COMPARING PASTURE QUALITY AND PERSISTENCE AND LIVEWEIGHT GAINS IN CLOVER AND LUCERNE BASED PASTURES

KEY MESSAGES

- Lucerne is a valuable perennial legume pasture capable of producing high-quality feed for stock from spring to autumn
- Rotationally grazing lucerne-based pastures, to allow a rest period, is important for lucerne persistence and productivity, as well as the productivity of stock grazing it
- To support persistence, lucerne sowing rates and cultivars should be selected to achieve target plant densities and productivity, while also being suited to the region's rainfall, temperature, and type of farming system
- At Savernake, lucerne quality declined from September to January before stabilising between January and March
- Well-managed lucerne pastures are valuable options for improving livestock farmers' drought resilience

BACKGROUND

This project aims to use the latest research on pasture species and management, to promote the use of perennial pastures within farming landscapes and increase resilience in dry seasons.

A species demonstration and grazing demonstration were established at Savernake and Barooga, respectively, in May 2023. These two demonstration sites aimed to showcase best-practice pasture management to build greater resilience for farmers in central and southern New South Wales.

METHOD

Pasture quality, plant frequency, plant species composition and biomass measurements were collected between spring 2023 to autumn 2024 at both sites, to monitor changes in pasture performance and persistence over the first summer of growth.

SAVERNAKE SPECIES DEMONSTRATION SITE

AIM

To demonstrate the impact of lucerne seeding rate and variety on pasture persistence and quality.

METHOD

The paddock was sown in late May 2023, with the treatments listed in Table 1.

Table 1 Savernake species demonstration site treatments.

TREATMENT	PERENNIAL PASTURE SPECIES	CULTIVAR	GROWTH TYPE	SOWING RATE (KG/HA)
Control (Lucerne/ sub clover mix)	Lucerne	SARDI 7s2	Winter active	5
	Brachycalycinum sub clover	Mintaro	Mid-maturing	3
	Yanninicum sub clover	Monti	Early-mid-maturing	3
Treatment 1 (Heavy lucerne rate/sub clover mix)	Lucerne	SARDI 7s2	Winter active	9
	Brachycalycinum sub clover	Mintaro	Mid-maturing	3
	Yanninicum sub clover	Monti	Early-mid-maturing	3
Treatment 2 (Two lucerne cultivars/sub clover mix)	Lucerne	SARDI 7s2	Winter active	2.5
	Lucerne	SARDI Grazer	Winter active, grazing tolerant.	2.5
	Brachycalycinum sub clover	Mintaro	Mid-maturing	3
	Yanninicum sub clover	Monti	Early-mid-maturing	3

Pasture quality samples were collected in mid-late September 2023 as well as mid-January and mid-March 2024. Lucerne and sub clover plant frequency, plant composition and biomass were measured in mid–late September 2023 and mid-March 2024 to measure differences before and after the first summer.

RESULTS AND DISCUSSION

The lucerne and sub clover stands established well across all treatments, with the first grazing event occurring in mid-late January 2024. The eight-month period between sowing and grazing was intended to enable the lucerne to establish an extensive root base to support plant persistence. At the time of the first grazing, the lucerne in the control (lucerne / sub clover mix) appeared shorter and lighter in colour compared to Treatment 1 (heavy lucerne rate / sub clover mix) and Treatment 2 (two lucerne cultivars/ subclover mix).

Average lucerne and sub clover pasture quality was similar in September 2023, as shown by the key feed quality measurements in Table 2. Lucerne quality declined from September to January, as indicated by the increase in neutral detergent fibre (NDF) and decline in crude protein (CP) and metabolisable energy (ME), and then remained relatively stable between January and March. Lucerne quality was consistently similar across all treatments (data not shown).

Table 2 Savernake species demonstration site showing average lucerne and sub clover quality across all treatments.

	NEUTRAL DETERGENT FIBRE (NDF) - NIR	ACID DETERGENT FIBRE (ADF) - NIR	CRUDE PROTEIN (CP) - NIR	DRY MATTER DIGESTIBILITY (DMD) - NIR	CALCULATION OF METABOLISABLE ENERGY (ME) - NIR
	%	%	%	%	MJ/kg DM
Mid September 2023					
Lucerne (Average all treatments)	26.0	17.0	22.3	82.0	12.7
Sub clover (Average all treatments)	28.0	19.0	25.5	82.0	12.3
Mid January 2024					
Lucerne (Average all treatments)	43.0	28.6	12.8	64.1	9.3
Mid March 2024					
Lucerne (Average all treatments)	40.1	28.9	19.1	66.7	9.7

Note: Pasture quality samples analysed on a dry matter basis by near-infrared spectroscopy (NIR).

Lucerne plant density remained stable over the first summer, as shown in Table 3, illustrating good initial pasture persistence. Sub clover is an annual plant which experiences seed dormancy over summer, and as such, density and composition (data not shown) were zero in March 2024.

Table 3 Savernake species demonstration site plant density.

	SEPTEMBER 2023		MARCH 2024	
	Lucerne	**Sub clover**	**Lucerne**	**Sub clover**
Treatment	(plants/m²)			
Control	41	32	43	0
1	50	29	50	0
2	47	37	45	0

In September 2023, lucerne composition was greatest in Treatment 1 (heavy lucerne rate/sub clover mix), and similar between the control (lucerne/sub clover mix and Treatment 2 (two lucerne cultivars/sub clover mix). This was as expected given the heavier lucerne sowing rate in Treatment 1 (data not shown).

Total biomass was similar across all treatments at both measurement times, with the greater biomass recorded in Treatment 2 being attributed to a historic soil disturbance from the digging of a pipe beneath part of the treatment (Figure 1). Across all treatments, total biomass was greater in March than September, despite two short grazing periods in late January and early February.
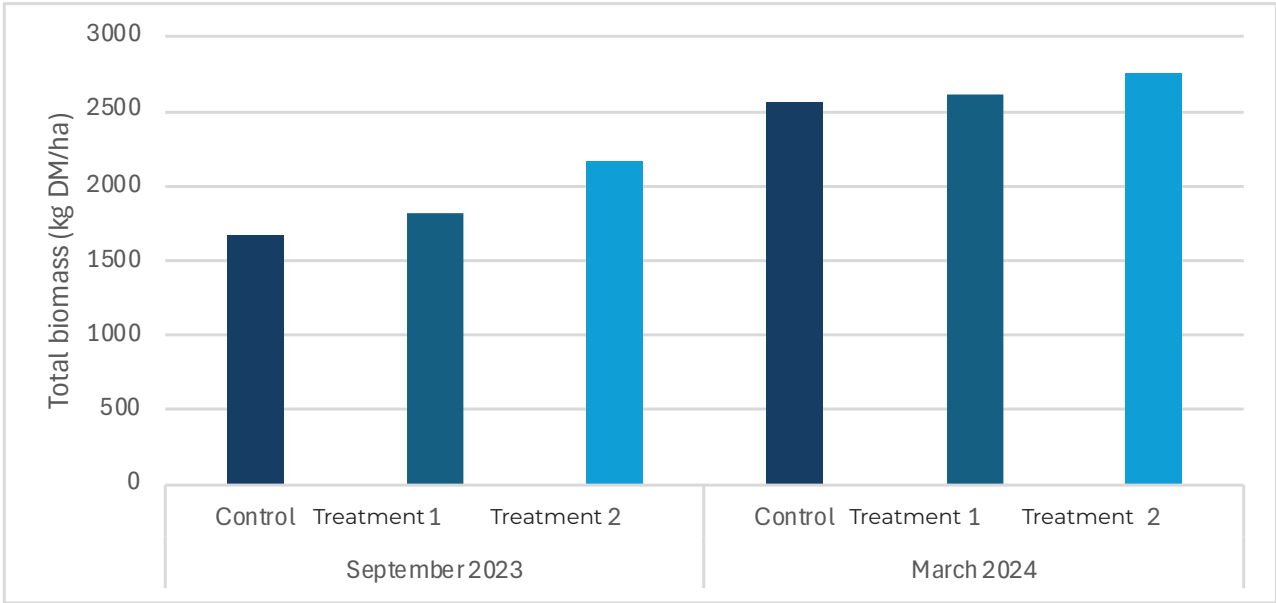
Figure 1 Savernake species demonstration site Total biomass (kg DM/ha).

While little difference was found between the treatments at four and 10 months after establishment, it's recommended that farmers sow the most appropriate species and cultivar at the best sowing rate for the region's rainfall and temperature, and the type of farming system. This is important for maximising pasture production and persistence.

BAROOGA GRAZING DEMONSTRATION SITE

AIM

To demonstrate the benefits of rotationally grazing lucerne for improving pasture persistence, pasture quality and animal production.

METHOD

The site consisted of two 10 hectare dryland paddocks, "A3 West" and "A3 East", which were sown to 9 kg/ha lucerne (cv L70) and 6 kg/ha arrowleaf clover (cv Zulumax) in late May 2023. Two irrigated 20 ha paddocks, "A7 West" and "A7 East", which were sown to lucerne in 2019, were also included as part of the demonstration.

Pasture quality samples were collected on 9 October 2023, 19 January and 14 March 2024. As the A3 West and A3 East paddocks were sown to the same species and treated similarly, quality samples were combined across both paddocks. Lucerne quality samples from both A7 West and A7 East were also combined for measurement. Lucerne and arrowleaf plant density, composition and biomass were collected on 9 and 30 October 2023 (data not shown) and 14 March 2024.

RESULTS

Pasture quality was relatively similar between the A3 lucerne and A3 arrowleaf clover (Table 4). The lucerne quality was also similar between the A3 and A7 paddocks. The volunteer grasses in the A3 paddocks were predominantly annual ryegrass, and had higher NDF and lower CP and ME than the legumes, reflecting their poorer quality.

Table 4 Barooga grazing demonstration site pasture quality.

	NEUTRAL DETERGENT FIBRE (NDF) - NIR	ACID DETERGENT FIBRE (ADF) - NIR	CRUDE PROTEIN (CP) - NIR	DRY MATTER DIGESTIBILITY (DMD) - NIR	CALCULATION OF METABOLISABLE ENERGY (ME) - NIR
	%	%	%	%	MJ/kg DM
Mid-October 2023					
Lucerne - A3	23.2	13.1	22.1	83.9	13.1
Lucerne - A7	23.3	14.7	25.4	85.1	13.1
Arrowleaf clover - A3	27.7	15.4	20.3	79.0	11.8
Grass weeds - A3	41.6	23.3	12.0	80.5	12.0
Mid January 2024					
Lucerne - A3	25.8	18.5	26.8	81.4	12.5
Lucerne - A7	26.5	19.2	25.0	80.4	12.3
Mid March 2024					
Lucerne - A3	45.2	30.9	18.5	67.3	9.7
Lucerne - A7	37.9	27.1	24.1	71.4	10.6

Note: Pasture quality samples analysed on a dry matter basis by near-infrared spectroscopy (NIR).

Lucerne and arrowleaf clover plant density remained stable over the grazing period, indicating appropriate sowing rates and grazing management (Table 5). The only notable decline in lucerne density over the summer occurred in A3 West, where the grass weeds population

had increased by March 2024. Arrowleaf clover plants were not present in the A7 paddocks (not sown), or in March in the A3 paddocks due seed dormancy. As such, arrowleaf clover density (Table 5) and composition were zero at this time (data not shown).

Table 5 Grazing demonstration site: Plant density.

	END OCTOBER 2023		MID MARCH 2024	
	Lucerne	**Arrowleaf clover**	**Lucerne**	**Arrowleaf clover**
	(plants/m2)			
A3 West	56	27	34	0
A3 East	46	30	41	0
A7 West	104	0	90	0
A7 East	98	0	87	0

The lucerne in A7 West and A7 East maintained almost 100% composition across all dates (data not shown). This, combined with the fact that the lucerne in these paddocks was more established and irrigated, likely contributed to its greater biomass at each sampling date (Figure 2). The late-summer dormancy of arrowleaf clover may have contributed to the lower total biomass in A3 West and A3 East during March.

Rotational grazing of all paddocks between October to March attributed to the decline in biomass between measurements (Figure 2). Similar weight gains were achieved for both mobs of wether lambs over the grazing period (data not shown).
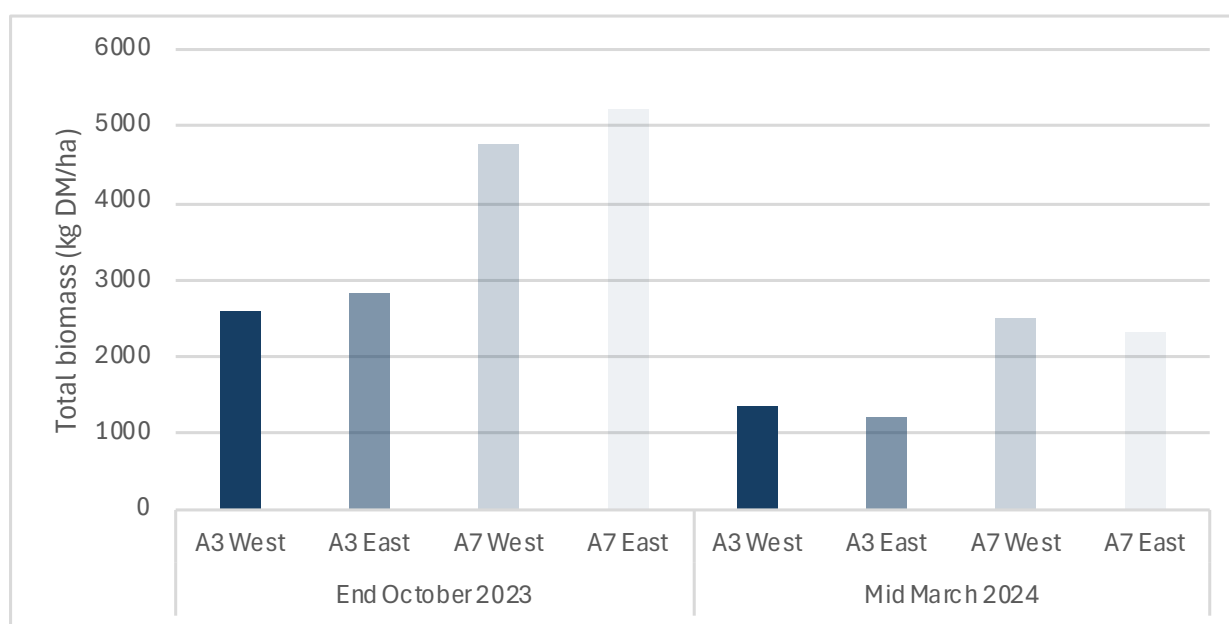

Figure 2 Barooga grazing demonstration site total biomass (kg DM/ha) for each paddock.

SUMMARY

Selecting the best sowing rate, species, and cultivar of pastures for your region and farming system, and rotationally grazing perennial pastures, is important for maximising pasture persistence and production. Lucerne provides a relatively high-quality feed option over summer, with quality being greatest in spring and declining through to autumn. Well managed perennial plants are valuable for extending the growing season and carrying livestock over summer, given their extensive root system and summer activity.

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