

# CASE STUDY

## WRITTEN & RESEARCHED BY

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## USE OF LEGUME AND HERB BASED PASTURES IN NSW DAIRY FARMS

### BACKGROUND

Most NSW coastal dairy pastures are based on kikuyu or paspalum in rotation with ryegrass over-sown in the autumn. This system produces forage for most months of year, is generally high yielding, retains drought and weed resilience of kikuyu base, rapidly regenerates after dry early summers following mid-summer rain and is generally resistant to, weeds, wet weather and pugging. However the system has weaknesses in that the winter and spring growth is reliant on ryegrass based pastures that need resowing every year, grass based pastures are highly dependent on nitrogen, most grass pastures are shallow rooted and prone to drought, and the kikuyu component produces only moderate summer feed quality.

Attempts were made 10-15 years ago on many farms to replace kikuyu with perennial rye based pastures. Results were generally poor due to a mix of poor persistence, grass weed invasion, poor summer productivity, endophyte issues and poor growth in dry periods. While improvements in perennial ryegrass cultivars and shifts in understanding in paddock preparation and management of these pastures has improved results in recent years, there is value in exploring other perennial or semi-perennial pasture options that may have different growth curves or may have reduced exposure to the risks, costs and green house emission of grass based pastures relying on high levels of nitrogen input for optimal productivity.

Experience with other farmers in NSW and positive, but unmeasured results from similar plantings at "Lemon Grove" prompted the investigators to seek funding under the Federal Government's Caring For Country program to trial, and quantify some an alternative pasture system based on tap rooted herbs and mixed legumes as an alternative to grass based coastal pastures in NSW. it was hypothesised that this system would have a much lower requirement for nitrogen, could have a different growth curve to grass based pastures, may be able to access deeper moisture and nutrient pools via tap root systems, could have excellent pasture quality in warmer months and as such could form part of a pasture portfolio with a number of risk management and productivity benefits.

### MATERIALS AND METHODS

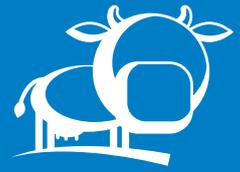
The trial was conducted at Lemon Grove Research Farm, located on the Minnamurra River floodplain just to the east of Jamberoo, NSW. Control and treatment paddocks were identified in December 2010 and soil tests were taken. One paddock was to be identified as the "trial" paddock and was to be prepared for the new pasture, the other "control" paddock was to be farmed as per the rest of the property, retaining its kikuyu base and being sown down to oats and Italian ryegrass in early autumn.

The trial paddock was sprayed with 6L/ha of Roundup Powermax ( 540 g/L glyphosate (present as the potassium salt)) on 17.2.2011. Pasture trash was mown and removed and the trial paddock sown down to 110kg/ha of Cooba oats on the 19.2.2011. A small area was topped up in early April following flooding in March. Grazing of the oats commenced shortly after and continued until the 5th of August when the paddock was sprayed again with 6L/ha of Roundup Powermax on 5.8.2011. The paddock was then direct drilled with a disc seed with the trial seed mix of:

- 8.5kg/ha Stamina GT6 Lucerne
- 4kg/ha Bulldog red clover
- 1.5kg/ha Kopu II white clover
- 1.5kg/ha Will ladino white clover
- 2kg/ha Tonic Plantain
- 2.5kg/ha Puna Chicory



Lynne, Michael and Nicholas Strong Dairy farmers,  
"Clover-Hill" and "Lemongrove" Jamberoo, NSW



The trial paddock was treated with 150ml/ha of Verdict (520g/L haloxyfop present as the haloxyfop-r-methyl ester) selective grass herbicide on the 20.2.2012 to control grass weeds. It was not oversown in the autumn of 2012.

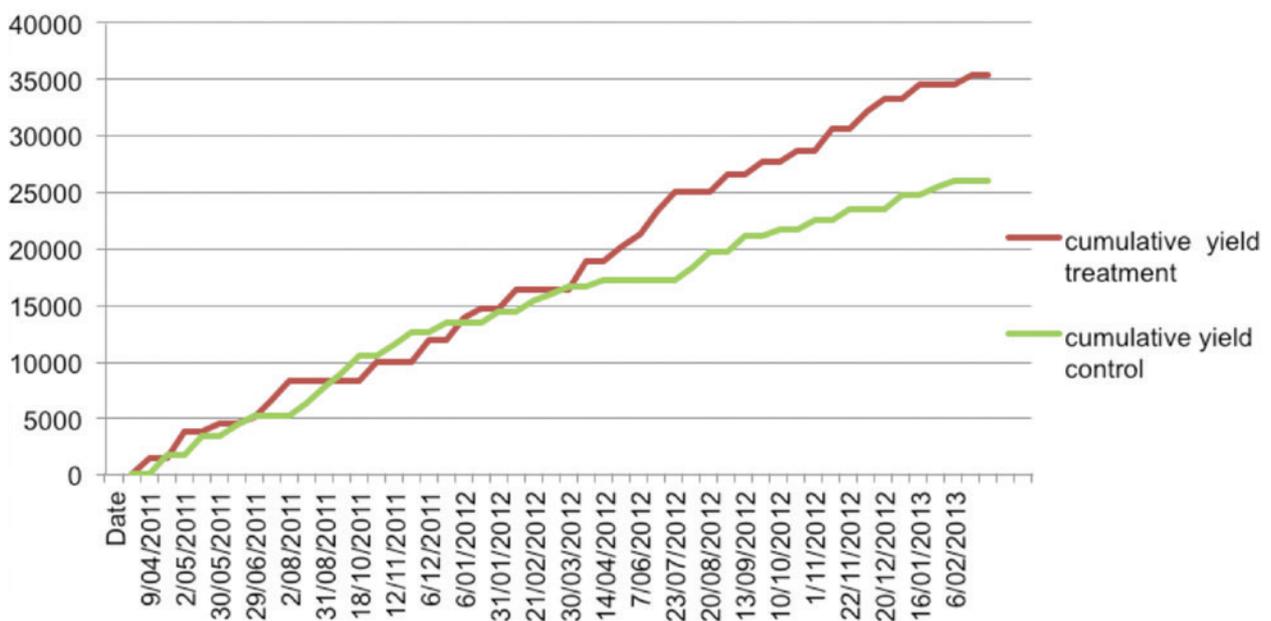
The "control" paddock was sprayed with 200mls/ha of Roundup Power Max on the 1/3/2011 to suppress kikuyu growth and facilitate early planting of a mix of 35kg/ha of Feast II ryegrass and 60kg/ha of Cooba Oats. Grazing commenced 16th April 2011. It was resprayed with 225mls/ha of Roundup Powermax on the 16/4/2012 to suppress kikuyu prior to autumn planting with a similar mix

Fertiliser was applied to both control and trial paddocks as deemed necessary by the farmer. This include urea, some mixed blended fertilisers and an application of liquid dairy effluent. Pastures were grazed only by the dairy herd and no fodder was conserved during the trial on the two plots. Pasture dry matter was estimated pre and post grazing using a C-Dax towable pasture metre and pasture yields determined. Yield data was validated using pasture cuts and estimation of dry matter during the trial. The nutritive value of the trial and control pastures were tested by NIR at Westons Laboratories, NSW.

## RESULTS

Total yield for the first 12 months of trial, including oats, and control pasture was 16413 and 15310 kgs of DM/ha respectively. Total yields in the six months following removal of the oats were 8134 and 6407 kgs DM/ha respectively. Total 2 year yields from trial and control paddocks was 35365 and 25989 kgs of DM/ha respectively. Cumulative yield data is presented in Graph 1.

Graph 1: Two year cumulative yield data: herbs and legumes (Treatment) v's kikuyu and ryegrass (control)



Two-year nitrogen application rates were 289kgs of N for the trial paddock in total and 85kgs of N after the oats and 726kg of N in total and 476kg of N per hectare after the oats in the trail paddock were removed. In the second year of the study, only 30kg per hectare of N was applied to the herb and legume paddock compared to 188kg of N per hectare in the control.



Table 1 Comparative feed quality of herb and legume pasture (treatment) vs spring ryegrass (control test 1) and kikuyu (control test 2)

COMPONENTS:	TREATMENT TEST 1:	CONTROL TEST 1:	TREATMENT TEST 2:	CONTROL TEST 2:
% NDF	30.7	46.3	30.4	51.4
% Crude Protein	32	24.1	33.1	27.5
% Ash	13.33	11.34	11.35	10.41
Lignin % NDF	12.4	3.9	16.8	5.6
% Calcium	1.23	0.58	1.37	0.53
% Phosphorus	0.45	0.42	0.45	0.43
% Magnesium	0.36	0.3	0.36	0.26
% Potassium	3.28	3.13	3.18	3.16
% ADF	23.6	26.3	23.1	26.7
% Lignin	3.8	1.8	5.1	2.9
% NFC	25.2	18.6	27.6	14.4
Relative Feed Value	214	138	217	123
ME (MJ/kg)	11.63	10.8	11.76	10.97
ME CPM (MJ/kg DM)			10.16	8.58

## DISCUSSION

This farm based trial has provided useful evidence of the potential for alternative pasture systems based on legumes and herbs on coastal dairies in NSW. The trial pastures have provided at least as much dry matter in the first year as the conventional system with the yield data in year 2 being substantially higher in the trial paddock. The trial pasture appears to have performed very well in the autumn of its 2nd year and did not suffer a planting lag as per the conventional system. It also appeared to continue growing very well off a one off significant rain event in October 2012 during what was a very dry spring and summer in the region.



Nitrogen inputs were significantly reduced in the trial compared to the conventional plots with potential here to reduce both fertiliser costs as well as nitrous oxide emissions and exposure to volatile nitrogen pricing. Full soil test data is not available at the time of writing.

Feed quality at all times on the trial was excellent with the farmers reporting anecdotal improvements in milk production when grazing trial pastures, particularly between November and March.

Weeds have been troublesome including both broadleaf and summer grass weed invasion in summer of 2012-2013.

These pastures have significant potential for NSW grazing based dairy systems. There has been considerable success with similar systems on the mid north coast and inland areas, however, problems with both stem root nematode and water-logging have been encountered on some properties. Soil characteristics, particularly, potential for poor drainage, underlying weed burdens and regional pasture pathogens need to be carefully considered, when selecting alternative pasture systems as part of a pasture "portfolio". However, there is considerable flexibility within both pasture species and cultivars in the group of pasture species under investigation to further explore these systems on a region by region basis. Farmers and scientific organisations can successfully partner to produce useful field based research.

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