scores (collected by S&W Seeds) — Nov 2021
- Herbage Mass (kg DM/ha) — April 2023, Dec 2023, March 2024
- Feed Quality (Digestibility (%), Crude Protein (%), ME (Mj/kgDM), ME Yield (Mj/ha)) — April 2023, Dec 2023, March 2024
- Plant frequency and dormancy assessments — August 2023

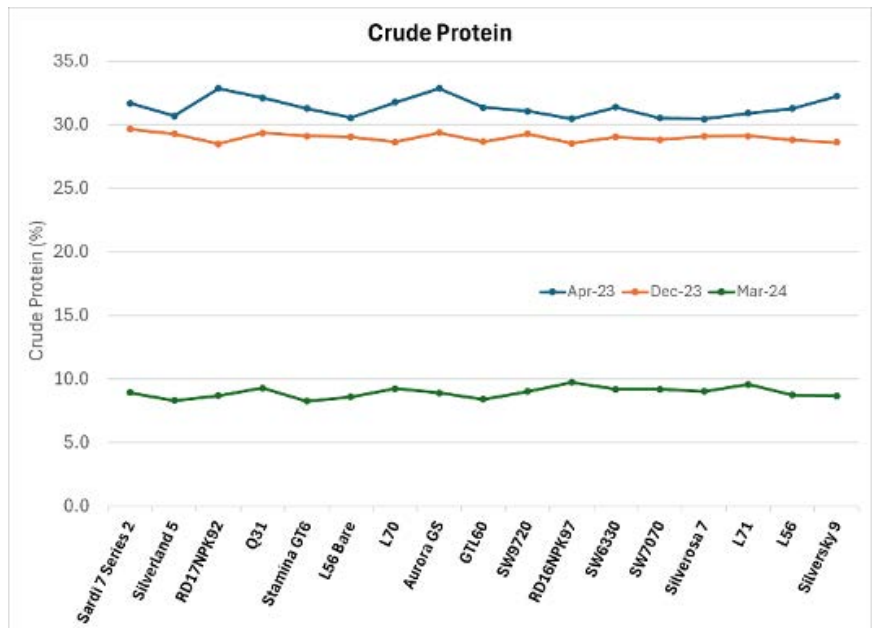
* Benchmark species

Results

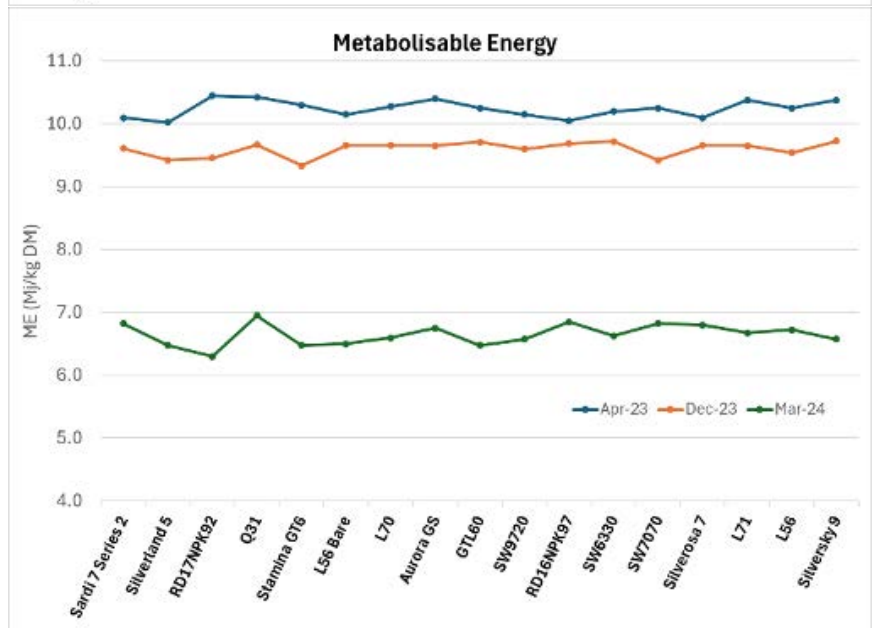
Graph 1: Autumn and Summer Biomass Production



Graph 2: Feed quality results – Crude Protein



Graph 3: Feed quality results – Metabolisable Energy



Graph 4: Feed quality results – Digestibility

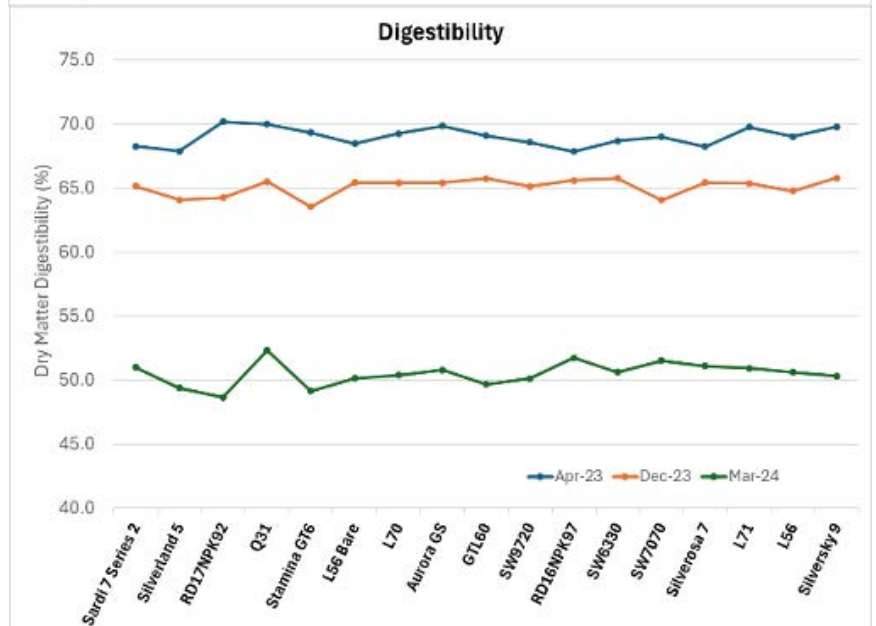




Photo 1: November 2022, Year 2 establishment



Photo 2: April 2023, Doug Alcock pasture cuts

Conclusions and key messages

The period of data collection for this site experienced extreme seasonal variability. 2023 experienced a very dry winter and spring with useable rainfall only being received in November 2023 and the January 2024 summer period. This contributed to challenges in data collection due to lack of biomass at critical dates.

The **biomass production in Graph 1 shows clearly the growth profile of lucerne** with its “wake-up” period in early summer leading into an immediate production response to summer rainfall and its shutdown over the autumn/winter period.

Graph 1 suggests some varietal differences in biomass production are emerging specifically in the early (December) and late summer (March) collection periods.

This type of data could be valuable when considering selection of varieties which will give the greatest production over summer (for a prime lamb enterprise) and shut down/dormancy over winter ie. lowest leaf material, lower growth, therefore less demand on soil moisture reserves.

In terms of **feed quality**, it was interesting to note for this study the highest digestibility, protein and metabolizable energy of lucerne was in the autumn period with the late summer (March 2024) showing the lowest feed quality figures. This pattern was consistent across all varieties and differences between varieties appeared minimal (see feed quality graphs).

It is important to understand the basic phenology behind the “dormancy” characteristic of lucerne which is the partitioning of shoot and root reserves in response to seasonal changes.

During the dormant period the emphasis is on recharging root reserves and grazing management over winter (defoliation) can significantly impact on root traits which has a flow on effect on production yield and persistence.

Varietal selection depends on enterprise relevance i.e. for fodder or livestock production and how you can “manage” lucerne to fit into your production system.

Consideration for fodder production may include:

- manipulation of yields and harvest timings
- maintain genetic variability for pest and disease pressure
- capitalise on different rainfall events over the year
- buffer from frost events.

Consideration for livestock production may include:

- select varieties with new genetics
- if sowing multiple paddocks, choose a different dormancy rating and manage differently to optimise utilization of feed production
- grazing management over winter is key to long-term establishment and production
- consider longer interval recovery periods i.e. longer autumn rest period if transitioning to set stocking in spring
- consider mixed lucerne system or monoculture
- long term production vs short term production, impacts on soil moisture and inputs.

Current research combined with what we would expect is that the varieties with a **dormancy 3 rating will show greater persistence in the longer term** due to their “senescence” over winter and energy diversion into tap root depth and diameter. This places them in a stronger position coming out of winter based on root mass accumulation.

Lucerne varieties with a **dormancy 7 rating are expected to provide a good amount of winter feed** therefore may be a good choice for the Monaro growing season if you are not targeting summer “finishing” pastures.

Varieties with a **dormancy 9 rating are not expected to perform well in the Monaro climate** as growth is stimulated over winter and their biomass can get severely damaged by frosts therefore impacting performance into spring and summer.

For the Monaro climate, lucerne varieties with a dormancy rating of 5 and 6 may provide the best balance in terms of year round overall production.

Ideally, in terms of managing lucerne for persistence, you need to select varieties that invest in root growth over winter rather than foliage. The added advantage is the significantly more spring and summer growth which would suit an enterprise looking to finish lambs or grow out weaners for joining. However the expense to winter growth needs to be taken into consideration.

“A key take-home message is that variety trials give a visual representation of how each dormancy will respond in our climate and provide data on a spread of genetics to see how varieties respond to local environmental challenges like pests and diseases. Trial results are a decision support tool for local growers to help them make decisions on how lucerne may best fit into their production system.”

— Josh Barron, Research Agronomist/Monaro commercial lucerne grower.

Please note

- Comments specifically relating to the trial site are “observations” only as the data was not statistically analysed and any varietal differences can not be confirmed as “statistically significant” at this stage.
- With only 2½ years of data it is too early to make any conclusions on the different persistence characteristics & yield potentials of each variety.
- It is intended that this trial site will be continued to collect and validate this data and the true value of the trial will be realised over the next 3–5 years.



Photo 3 – March 2024, pasture cuts, residual summer production response - low in feed quality (see graphs)

For more information
monarofarmingsystems.com.au



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