MILK PRODUCTION FROM RUZI GRASS ALONE, RUZI MIXED WITH LEUCAENA AND RUZI SUPPLEMENTED WITH DOLICHOS LABLAB

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ABSTRACT
Three groups of dairy cattle were compared under different grazing managements viz. strip-grazed on pure ruzi grass (*Brachiaria ruziziensis*), strip-grazed on mixed pasture between ruzi and leucaena (*Luecaena luecocephala*) and strip-grazed on pure ruzi and supplemented with lablab (*Lablab purpureus*). The results showed that the animals that received the legumes through supplementary or mixed with the grass produced higher in daily milk yield (13.63 and 13.26 kg/cow) and fat percentage (4.7 and 4.5) than that of the pure grass alone (12.00 kg/cow for milk yield and 4.2 % for fat). This advantage was due to the greater crude protein levels compared with that of pure grass alone. It is concluded that growing tree legumes with grass or sowing of pure herbaceous legumes can be recommended as dairy cattle pasture in Thailand.

KEYWORDS
Milk production, *Leucaena leucocephala, Lablab purpureus, Brachiaria ruziziensis*

INTRODUCTION
Grass/legume pastures are not widely used to reduce the cost of milk production in Thailand due to the difficulty of maintaining legumes in mixtures with grasses. In order to overcome this a problem, use of tree legumes such as leucaena (*Leucaena leucocephala*) instead of herbaceous legumes is of real practical significance. Sowing of pure legume in a small area and using for special purposes has also been recommended by Wongsuwan and Watkin (1990). Therefore, this paper reported a grazing trial in which milk production from ruzi grass (*Brachiaria ruziziensis*) mixed with Leucaena and ruzi supplemented with (*Lablab purpureus*) were compared to ruzi grass alone.

MATERIALS AND METHODS
The experiment was conducted at the Dairy Farming Promotion Organisation of Thailand, located at Muaklek, Saraburi, 150 km northeast of Bangkok. The soil is a clay loam of moderate fertility with pH 6.5. Twenty-four European crossbred cows in their first to third lactation and in their first and second months of lactation period were selected. They were balanced for these factors and also the previous milk yield across the three treatments viz.:

1. 8 cows strip-grazed on pure ruzi grass alone for 24 hours daily, apart from twice-daily milking.
2. 8 cows strip-grazed on improved pasture of ruzi grass mixed with *Leucaen leucocephala* for 24 hours daily as in group 1.
3. 8 cows strip-grazed on pure ruzi grass during 1.00 pm - 5.00 am and strip-grazed on pure lablab during 5.00 am - 1.00 pm.

Pastures were fertilized with 200 kg/ha of N:P:K (15:15:15) compound fertilizer before the start of the experiment. The experimental area was subdivided into 6 paddocks ranging in area from 0.64-0.96 ha. Two paddocks were used for each treatment. Rotational grazing was adopted, with an average grazing interval of 25-30 days. Pasture were grazed down to 15-25 cm above ground. All cows were also fed with concentrate (14% CP) according to their individual milk production, at the rate of 1 kg per 3 kg of milk per day. Pasture production and chemical compositions were measured before grazing. The experiment was carried out for 14 weeks commencing on June 7th and terminating on September 13th 1995. A pre-experimental period of 1 week was allowed for the animals to adjust to procedure.

RESULTS
Animal Production. The pattern of daily Fat Corrected Milk production over 13 weeks was presented in Fig. I. The results showed highly significant differences between the treatments. Animals grazing ruzi and supplemented with lablab achieved the highest average daily milk yield of 13.6 kg/cow when compared to 13.2 and 12.0 kg/cow in the mixed and pure grass pasture, respectively. In addition the animals grazing mixed pasture were also superior to the pure ruzi grass treatment without the legume supplement. Milk production from the supplemented and mixed pasture treatments remained relatively high during the first 10 weeks of the experimental period compared with the pure grass alone. Thereafter all the treatments declined. Milk fat percentage showed a noticeable increase in the legume added treatments (2&3) compared with the ruzi grass only treatment (1). The Ruzi/Lablab treatment also appeared to be slightly superior to the Ruzi/Leucaena treatment in this regard (Table 1). The average milk fat percentage were 4.7, 4.5 and 4.2 % in the supplemented, mixed with leucaena and pure ruzi grass treatments, respectively.

Pasture Production and Protein Content. During the first cycle of grazing, all pasture treatments had 35-50 days regrowth (Table 2) but in the second or third grazing cycles the grazing interval was reduced to 25-30 days. As a result, the amount of pasture on offer was greater in the first cycle but with a lower crude protein content, compared with the lower pasture yield but much higher protein content in the later grazing cycles. However, the supplemented treatment was still noticeably superior in dry matter on offer than the rest. All legume yields in the mixed and supplemented treatments declined following the second and the third cycles of grazing, but maintained a consistently high crude protein percentage compared to that of the ruzi grass.

DISCUSSION
The results of this experiment indicate the significant importance of high quality forage for animal production. The animals receiving the legumes through supplementation or mixed with the grass showed higher milk yield and fat levels than that of the pure grass alone. This advantage was possibly due to the higher crude protein levels compared with pure grass as reported by Stobbs (1975).

The results of this study also showed that sowing of pure legumes and feeding daily by grazing or cutting in order to provide the cow with high protein forage can be achieved without difficulty. This supplementary system also allows the farmer to add more urea and other fertilizer to the pure grass without any problem of suppression of the legume which commonly occurs in mixed grass/legume pastures (Whiteman 1980). As a result, the supplementary system can achieve higher milk yield and fat percentage than the mixed grass/legume system. However, the use of a tree legume, such as leucaena, is of particular interest as it can better withstand grazing pressure and compete well with the grass. From observations there appeared to be no death of Leucaena plants as compared with the severe death of Hamata plants reported by Wongsuwan and Watkin (1990). All treatments declined in milk yield especially under the legume

treatments during the last three weeks of the experiment, due probably to the reduction in legume yield and hence forage quality of the legume-based treatments and due to the commencement of the reproductive phase in the grass only treatment. The animals may have also reaced the physiological stage of mid lactation period (Bryant and Trigg, 1982).

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Table 1
Effect of pasture management on milk fat percentage

	Weeks													Mean
	1	2	3	4	5	6	7	8	9	10	11	12	13	
Treatment 1	3.41	3.22	3.53	3.52	4.31	4.50	4.58	4.92	4.70	4.74	4.59	4.30	4.34	4.21
Treatment 2	3.71	3.84	3.31	4.19	4.39	5.08	5.25	5.25	5.20	5.00	4.70	4.42	4.56	4.53
Treatment 3	4.62	4.04	3.76	4.13	4.08	5.03	5.10	5.42	5.44	5.22	4.97	4.61	4.86	4.71

Treatment 1 Ruzi grass alone
Treatment 2 Ruzi mixed with Leucaena
Treatment 3 Ruzi supplemented with Lablab

Table 2
Pasture on offer before grazing or each cycle and their protein content (kg/ha)

Treatment	Cycle	Pasture Components						Total
		Ruzi		Guinea		Legume		
		DM	%CP	DM	%CP	DM	%CP	
Treatment 1	Cycle 1	2652	6.4	406	6.3	-	-	2968
	Cycle 2	2188	12.1	275	13.4	-	-	2463
	Cycle 3	1800	12.7	206	13.6	-	-	2000
Treatment 2	Cycle 1	1650	5.9	180	6.3	688	25.6	2518
	Cycle 2	1028	12.3	120	13.1	356	26.1	1504
	Cycle 3	964	11.4	136	12.3	174	26.8	1274
Treatment 3	Cycle 1	1396	6.3	1684	5.9	875	23.4	4955
	Cycle 2	936	13.1	1240	12.3	1484	24.1	3660
	Cycle 3	801	12.7	1136	13.1	750	25.6	2673

Remark

Treatment 1: Ruzi grass alone
Treatment 2: Ruzi mixed with Leucaena
Treatment 3: Ruzi supplemented with Lablab

Figure 1
Milk production over 13 weeks at 4% fat.