

# Diet selection and productivity of cattle grazing *Leucaena leucocephala*–grass pastures in response to seasonal variations in forage quality and availability

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*Leucaena leucocephala* is a tropical leguminous tree that is planted in rows with improved grass species for beef cattle fodder. In central Queensland, leucaena-grass pastures substantially increase beef production and profitability compared with perennial grass pastures as they support higher stocking rates, longer grazing periods, and higher daily cattle liveweight gain due to increased diet quality (Bowen *et al.* 2018). However, there is little data documenting diet selection of cattle grazing leucaena-grass pastures over different seasonal conditions with varying forage availability. The aim of this study was to provide a better understanding of the grazing habit of cattle on leucaena-grass pastures to inform productive and profitable management of leucaena-grass systems.

At four established leucaena-grass pasture sites on commercial beef properties in central Queensland, measurements were made over the years 2011-2014 of forage availability and quality, and diet selected by cattle including the proportion of leucaena. As these were commercial beef properties, this study recorded what happened under existing management. These were not replicated research sites, so no statistical analysis could be conducted.

Cattle diets from leucaena-grass pastures were on average very high quality over the annual cycle with dry matter digestibility (DMD) 59% and crude protein (CP) 12%. On average, edible leucaena (leaf and stems < 5mm diameter) was 64% DMD and 23% CP and comprised ca. 10% of the total edible forage biomass available. Despite only a small amount of leucaena available to cattle, the proportion of leucaena in the diet ranged from 17 to 90% and averaged 51% over the year. When leucaena biomass was not limiting (over 13% of available forage), the proportion of leucaena in the diet was generally highest (above 71%, but as high as 89% at some sites) when grass quality dropped below ca. 8% CP and 53% DMD. A distinct switch in diet selection from mostly grass to mostly leucaena, usually occurred in the mid-late wet season (March-May) and these points are shown in more detail in Table 1. At Site 4, in the period April to May 2013, biomass of leucaena decreased from 747 to 88 kg DM/ha whilst leucaena in the diet remained above 89%, demonstrating targeted selective grazing of leucaena to the point where it was nearly grazed out.

**Table 1. The months of maximum dietary intake of leucaena, and quality and quantity of forage biomass, for cattle grazing leucaena-grass pastures at four different sites monitored over the annual cycle**

	Site 1	Site 2	Site 3	Site 4		
Month	May	May	April	March	April	May
Year	2013	2013	2013	2012	2013	2013
Edible leucaena biomass (kg DM/ha)	218	1,922	769	794	747	88
Grass biomass (kg DM/ha)	1,504	-	5,623	5,289	2,515	2,862
Edible leucaena CP (%)	18.3	20.6	19.6	18.7	18.2	14.9
Edible leucaena DMD (%)	64.5	67.0	59.6	61.2	59.0	57.6
Grass CP (%)	5.8	7.6	5.31	4.4	5.2	5.3
Grass DMD (%)	51.5	51.0	49.5	53.6	32.7	44.2
Leucaena in diet (%)	71.9	81.6	82.7	81.0	89.9	89.6

This study demonstrated how the distinct wet and dry seasons of central Queensland affected the grazing habit of cattle on leucaena-grass pastures. The summer wet season months produced high quality grass with large biomass but quality quickly decreased as the wet season ended; however, leucaena was very high quality all year round. The amount of leucaena cattle selected in their diet was related to the declining quality of available grass and this study identified grass quality of ca. 8% CP and 53% DMD as a threshold for when cattle switch to selecting more high-quality leucaena. These findings demonstrate the importance of managing the grazing of leucaena-grass pastures as a ‘whole system’ as the availability and quality of both grass and leucaena are important in contributing to the large increases in productivity and profitability.

## References

Bowen M, Chudleigh F, Buck S, Hopkins K (2018) *Animal Production Science*. **58**, 332-342.

*Some aspects of this research have been published in Bowen et al. (2018).*