

Using 2nd generation annual, hardseeded pasture legumes to 'meat' lamb production targets in southern Australian mixed farming zone

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Overview

Annual regenerating pasture legumes in southern Australian mixed farming (wheat-sheep) zones

Most commonly used species

- **Subterranean clover** (*Trifolium subterranean* L.)
- **Medic spp.** (*Medicago* spp.)

Climatic, edaphic and biological constraints

- Lucerne (*Medicago sativa* L.) – perennial legume



Overview

2nd generation alternative, self-regenerating annual pasture legumes

1. **Arrowleaf clover** (*Trifolium vesiculosum* Savi)
2. **Biserrula** (*Biserrula pelcinus* L.)
3. **Bladder clover** (*Trifolium spumosum* L.)
4. **Gland clover** (*Trifolium glandiferum* Boiss)
5. **French serradella** (*Ornithopus sativus* Brot)



1



2



3



4



5

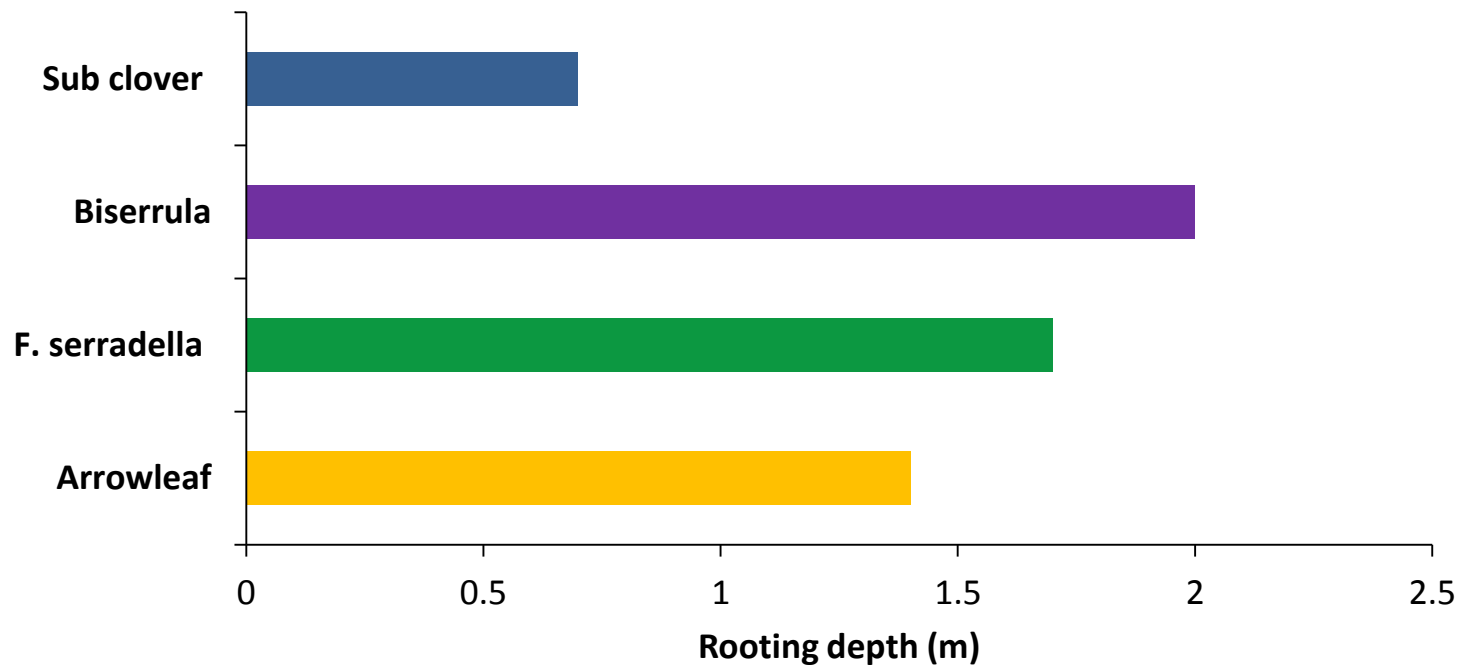
Wide spread adaptation to Australian mixed farming systems
with multi-purpose roles

(ruminant production and provision of N in mixed farming systems)

Overview

2nd generation alternative, self-regenerating annual pasture legumes

- **Deep rooting systems**
 - Ability to remain **green** and **productive** in **very dry conditions**

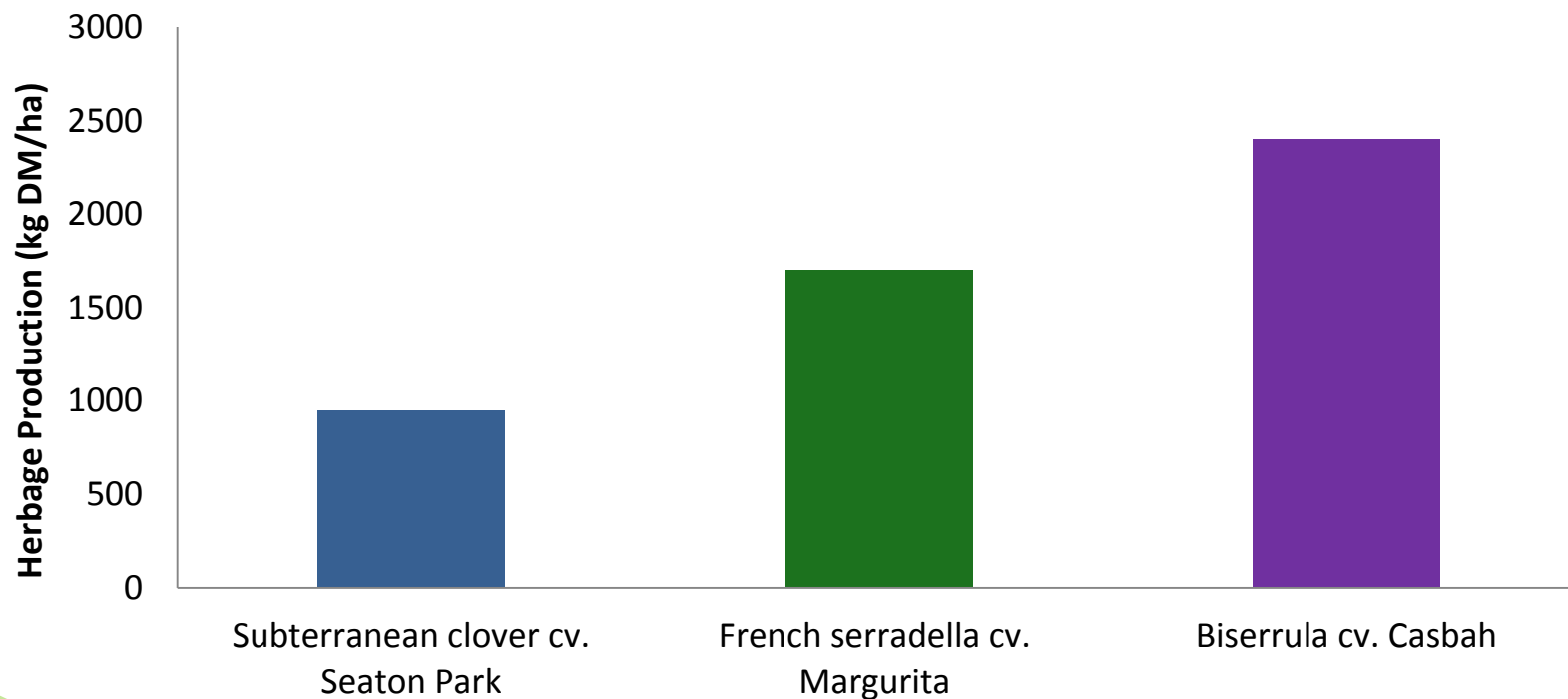


Source: Adapted from Carr et al. 1999

Overview

2nd generation alternative, self-regenerating annual pasture legumes

- High herbage production (kg DM/ha)

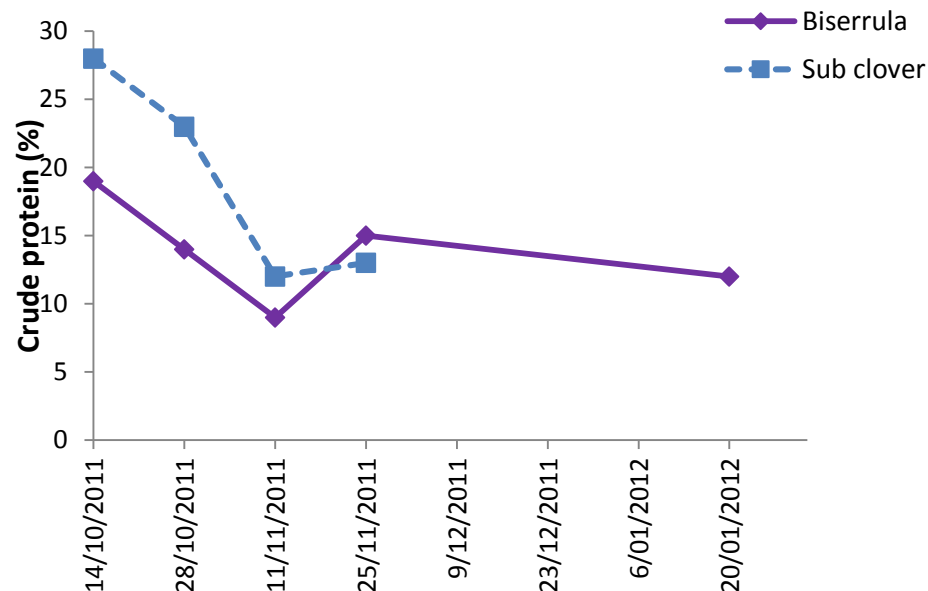
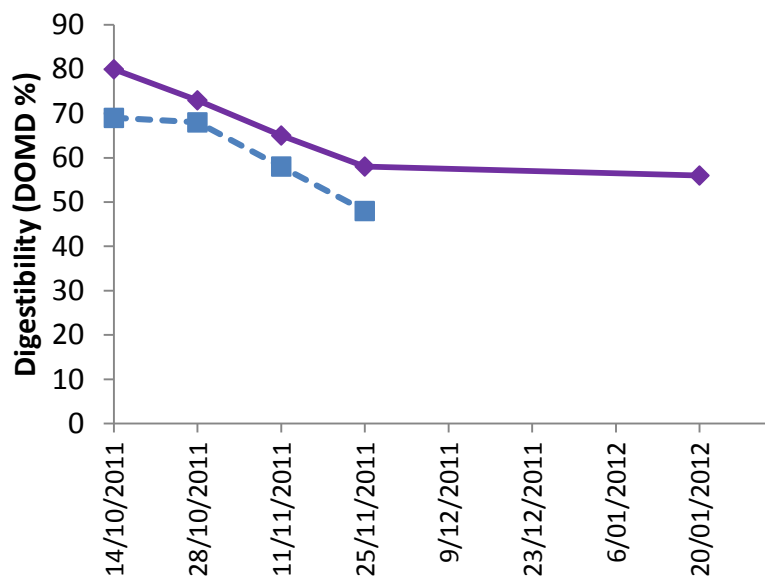


Source: Adapted from Hackney et al. 2013

Overview

2nd generation alternative, self-regenerating annual pasture legumes

- **High/comparable nutritive values to traditional spp.**
 - Ability to maintain nutritional value later into the season

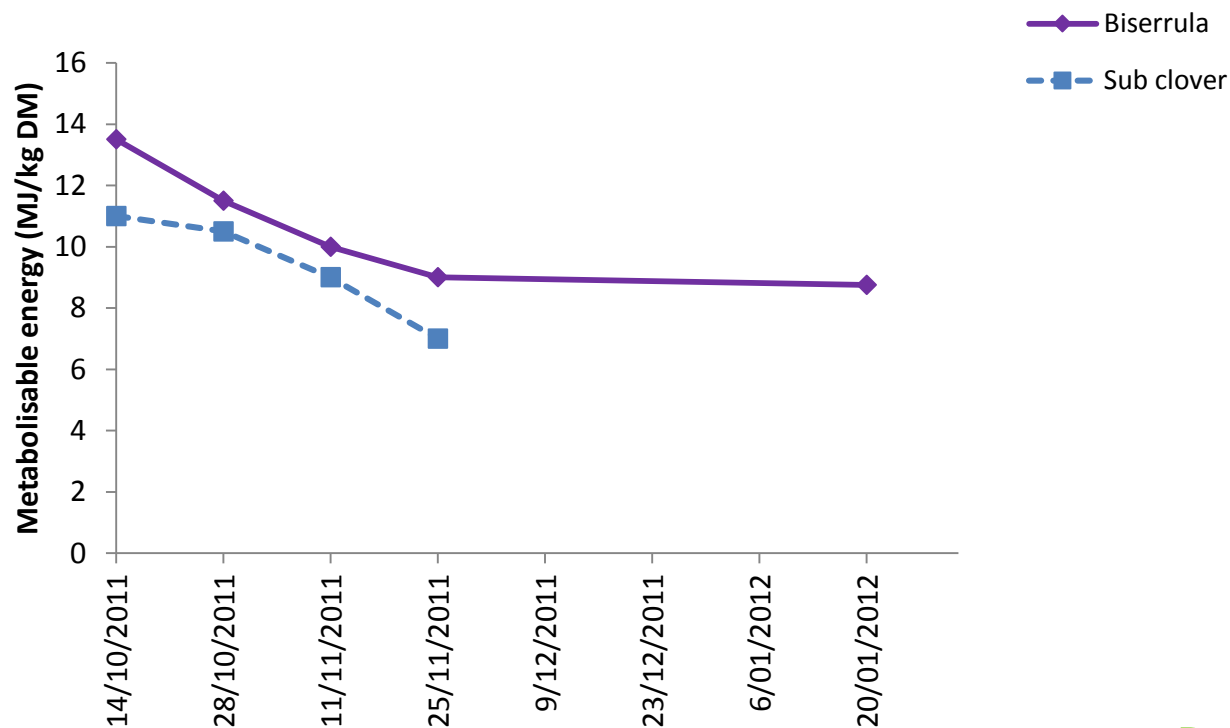


Source: Adapted from Hackney et al. 2012

Overview

2nd generation alternative, self-regenerating annual pasture legumes

- **High/comparable nutritive values to traditional spp.**
 - Ability to maintain nutritional value later into the season



Source: Adapted from Hackney et al. 2012

Overview

2nd generation hard-seeded, self-regenerating annual pasture legumes

- A wide range of agronomic studies undertaken in various regions throughout Australia (e.g. Hackney et al. 2012; 2015)
 - Increased adoption of these species in the 400-650 mm mixed farming zone, principally for use in cropping rotations
- In more recent years, **livestock producers have begun to introduce these species into their pasture mixes as forages for grazing livestock**
- The **expected impact on livestock production**, both as grazed and conserved forages **is largely unknown**



Utilising second generation legumes as conserved forages

Why is it important?

- Utilisation of pasture growth in spring rarely exceeds 30% in this region (Kaiser *et al.*, 2006)
- Feed gaps are common in the **summer, autumn** and often **winter**
- Conservation of excess spring growth would provide an alternative to:
 1. Purchasing supplementary feed
 2. Untimely sale of livestock



Utilising second generation legumes as conserved forages

Merino lambs (9-10 months)

Hay Diets (sourced from Riverina)

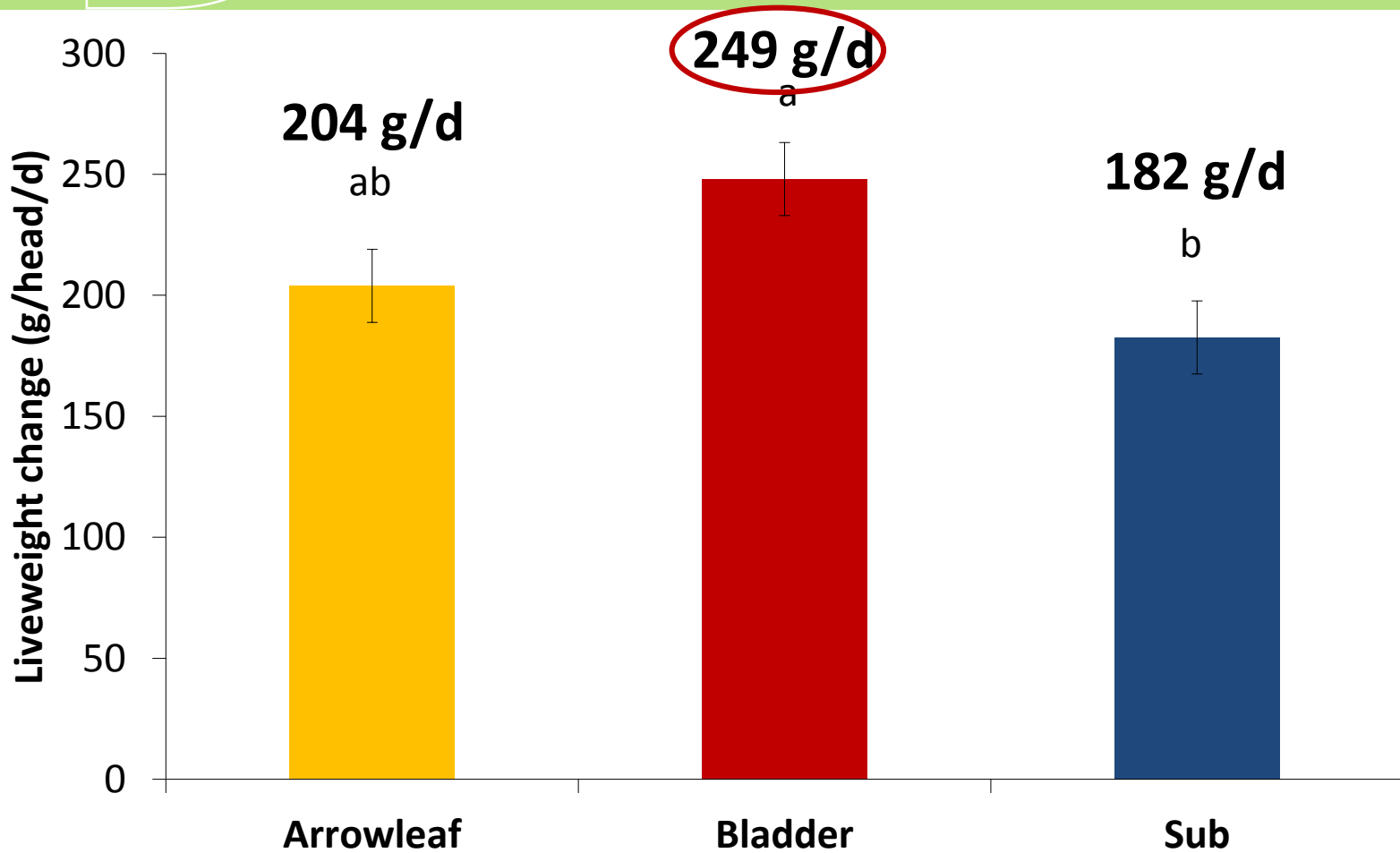
- Arrowleaf clover (cv. Cefalu) → late vegetative (80 cm tall)
- Bladder clover (cv. Bartolo) → 40% flowering (40 cm tall)
- Subterranean clover (cv. Mt Barker) → not assessed

Measurements

- Liveweight gain (g/head/day)
- Dry matter intake
- Organic matter digestibility



Utilising second generation legumes as conserved forages



Utilising second generation legumes as conserved forages

Table 1. Average crude protein (CP), metabolisable energy (ME), *in vivo* organic matter digestibility (OMD) and lamb DMI and LWG of the arrowleaf clover, bladder clover and subterranean clover hays.

	CP (%)	ME (MJ/kg DM)	<i>In vivo</i> OMD (%)	DMI (kg/d)	LWG (g/d)
Arrowleaf Cl.	15.8	9.8	67.6	1.34	204 ^{ab}
Bladder Cl.	20.4	10.3	72.9	1.50	249 ^a
Sub Cl.	15.6	9.0	65.3	1.31	182 ^b

Exploring alternative options for grazable pastures – which legume performs best?

September – November 2015

Merino and XB Lambs

Pastures

- Arrowleaf clover (cv. Arrotas)
- Bladder clover (cv. Bartolo)
- Biserrula (cv. Casbah)
- Lucerne (cv. Sardi)
- Lucerne/phalaris (cv. Advanced AT)



Stocked according to the carrying capacity of the pasture

- Seed set
- Pasture production (biomass)

Exploring alternative options for grazable pastures – which legume performs best?

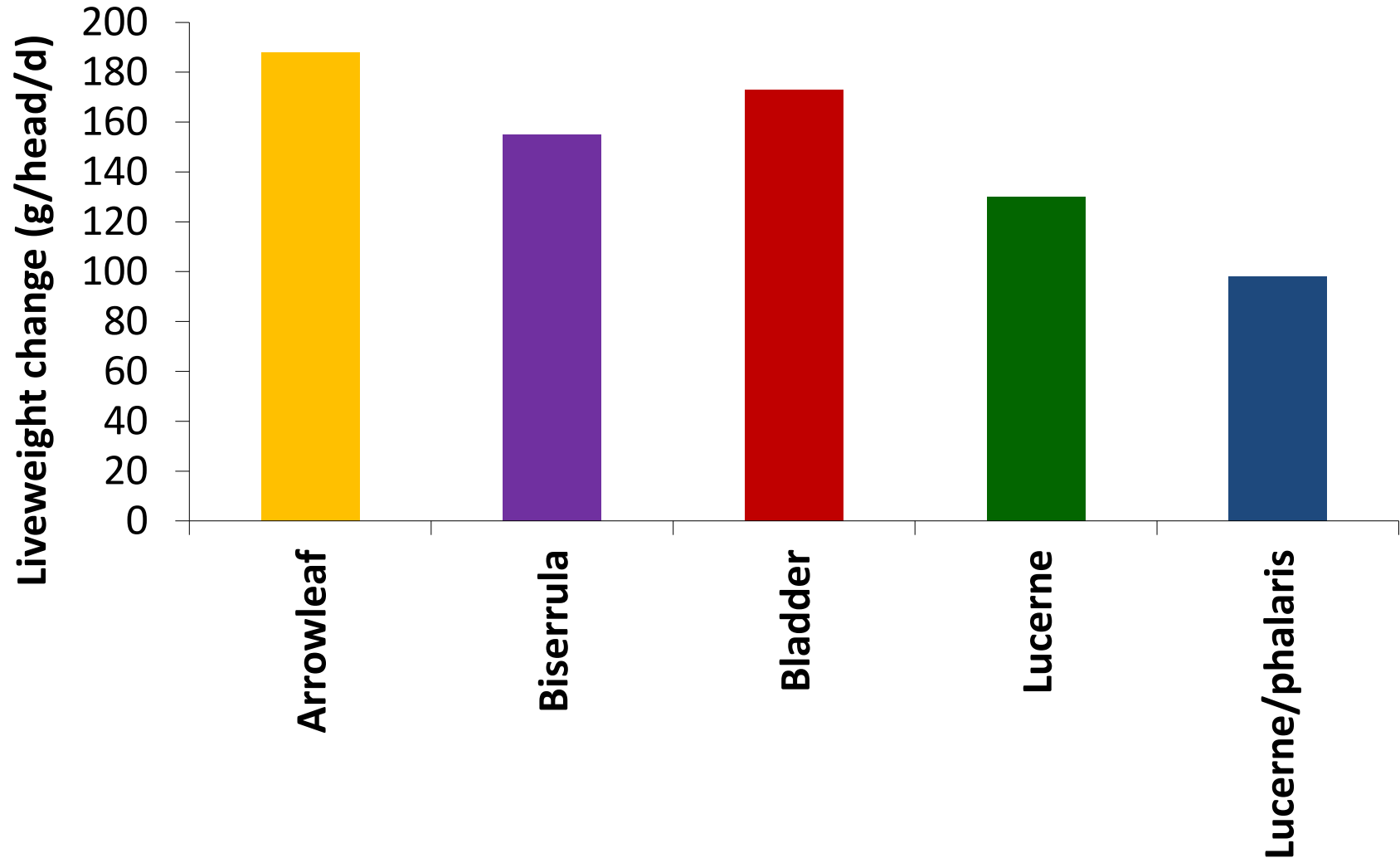
Table 2. Average carrying capacity of the legume and legume-grass pastures throughout the 2015 grazing trial.

	Carrying capacity (sheep/ha)
Arrowleaf	21.5
Biserrula	16.2
Bladder	15.1
Lucerne	27.1
Lucerne-phalaris	31.8

NB. The carrying capacity set was based on feed availability and stage of growth in the annual pasture legumes to manage for seed set and subsequent year regeneration

Exploring alternative options for grazable pastures – which legume performs best?

Spring 2015 (Sept-Nov)



Exploring alternative options for grazable pastures – which legume performs best?

What is the value in \$/ha?

	\$/ha *
Arrowleaf clover	475.34
Biserrula	295.29
Bladder clover	307.21
Lucerne	414.30
Lucerne-phalaris	366.49

*2.80/kg used to calculate value of liveweight gain

Conclusions

- Equivalent or greater potential than traditional pasture species
 - **High liveweight gains** → Lambs of Merino and XB breeds
 - **High nutritive value**
 - **High spring pasture productivity**



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