

ILC2018 Poster and Producer paper*

Leucaena in southern Queensland, Australia

Leucaena en el sur de Queensland, Australia

CRAIG ANTONIO

'Borambil', Milmerran, QLD, Australia

Keywords: Animal performance, establishment, fattening, management, tree legumes.

Background

Our 4 properties are located 250 km west of Brisbane and 100 km north of the Queensland-New South Wales border. Soil types range from undulating fertile Brigalow clay soils to infertile sandy forest loams of ironbark, pine and box country. Average annual rainfall is 625 mm, spread between winter and summer with the heavier falls in summer.

Three of the properties are used for breeding Angus cattle, while steer and cull heifer progeny are carried on the remaining property until they reach their respective target weights. Our target markets include feeder steers for feedlots (400–500 kg live weight), cull heifers for slaughter (500 kg live weight) and milk and two tooth cattle (260–280 kg dressed) aimed at either Meat Standards Australia (MSA) Grassfed or Angus grids (depending on price), if the season allows.

Cropping history

Historically this region was composed of small farms for dairying and over time, most landholders diversified into dryland (grain) cropping and small-scale beef production enterprises. As with all farming areas in Australia, with limited and unreliable rainfall plus marginal soil fertility for cropping, continuous cropping has resulted in rundown of soil nutrients. Subsequently, there has been a progressive shift from cropping to beef production on sown pastures with this nutritional rundown. Sown pasture establishment primarily involved tropical grasses as attempts to establish legumes were generally unsuccessful due to poor soils, variable rainfall and unsuitable legume varieties. Sown grass pastures would remain productive for 2–3 years then slowly decline leaving the land devoid of ground cover and susceptible to erosion and weeds.

Trialing leucaena

Our leucaena journey began in 2003. Although many pasture advisors deemed leucaena unsuitable in southern Queensland, due to the impact of cold temperatures and frost on growth and overall profitability, we made the decision to trial the plant. Owing to the favorable elevation (higher) and north-facing slopes on some of our country, we were confident of being able to establish and grow leucaena for 6–7 months of the year. As land prices increased, we decided that improving what we already had was preferable to purchasing more land. The first planting in March 2003 (twin rows at 30 cm apart; 4 m inter-row spacing) was with a broad-acre planter with a narrow point and press wheel following directly behind. Establishment was only partially successful with approximately 2 plants/m of row growing to around 50 cm high by late May, when the first frosts for the year were experienced. Good rainfall (100–150 mm; 95th percentile for that time of year) and mild temperatures (25–35 °C) in late August and early September (late-winter and early spring) provided good growing conditions. The leucaena plants competed successfully with weeds and poor soil fertility and we were surprised how they recovered and finally flourished.

Refining leucaena establishment practice

With the promising performance of leucaena in this initial trial, we decided to continue with further sowings, but sought additional information for refining our establishment techniques. After attending a University of Queensland leucaena course I proceeded to build a planter, which proved to be a bad decision. After a couple of unsuccessful attempted plantings with that planter, we eventually purchased a twin-disc vacuum planter for \$12,000. Acquiring this purpose-built planter

Correspondence: Craig Antonio, 'Borambil', Milmerran, QLD 4357, Australia. Email: craigandlex@bigpond.com

*Poster presented at the International Leucaena Conference, 1–3 November 2018, Brisbane, Queensland, Australia.

coupled with meticulous seedbed preparation and serious post-planting weed control regimes were all key factors in achieving successful leucaena establishment on our properties. Problems with weed control are common and from experience we found that higher application rates of Spinnaker® (Imazethapyr 700 g/kg) are required on lighter soils (160 g/ha) in comparison with clay soils (120 g/ha). Spinnaker® is applied in a single pass pre-planting. Depending on the weeds in a given season, we spray across the leucaena strip (approx. 3 m) and cultivate the remainder (sometimes across the whole paddock; Figure 1). We use Verdict™ (520 g/L haloxyfop) to control grass in leucaena, and, if weed problems persist, we use conventional inter-row tillage. On our property, land that was used previously to grow grain does not require seedbed preparation but intensive cultivation is required on land developed from tree regrowth.



Figure 1. Leucaena rows at Borambil.

Our best recipe for success is September planting (twin rows 1 m apart; at 8 m inter-row centers spacing) with effective weed control and fertilizer application. Seeding rate is a seed every 3 cm, which is the equivalent of 1.4 kg/ha. If soil moisture is adequate and well distributed down the profile and adequate summer rainfall is received, we can graze leucaena in the following March (6 months after sowing). By sowing grass or forage oats for winter feed (Figure 2) in the inter-row space, the leucaena-grass pasture can be in full production by October–November with adequate spring rain (Figure 3).

Good soil fertility is paramount for leucaena establishment and productivity. Fertilizer must be added to our soils as soil phosphorus levels range from 8 to 20 mg/kg (Colwell). Our fertilizer regime focuses on

phosphorus, sulphur and zinc. MAP Starter (22% P, 10% N) is applied pre-planting at 25 kg/ha across the total area, or closer to 100 kg/ha if applied directly under the twin rows of leucaena. We plant a mixture of leucaena varieties, i.e. Cunningham, Wondergraze and Tarramba, with no specific preference, although adjacent to creeks where frosts are more prevalent, Tarramba is well suited. Infestations of psyllids have been a problem on only rare occasions and we do not spray to control psyllids.

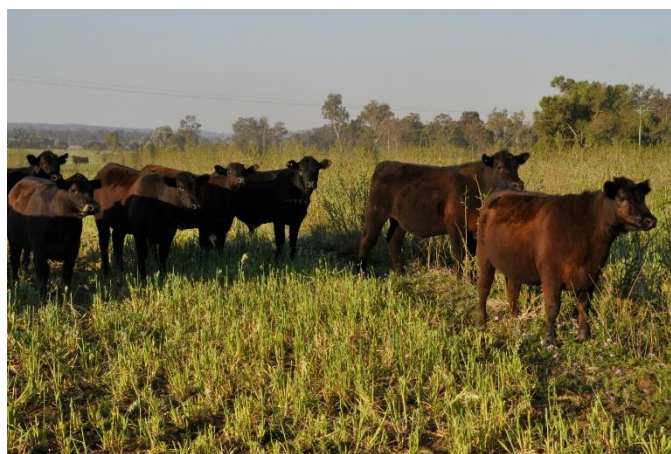


Figure 2. Cattle grazing winter oats.



Figure 3. Leucaena with fully established inter-row pasture.

Paddock and business benefits

As our land use changed we noticed how our country improved. Since soil nutrient rundown had occurred prior to planting leucaena, cattle preferentially grazed the leucaena, leaving grass on areas after the available leucaena had been eaten. We were able to subdivide paddocks into 40–60 ha blocks and to implement

rotational grazing, which maintained good ground cover in each paddock after the edible leucaena had been eaten. This reduced runoff and rates of soil loss, while improving soil organic matter and nutrient status.

Our establishment costs are lower than those for most growers as we own the necessary machinery and our paddocks are already cleared. We have cleared regrowth in some paddocks to plant leucaena, which increased costs. Regrowth control must be thorough prior to planting, as controlling suckers is problematic in established leucaena stands. Depending on variety, leucaena seed can cost \$10–50/kg and, taking into account costs of using our own machinery, we estimate that establishment costs are \$200–250/ha on country previously farmed and greater than \$300/ha on country where regrowth must be cleared first.

Leucaena-grass pastures will increase annual live-weight gains and carrying capacities over those on grass pastures but are profitable only if correct establishment procedures are followed. With occasional planting failures taken into account, establishment lags of 2–3 years are common, which results in significant ‘opportunity costs’ or income foregone.

Our best daily gain results from this leucaena program were 1.6 kg/hd/d (2 month period) averaging out over the summer (7 months) at 1.3 and 1.4 kg/hd/d (heifers and steers, respectively). Gains at this level could have been maintained for longer if the stocking rate was decreased. We focus on kg live weight produced per ha and have achieved up to 250 kg/ha in the best years. Our stocking rates have almost doubled in the leucaena paddocks (to 1 beast/ha). In conventional grass paddocks, the long-term carrying capacity deteriorates over time and there is more longevity in leucaena as it is a perennial legume and reduces grazing pressure in the inter-row pastures. It enables us to look after the grass better due to decreased

time spent grazing in the rotations. The nature of the leucaena taproot has provided a much-needed improvement in our ability to manage drought and target appropriate markets, as well as predict daily weight gains even over long dry spells.

Summary

To date we have established approximately 400 ha of leucaena. Unfortunately efforts to expand leucaena plantings across our fattening block have been hampered by a series of below-average summer rainfall years. Future development plans include expansion of leucaena plantings across both our fattening block (500–600 ha) and breeder country (approx. 1,000 ha). Planting leucaena on the breeder country will increase protein supply and assist with drought mitigation. We propose to use wider row spacings (12 m) on this area. In the future we intend to trial inter-row winter forage cropping (Figure 2) to improve paddock productivity over the winter-spring period and extend production to 12 months of the year.

While there are many challenges with leucaena establishment and productivity in the southern regions of Queensland, the positive outcomes for our business far outweigh the negatives. Once the ‘upfront’ costs are covered, leucaena pasture systems are relatively cost-free (with the exception of fertilizer applications in some circumstances). When we look at the methane emissions reduction potential, carbon sequestration attributes and drought mitigation qualities (which in the future may provide additional income opportunities), as well as increased carrying capacity and profitability, the decision to plant leucaena on our property is not one that I regret and I cannot envisage any change to that situation in the future.

(Accepted 17 December 2018 by the ILC2018 Editorial Panel and the Journal editors; published 3 September 2019)

© 2019



Tropical Grasslands-Forrajés Tropicales is an open-access journal published by *International Center for Tropical Agriculture (CIAT)*, in association with *Chinese Academy of Tropical Agricultural Sciences (CATAS)*. This work is licensed under the Creative Commons Attribution 4.0 International ([CC BY 4.0](https://creativecommons.org/licenses/by/4.0/)) license.