

The Effect of Proportion of Amarillo-based Pasture in the Forage System on Milk Production in a Tropical Upland Environment

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Arachis pintoii cv. Amarillo is a useful legume in tropical and subtropical environments for dairying, achieving a 1 L/cow/day milk yield increase over nitrogen fertilised grass in autumn in short term studies (Lowe *et al.* 1994). Little is known of its performance in forage systems. This paper describes an experiment to determine the effect of various proportions of Amarillo-grass mixtures in the forage system.

An experiment was conducted on Kairi Research Station (17° 14'S, 145° 34'E, altitude 700m, average annual rainfall of 1,280 mm) to look at the effect on milk production of replacing 0 to 100% of the standard tropical grass-N pasture with a tropical grass-Amarillo pasture in the summer component of the forage system. These pastures were grazed throughout the year, with winter forage augmented by an irrigated annual ryegrass-N pasture. Overall farmlet stocking rate was 2.5 cow/ha and cows were fed a supplement of 1.8 t of grain-based supplement and 1 t of molasses/cow/annum. For the first 12 months, spring- and autumn-calved cows were used in the farmlet herds with dry cows grazing within the farmlets, but legume deterioration in half the area resulted in a revised system where only freshly-calved milking cows entered the experiment at approximately 6-month intervals at the same SR. Tropical grass was either *Setaria sphacelata* cv. Nandi or *Panicum maximum* cv. Gatton. Fertiliser applied was 300 kg/ha N (tropical grass), 450 kg/ha N (ryegrass) and 250 kg/ha of CK66(S) (N:P:K:S - 13.0:10.6:15.0:4.9) (all pastures).

Table 1. Daily milk yield (L/cow/d) for each treatment in each period of the project

	Percent of summer forage as Amarillo pasture				
	0	25	50	75	100
Period 1 - autumn & spring calving groups	21.2	24.1	21.0	22.7	22.6
Period 2 - autumn calving group	25.0	24.9	22.9	22.4	22.8
Period 3 - spring calving group	20.8	20.5	19.5	20.0	18.8
Period 4 - autumn calving group	24.9	25.6	24.1	23.6	23.6
Period 5 - autumn calving group	20.0	19.5	19.9	19.5	18.6

Milk yield, analysed by GenStat 9 (Payne *et al.* 2007) using a repeated measures analysis that incorporated the weekly milk yield of cows during each period, showed there were no significant differences ($P>0.05$) between treatments (Table 1). Forage yields were higher in the grass-N, than in the Amarillo pastures (Table 2). Grass yields in the both pastures were higher in 2004-05 because of better growing conditions. Amarillo yield, expressed as a percentage, declined in pasture cages over the experimental period. This was thought to be a result of the management system which encouraged grass dominance, rather than from overgrazing. Amarillo loss was not repeated at other sites and suggests that Amarillo may be less well adapted to the lower rainfall Kairi site. The fact that milk production differences were small between the systems suggests that replacing N fertilised pastures with Amarillo has commercial advantages in reducing costs and soil-N build up.

Table 2. Total cut pasture yield (kg DM/ha) from the pasture cages in grass-N and Amarillo pastures

Year	Grass - N	Setaria - Amarillo			
	Total	Total	Grass	Amarillo	% Amarillo
2003-04	15,372	9,428	8,221	1,207	14.7
2004-05	18,173	10,941	9,967	974	13.2
2005-06*	12,692	5,027	4,442	585	12.3

* eight months of data December to July

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Payne, R.W. *et al.* (2007) 'The Guide to GenStat Release 10, Part 2: Statistics.' VSN International Hemel Hempstead.

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