EFFECTS OF CUTTING HEIGHT ON YIELD AND QUALITY OF FIVE NAPIER CULTIVARS

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ABSTRACT
Results of this experiment revealed that dry matter yield of five Napier grass species increased with higher stubble and that a delay in closing date had produced a negative effect on regrowth for the following season, especially, when low cutting height had been imposed. The nitrogen and phosphorus percentage in leaf and stem materials were not affected by cutting height. Potassium percentage and NDF% were lower for herbage with 0 cm cutting height compared to 30 cm cutting. Among the different cutting intensities, 20 cm and 30 cm cutting height can be recommended through the growing season.

KEYWORDS
Napier grass, Cutting height, Elephant grass, *Pennisetum purpureum*, Fodder quality

INTRODUCTION
Most dairy cattle in Thailand are raised by smallholder farms using cut-and-carry systems. In order to optimize production, correct cutting management must be implemented, since it affects the regrowth of herbage. The present study was conducted in order to examine the influence of different cutting heights on herbage yield and quality of five different cultivars of Napier grass (*Pennisetum purpureum)*.

MATERIALS AND METHODS
The experiment was conducted at the University farm, located at Packchong, Nakorn Rachasima, 200 km northeast of Bangkok. The soil is a sandy loam of moderate fertility with pH 6.5. Experimental design was split plot design with three replications. Main plots consisted of five Napier grass cultivars i.e. Common napier, Merkeron, Dwarf napier, Taiwan A25 and Tangashima and sub plots consisted of four different cutting heights i.e. 0 cm, 10 cm, 20 cm and 30 cm. The Napier grasses were grown in rectangular plots of 3x5 m^2. Planting take place on 16th of November, 1993 in rows 50 cm apart with 50 cm spacing within rows. The cutting treatments commenced on 30th March 1994 and were carried out at monthly intervals throughout 1994-1995. However, the data were collected for all cuttings in 1994 and only three cuts in 1995. After the last cutting on 10th November, 1995 each subplot was divided into two parts. The first part was cut again on 15th January, 1996 with no measurements of DM yield. The statistical design was then changed into a split-split-plot design, still with five Napier grass cultivars as mainplots and four cutting heights as subplots. The two sub-sub plots being added were two closing dates, i.e. 10 November, 1995 and 15 January, 1996. From each plot, yield was measured in the form of dry matter per unit area, and composition of dry matter was subdivided into leaves and stems. Basal fertilizers were applied at the rate of 300 kg/ha (15-15-15) before the start of the experiment and again in the early growing season in 1996. Nitrogen was applied every three months at the rate of 60 kg N/ha.

RESULTS AND DISCUSSION
Results of this experiment showed that there was no effect of cutting height on total dry matter yield in the first year (1994). However a significant effect of cuttings was found in the second year. Severe and repeated cutting of napier grasses was found to reduced the yield greatly. Even when cutting was imposed at 10 cm. above ground levels, the yields were still reduced. This result is in contrust to the yields obtained with 20 and 30 cm cutting height which were similar and relatively higher than the close cuttings (0 and 10 cm). The beneficial effects of lax cutting of the pasture were related to the greater size and levels of residual plant variables following cutting, such as residual leaf area, the number of growing points and the amount of stubble reserves (Ward and Blaser, 1961 and Harris, 1978). The significant effect of higher stubble on dry matter yield of all cultivars derived both from an increase in stem yield and leaf yield.

Of the two closing dates, 10th November 1995 gave the best regrowth when cut with 0, 10 and 20 cm stubble, while 30 cm cutting height differed little between the two closing dates in terms of regrowth after the long dry period (Table 1). These results demonstrated that lax cutting of the pasture at the end of the rainy season is of major importance in maintaining higher forage production even if the pasture was cut late in the dry season (15th January 1996).

There were no differences in yields among napier cultivars. However, Tangashima tended to produce the highest dry matter yield compared to common napier, Merkeron, Dwarf napier and Taiwan A25 which showed similarity in yields (Table 1). The cutting intensity had little effect on nitrogen and phosphorus in the leaf and the stem. Most important was a lower NDF and potassium when cut at 0 cm compared to 30 cm (Table 2).

REFERENCES
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Table 1
Cumulative herbage yield of herbage dry matter (ton/ha) in 1994 and of August 21, September 25 and November 10, 1995.

	Cutting intensity				
Cultivars	0 cm	10 cm	20 cm	30 cm	Mean
First Year 1994					
Common napier	22.07	21.08	20.63	23.38	21.79
Merkeron	18.68	17.65	18.14	19.79	18.57
Dwarf napier	16.63	18.29	16.68	15.65	16.81
Taiwah A25	16.71	20.54	17.21	20.31	18.69
Tangashima	18.01	21.51	22.40	21.00	20.73
Mean	18.42	19.81	19.00	20.02	
Second year 1995					
Common napier	8.560	8.139	13.335	10.163	9.299ab
Merkeron	8.006	6.738	9.503	11.410	8.914ab
Dwarf napier	6.959	9.678	9.778	10.430	9.211ab
Taiwan A25	5.930	9.269	8.741	9.178	8.280b
Tangashima	6.807	11.028	11.215	11.621	10.168a
Mean	7.252[c]	8.970[b]	9.914[ab]	10.560[a]	
10 Nov 1995 1)	3.828	4.010	4.331	4.166	4.084
15 Jan 1996 1)	3.179	3.278	3.421	4.346	3.556
Mean	3.503	3.644	3.876	4.256	

1) Closing date of the pasture, harvesting on May 10, 1996.

Table 2
Average chemical compositions analyzed from dried plant material from 21 August, 25 September and 10 November, 1995

Cultivars	Plant part	Cutting height	% Nitrogen	% Phosphor	% Potassium	NDF %
	Leaf	0 cm	1.87	0.42	1.54	65.9
Common napier		30 cm	1.81	0.38	1.70	67.4
	Stem	0 cm	0.90	0.40	1.66	70.9
		30 cm	1.01	0.40	1.75	72.7
	Leaf	0 cm	2.29	0.38	1.60	66.1
Merkeron		30 cm	2.25	0.29	2.24	67.0
	Stem	0 cm	1.43	0.37	1.75	67.6
		30 cm	1.55	0.34	2.47	71.0
	Leaf	0 cm	2.25	0.35	1.59	64.9
Dwarf napier		30 cm	2.01	0.34	1.87	65.0
	Stem	0 cm	1.32	0.43	2.11	68.7
		30 cm	1.08	0.42	2.30	68.0
	Leaf	0 cm	2.04	0.35	1.79	66.0
Taiwan A25		30 cm	1.90	0.33	2.11	65.8
	Stem	0 cm	1.15	0.47	2.33	66.7
		30 cm	1.17	0.38	2.53	68.8
	Leaf	0 cm	2.08	0.38	1.76	66.5
Tangashima		30 cm	1.88	0.36	1.58	67.9
	Stem	0 cm	1.14	0.51	2.34	69.4
		30 cm	1.15	0.46	2.04	69.7