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Faba beans and lupins as a winter forage option in subtropical dairy systems

M. Bauer[A,B], *K. Ison*[A], *A. Anstis*[A], *J. Gorman*[A] *and D. Barber*[A]

[A]Queensland Department of Agriculture and Fisheries, Gatton, Qld 4343, Australia.
[B]Corresponding author. Email: mark.bauer@daf.qld.gov.au

Forage crops grown for silage in subtropical dairy systems in winter in Australia are predominantly based on forage oats and barley varieties, with legumes often overlooked due to reduced yields and low dry matter content at the time of harvest. However, legumes offer potential agronomic benefits in terms of fixing their own nitrogen and leaving soil nitrogen reserves intact. In addition, they also allow for a crop rotation to be implemented resulting in herbicide breaks and disruption of disease cycles, especially cereal root diseases. These positive attributes often result in improvements in the form of increased yields and gross margins in subsequent crops. Yield increases in wheat crops following a faba bean crop of 1–1.5t/ha and increases in grain protein of 0.7–1% have been observed (Matthews *et al.* 2003). Gross margin analysis of irrigated faba beans grown as a grain crop showed a return of $353/ha compared to an irrigated wheat crop grown under the same conditions at $318/ha (NSW Agriculture Farm Budgets 2002). This improvement in returns does not allow for the nitrogen return and subsequent yield benefit available to the next crop. From a nutritional perspective, legume crops generally offer improved feed quality over cereal crops.

An unreplicated development trial was conducted at the Gatton Research Dairy unit in 2019. Two varieties of faba beans (var. Nasma and Warda) and lupins (var. Bateman and Luxor) were evaluated alongside traditional cereal crops grown under irrigation and harvested for silage (Table 1). Crops were harvested at differing times to reflect the maturity patterns between crop varieties and species, ranging from 103 days to 148 days post planting. Both varieties of faba beans yielded higher than all cereal species except triticale. The Bateman lupins also yielded well compared to the cereals. Forage quality parameters were higher on average for the legumes compared to the cereals, with lower neutral detergent fibre (NDF) and higher crude protein (CP) content. In addition, the legume crops were quicker to reach harvest maturity than the cereal crops, potentially allowing a faster turnaround in a double cropping scenario.

Table 1. Yield (t DM/ha), crude protein (CP; % DM), metabolisable energy (ME; MJ/kg DM), neutral detergent fibre (NDF; % DM) and days to harvest (DTH) of single harvest irrigated forages

Forage	Yield	CP	ME	NDF	DTH
Legumes					
Faba *b*eans (Nasma)	18.4	18.5	10.2	35.3	117
Faba beans (Warda)	18.1	18.5	9.6	37.2	117
Lupins (Bateman)	16.0	14.3	10.1	43.1	134
Lupins (Luxor)	7.7	17.6	10.5	32.5	103
Mean	15.1	17.2	10.1	37.0	118
Cereals					
Triticale (Endeavour)	19.3	13.1	10.1	48.6	148
Cereal Rye (Southern Green)	16.7	9.5	9.0	54.6	148
Wheat (Bennett)	15.7	16.2	9.9	48.6	148
Barley (Shepherd)	11.7	15.6	9.9	42.3	117
Oats (Austin)	8.7	19.7	9.9	47.4	111
Mean	14.4	14.8	9.8	48.3	134

The yield and quality attributes of the faba bean and lupin crops grown in this development trial have shown there is potential to increase both the quantity and quality of winter crops grown on farm. These legume crops add value as a break and rotational crop option, without a loss in yield, confirming their suitability to the winter cropping system. Farmers need to assess where these crops could potentially fit into their cropping program to enhance not only feed quality and quantity but also agronomic practices. Additional research needs to be conducted to evaluate palatability of ensiled crops, optimal fertiliser and planting rates to increase yield and quality as a fodder crop, optimal ensiling times and timing of harvest with regards to maturity and dry matter levels, for example faba beans mature quickly and rapid leaf loss and therefore yield losses are possible.

References

Matthews P *et al.* (2003) 'Faba Bean Agfact.' 2nd edition.
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