

Milk Production Responses to Oversowing a Portion of Tropical Grass Pasture with Summer Crop Legumes on Sub-tropical Dairy Farms

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Northern Australian dairy farms have a large area of tropical dryland grass pasture available for use as summer pastures. Late summer-autumn in sub-tropical Australia is traditionally a difficult period in which to produce milk because of the decline in both quality and quantity of tropical grasses (Ehrlich *et al.* 1994). Options to improve autumn feed on dairy farms include introducing forage crops and conservation, increasing concentrate feeding and introducing legumes. Perennial tropical legumes have not been successful at this time of year because of their inability to sustain stocking rates above one cow/ha. This experiment, conducted on farms, was designed to test if annual crop legumes could be successfully oversown into tropical grass areas using minimal till methods to measure the subsequent impact on milk production on farms. Previous experiments using annual legumes in plots at Mutdapilly Research Station had demonstrated yields up to 10 t/ha can be achieved using annual tropical legumes with protein levels as high as 20% in the whole legume plant.

An experimental design referred to as BACI (Before/After Control/Impact) was chosen for this study. This method is commonly used to assess the impact of a new development on environmental factors such as beach or stream quality and is further described by Underwood (1993). The methodology has parallels with dairy farms; the unit of interest is a complex biological system where replication is difficult and where a new intervention is to be tested with minimum additional disruption to the units during the research. The experiment was conducted from October 1994 to May 1995. Five coastal farms with average rainfall between 800-1000 mm/annum were used. All were grazing units, using tropical grasses during summer and autumn as their pasture base. The tropical grass species comprised Kikuyu, Setaria and Rhodes grass. Two farms were chosen for intervention and 3 as controls. On each of the 2 intervention farms an area of 16 ha, around 25% of the summer tropical grass area, was heavily grazed in spring, then following rain in December or January sprayed with glyphosphate and minimal till planted with discrete areas of soybeans, cow peas and lablab. Data was collected for an equal period before and after the intervention on all the farms, and the impact assessed as the time by unit interaction between the intervention farms and the control farms. This data was then analysed using analysis of variance. Farms were herd recorded monthly and milk production was monitored for fifteen cows from each herd. These cows calved during September and October 1994. All cows in a farm herd grazed together.

Rainfall in 1994-5 was substantially below average for all farms. Legume crops were grazed daily from early February through to May. Grass pasture yields were relatively low, with an average of 1.7 t DM/ha on offer during autumn. The mean yield of legume crop on offer to cows during autumn was 2.2 t DM/ha. Control farm 1 fed maize silage throughout the experiment, averaging 2.7 kg DM/cow/day (Table 1). All farms fed concentrate with control farms 1 and 3 and impact farms feeding an average of 5 kg/cow/day and control farm 2 feeding 7 kg/cow/day. Control farm 2 had a large hill area of tropical legume and grass based pasture. In 5 of the 6 comparisons there was an increase in milk yield, statistically significant ($P < 0.05$) in 3 cases.

Table 1. The relative change in milk yield during autumn of impact verses control farms (kg/cow/day)

			Significance
Impact farm 1	v. control farm 1	4.3	$P < 0.01$
	v. control farm 2	-1.2	$P < 0.16$
	v. control farm 3	1.2	$P < 0.31$
Impact farm 2	v. control farm 1	5.9	$P < 0.01$
	v. control farm 2	0.5	$P < 0.42$
	v. control farm 3	1.7	$P < 0.03$
Mean effect		2.1	----

Legume forage crops were shown to increase or maintain production on farms where it was introduced and offer a cheap alternative to silage or higher concentrate use. Results from this experiment suggest minimal tillage planting's of legume crops into tropical grass pastures can make a positive contribution to milk yields during autumn.

Ehrlich, W. K., Cowan, R. T., Romano, R. L., Crouch, D. A. and Lowe, K. F. 1994. Management of Rhodes grass (*Chloris gayana* cv. Callide) during autumn. Proc. Aust. Soc. Anim. Prodn. 20: 379.

Underwood, A. J. 1993. The mechanics of spatially replicated sampling programmes to detect environmental impacts in a variable world. Australian Journal of Ecology 18,99-116.

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