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THE STATUS OF FORAGE UTILIZATION AND VIABILITY OF HOMEPLOTS FOR DAIRY COWS IN JASIN MILK COLLECTING CENTRE (MCC) SCHEME

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ABSTRACT

A 4 week study on the status of forage utilization and viability of homeplots for dairy cow was conducted on 3 above average farmers in Jasin area, 2 with 30 animals practising free grazing and one with 5 animals under "cut and carry" system. The animals under free grazing had an average grazing time of 5 hours on native pasture in oil palm estate with 8.1 kg DM intake from grazing and a total DM intake of 12 - 13 kg/an/day with 2 - 3 kg of concentrate supplementation, while "cut and carry" system had a total DM intake of 12 kg/an/day with 4.1 kg of concentrate supplementation. The animals under free grazing had an average of 7.0 and 8.8 kg of milk/an/day respectively while that of "cut and carry" 7.9 kg/an/day. There was no significant difference in milk yield under both systems. The forage offered under free grazing had 9 - 10% crude protein with 37 - 38% ADF while that of "cut and carry" 7.3% crude protein and 41.2% ADF. Thus it was found that native pasture given in sufficient quantity with concentrate supplement can maintain good milk production.

In free grazing system native pasture under 5 year oil palm was able to carry 1.7 an/ha with 5 - 6 hours of grazing per day and no over grazing was evident. Under "cut and carry" it could maintain 2.5 an/ha. An area of 0.67 ha/an is recommended as optimum stocking rate for native pasture in Jasin area.

It was also found that the homeplot scheme was not very successful with farmers as a result of many constraints including limited availability of land and ready availability of native pasture from estates. But it is feasible to plant pasture grass as intercrop in immature rubber and even in mature coconut plantations besides utilizing idle land for homeplot development. But all these need more detailed study for a longer duration.

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1. INTRODUCTION

In Malaysia it has been realised that pasture, its availability management and utilization has been found to pose a serious limitation on a steady growth of cattle industry (Mustapha,1978). With regards to this problem much studies on pasture utilization and its effect on production have been carried out on large scale cattle enterprises with established pasture and management systems. Little is known of small dairy farmers such as those involved in Veterinary Division's Milk Collecting Centre projects, which account for 90% of the dairy cattle population in the country. The Government's set target to reach a 20% self sufficiency in milk by year 1990 requires a considerable increase in the number of dairy animals from the current cattle population of 624,000 (1976) to approximately 1,000,000 heads by year 1990 (Osman Din, 1978).

This considerable increase in the cattle population particularly among the small dairy farmers warrants a more efficient utilization of available cheap source of animal feed in the form of native pasture grasses found under immature rubber and oil palm estates and at the road side areas. The need for improved pasture and fodder becomes necessary as the native pasture available may not be able to meet the increased demand for forages. Hence a programme to introduce and to plant grasses and legumes more extensively has to be undertaken if the level of nutrition of the animals and the milk production is to be maintained.

This paper presents the study on forage utilization under free grazing and "cut and carry" system in relation to milk yield and the viability of homeplot scheme as a mean for more intensive small holder dairy farming where more heads of cattle can be raised by each farmer.

2. LITERATURE REVIEW

The first limitation in the tropics which is the main cause of low animal production from cattle grazing tropical pasture is a low intake of digestible energy (Holder, 1967; Hamilton et. al. 1970). Evans (1977) further adds that a low intake of digestible energy is the main cause of low milk production from cows grazing tropical pasture. Stobbs (1977) reported that milk production per cow at low grazing pressure was in the region of 8-10 kg daily in contrast to about 16 kg daily from temperate pasture. Furthermore, it has been reported that lactating cows have a very much higher nutrient requirement than beef cattle, whereby nutrient required for 1 kg liveweight gain per day is equal to the amount required for 8-9 kg milk per day. This basic principle is observed in a poor productivity of dairy cows on a sole tropical pasture diet and relatively satisfactory performance of beef cattle on these pastures. Voluntary intake is positively corelated with digestibility. Minson and McLeod (1970) stated that tropical grasses are on the average 13% less digestible than the temperate grasses.

High level of indigestible fibre reduces daily intake of feed and consequently animal production.

Studies on grazing behaviour and the effect of sward structure on intake (Stobbs, 1974/1975) have shown that intake is controlled by the amount of material that animal can prehend when grazing. The rate of grazing is controlled by the number of bites per unit time and the quantity ingested per bite, when pasture yields are low, animals have difficulty in obtaining sufficiently large bites to achieve maximum intake of herbage. Stobbs (1974/1975) estimated that the critical level for 400 kg animal to get adequate dry matter intake was 0.30 g organic matter per bite. Cattle grazing a Stemmy pasture or one with low leaf density ingested less than this figure and could not satisfy their requirement.

Forages, if available in quantity and quality can fulfill almost all the nutrient requirements of the dairy animal for any given function (growth/maturity, fertility or milk production). While this may be true and practical in the temperate region, tropical countries like Malaysia imposes some severe limitations towards achieving high levels of production from foraging alone. There is ample evidence that animal production from native pasture in many different environment is limited by the quantity of herbage produced and its nutritive value (Mustapha, 1978). A characteristic of this pasture is rapid growth after rain during which nutritive

value may be quite adequate and there after a rapid decrease in nutritive values with increasing maturity of the plant and a decline in digestibility, protein and mineral content which may be enhanced by desiccation or leaching of nutrients (Dougall, 1960; Bredon and Horrel, 1962; Driver, 1963; Hagger, 1970).

It is sometimes stated that the increased maintenance energy requirement (20 - 25% increase) for grazing compared to stall feeding lead to less energy being available for productive purposes and that stall feeding will give greater animal production. However, this is rarely the case principally because of low nutritive value of fodder where it restricts the animal's opportunity for selection of its diet under stall feeding. An animal is also capable of delivering energy from body reserve and considerable quantities of energy can be obtained from catabolism of body tissue (Stobbs and Brett, 1974).

3. MATERIALS AND METHODS

A 4 week study was conducted in the region of Air Molek, Jasin, Malacca. This is a village with about 13 farmers under the Milk Collecting Centre Scheme having a total of 215 dairy animals all grazing permanently in a nearly 5 year old oil palm estate for the past 3 years. The owner of the estate does not object the cattle being grazed in his land. The oil palm estate has an area of 128 hectares and is covered with mixed native pasture.

Three cooperative, above average farmers were chosen for the study. Two farmers under free grazing had 30 animals - 16 lactating and one farmer with 5 animals - 3 lactating under "zero" grazing. Most of the animals were Friesian-Shaiwal crosses and weighed about 350 - 400 kg. But there were Friesian crosses of unknown genetical base.

1. Dry matter intake

The grazing time of the animals under free grazing was determined and the cut grass given per day under both systems were determined by the difference between the amount offered and rejected. In both systems, the amount of concentrate offered and the milk yield per animal per day was measured and recorded throughout the one week trial with each farmer.

2. Stocking density

The amount of native pasture available in that region was estimated by dry matter yield per quadrat (0.25 sq. m) and multiplying with the area under pasture. This was done in various places - grazing area, cutting area and road side native pasture. The Botanical Composition and Dry Matter yield of natural pasture at 21 day cutting interval was determined. The stock carrying capacity of natural pasture at grazing, grazing with cut grass and cut grass only; was estimated based on stocking rate being practised in that region for grazing, dry matter yield of pasture,

dry matter intake of animal and the area of land required to supply 2.7 kg dry matter of cut grass per animal per day (0.08 Ha).

3. Homeplot yield

The dry matter yield of improved homeplot pasture (Napier) was determined at 21 day cutting interval where cow dung was used as fertilizer. This was carried out on 2 farmers; one with 0.16 Ha of homeplot in rubber clearing and the other with 0.16 Ha of homeplot idle land behind cattle shed.

4. Chemical composition

Samples of offered forages, concentrate, samples from grazing area, cutting area and homeplot were analysed for their chemical compositions i.e. dry matter, ash, crude protein, modified acid detergent fibre and in-vitro digestibility trial.

An interview was also conducted with 20 farmers in other region to determine average grazing time, response to homeplot scheme and common places of forage collection.

4. RESULT

4.1 Dry Matter Intake

Table 1. Average Dry Matter intake (Kg)/Lactating cow/day and Average Milk Yield/cow/day

	Free Grazing		"Zero" Grazing
	Farmer A	Farmer B	Farmer C
No. of Lactating Animals	9	7	3
Grazing time (hr)	5 ± 1	5 ± 1	-
DM intake from grazing (Kg)	8.1[1]	8.1[1]	-
Cut grass (Kg)	2.7 ± 1.1	1.1 ± 0.3	7.9 ± 0.54
Total Concentrate (Kg)	2.4	3.0	4.1
Total DM intake (Kg)	13.2	12.2	12.0
Av. Milk/cow/day (Kg)	7.0 ± 0.5	8.8 ± 1.6	7.9 ± 0.9

[1] - Nor Azman (1982)

As indicated in Table 1 the average grazing time is about 5 hours per day for farmers in Air Molek area and slightly lower (4 hrs) in other parts as indicated by the survey. The amount of cut grass given under free grazing varies considerably between farmers from no cut grass at all to about 4 Kg DM/day per animal. The amount of concentrate given is also variable but all farmers do give concentrates of one form or another (Commercial, linseed-cake, ricebran or rice water). It is not given according to

milk yield thus dry cows get equal amounts as well as lactating ones except for linseed cake which the farmers believe to be very nutritious and given only to lactating cows.

In the "cut and carry" system, the animals are under restricted feeding with an average dry matter forage intake of 7.9 Kg/day. The animals are fed at regular intervals 8.00 a.m., 3.00 p.m., 7.00 p.m. and 11.00 p.m. But under ad lib feeding (for 2 days) the animals were able to consume up to 12.4 kg dry matter of forage per day. The farmers in this study are quite knowledgeable and increase their concentrate level when there is higher milk yield from the animal, based on 2:1 milk, concentrate ratio.

Table 2 shows the average dry matter intake of dry cow per day.

Table 2. Average DM intake (Kg)/Dry Cow/day

	Free grazing		"Zero" grazing
	Farmer A	Farmer B	Farmer C
No. of Dry Animals	9		2
Grazing time (hr)	5 ± 1	5 ± 1	-
DM intake from grazing (Kg)	8.1[1]	8.1[1]	
Cut grass (Kg)	-	1.1 ± 0.3	7.9 ± 0.5
Total concentrate (kg)	1.0	2.5	1.4
Total DM intake (Kg)	9.1	11.7	9.3

[1]Nor Azman (1982)

4.2 Stocking Rate

Table 3 shows the stocking rate (An/Ha) under native pasture as practised by the farmers. The native pasture under this oil palm estate consists of 86% native grasses predominantly Paspalum conjugatum, Ottechloa nodosa, Axonopus compressus and 14% legumes mainly Pueraria phaseodoides and Centrosema pubescens.

Table 3. Stocking Rate (An/Ha) under native pasture in oil palm estate as practised by farmers.

Total area (Ha)	128
Total no. of grazing Animals	215
Stocking Rate (An/Ha)	

Table 4 shows the dry matter yield of native pasture at 21 day cutting interval. This is the value of one cutting in November (rainy season)

Table 4. DM yield of native pasture (kg) at 21 day cutting interval.

	DM yield/Quadrat (g)	DM/HA (Kg)	Estimated DM yield/HA/yr. (Kg)
Grazing Area (oil palm estate)	10.5 ± 2.1	420	7,300
Forage cutting Area (Rubber estate)	16.7 ± 5.9	668	11,610.0
Road side pasture	14.6 ± 6.2	584	10,150
Average DM yield for native pasture	14.0 ± 3.1	557.3 ± 126.1	9,687 ± 2192

Table 5 shows the dry matter of native pasture available in grazing and forage cutting area.

Table 5. DM of Native pasture available in grazing and forage cutting areas

	Av. DM/Quad. (g)	DM available (Kg/Ha)	Forage allowan (DM per animal (Kg)
Grazing Area oil palm estate (AIR MOLEK)	9.56 ± 11.8	3,824.0	2249.4
Forage cutting Area (3 yr Rubber)	112.8 ± 12.7	4,512.0	1804.8
Grazing Area oil palm (Air Merbau)	67.1 ± 38.4	2,684.0	1578.8

Table 6 shows the carrying capacity of Native pasture under different management system.

Table 6 Carrying Capacity (size of Area/An)

	Group I	Group II	Group III
Grazing	0.59	0.59	-
Cutting	-	0.08	+0.40
Total Area/An.	0.59	0.67	0.40
Stocking rate/An/Ha	1.7	1.5	2.5

+Based on 7.9 Kg DM intake/An./Day (Table 1) and 7300 Kg DM yield/Ha/yr (Table 4)

Group I - grazing only

Group II - grazing + cutting

Group III - Cutting only

4.3 Homeplot Scheme

Table 7. DM yield of Homeplot Napier grass at 21 day cutting interval with cow dung as the fertilizer.

		DM yield/Quadrat	DM/Ha (Kg)	Estimated DM/Ha/yr
Homeplot I Back yard	12.2 ± 1	68.5 ± 5.5	2740	47,623.8
Homeplot II (Rubber clearing)	11.5 ± 0.5	41.5 ± 2.5	1660	28,852
Av. DM from Homeplot	11.8 - 0.8	55 ± 19.1	2200 ± 763.7	38,237.7

Table 7 shows the dry matter yield of Homeplot Napier grass at 21 day cutting interval with cow dung as the fertilizer. The species of grasses commonly planted under these schemes are:

1) Napier (Pennisetum purpureum)

2) Guinea (Panicum maximum)

3) Para grass (Brachiaria mutica)

Cultivation of tree legume as fodder is also being practised and under this scheme Lencaena leucocephala, a legume tree fodder is being cultivated for the provision of high protein leaf fodder feed and as 'live' fence posts when fully grown.

5. DISCUSSION AND RECOMMENDATION

The average milk production of 7.0 Kg and 8.8 Kg per animal per day under free grazing and 7.9 Kg under 'zero' grazing (Table 1) is much higher compared to the average value from Milk Collecting Centre (MCC) which is only 5.5 Kg per animal per day. The production level obtained is only slightly lower than the value of 9.1 Kg obtained for Friesian crosses by MARDI Workers (Sivarajasingam and Kassim, 1974). However the average value in this study gives no allowance for animals in different stages of lactation as such the result has to be interpreted coutiously.

The total dry matter intake under free grazing is between 12.0 - 13.0 Kg/An/day which is only slightly higher than that of 'zero' grazing but the quality of forage obtained by free grazing

animals were much superior (Appendix 1b) as can be seen from the crude protein value of 10.3% and 38% ADF compared to cut and carry system which had only 7.3% crude protein and 41.2% ADF. The higher energy requirement for the free grazing system can be compensated by superior forage of higher feeding value obtained through greater selectivity from more young leafy forage. The presence of 14% legume in the pasture also contributes to the improved feeding value of the pasture. In the "zero" grazing system the animal requires less energy for maintenance and the higher concentrate supplement of 4.1 Kg/An/day compensates for the low nutritive value forage given which has high stem and dry material component as a result of cutting very close to the ground. Hence the animals in both management system are able to perform equally well in terms of milk production and maintain a good body condition. It has to be noted that to maintain 5 animals under the cut and carry system, the farmer has to spend more than 3 hours per day on cutting grass alone and have a seven day working week as the animals need to be fed every day regardless of rain or shine. As a result it is not favoured by farmers as only one out of 13 practice "cut and carry" system. The same farmer would be able to manage about 10 animals with the same amount of work and earn a better income like the other farmers as there is no significant difference in production level. With free grazing alone and a 4 Kg of concentrate supplement, it would be possible

to maintain the present production level even without cut grass supplement - a big relieve in terms of labour requirement. The commercial concentrate which is being offered presently is of inferior quality as seen from low crude protein value of 13.2% and 30.0% ADF. Rice bran and linseed cake being used are much superior in nutritive value (Appendix 1b).

The stocking rate practised as shown in Table 3 is slightly higher than what could be expected of native pasture under oil palm. This could be partly due to the presence of 14% legume (Appendix 1d) which fixes nitrogen and the absence of animals from pasture for most part of the day (about 18 hours) where less trampling and fouling of forage occurs thus a better yield. The average dry matter yield of native pasture/Ha/yr was found to be around 9,687 Kg (Table 4) which is comparable to values obtained by other workers. The value obtained based on one cutting during rainy season could be misleading as distribution of forage throughout season is of vital importance. During dry spells farmers could make good use of the padi straw abundantly available from padi fields about 8 Km away and at the same time increase the level of concentrate during this time. Forage allowance of 2249 Kg DM/An (Table 5) in the grazing area indicates the pasture is not overgrazed although overgrazing is observed around the area towards the road as more farmers let their animals in the same place for convenience sake. This is more of management problem

and the farmers ought to let their animals deeper into the oil palm estate and rest the overgrazed areas. High forage allowance per animal in cutting and other neighbouring grazing area suggest that there is plenty of native forage available as animal feed in that region.

In terms of animal production higher stocking rate (Table 6) could be obtained under the cut and carry system of 2.5 An/Ha but the greater requirement for labour and higher fertilizing needed to maintain that stocking rate make it a more vulnerable system compared to grazing or grazing with cutting system which still gives fairly good stocking rate for native pasture. A 0.67 Ha of native pasture could be taken as a guide for determining the stock carrying capacity to maintain optimum level of production in Jasin area.

Increasing the cattle population in Air Molek (region of study) would result in overgrazing of the pasture in the oil palm estate. Therefore we need to look for other neighbouring places for grazing and start homeplot scheme to get more fodder as non of the farmers have homeplots. The farmers need to be taught the importance of homeplot scheme if they wish to sustain a profitable dairy production on the long run.

Under the homeplot scheme it is possible to acquire large amount of fodder from improved pasture species like Napier fertilized with farm effluent (Table 7). The estimated value of DM/Ha/yr

based on one cutting during rainy season is not very accurate. Nevertheless it indicates that large amount of good quality fodder with 14.5% crude protein and 30.0% ADF can be obtained at door step through homeplot scheme. So far the MCC has developed 9.1 hectares (22.5 acres) of homeplot involving 11% of the farmers in the area with an average 0.16 hectare (0.4 acre) of homeplot per farmer, mostly planted with Napier and Guinea. There are also others who have planted Lencaena tree legume crop as hedgerows around the homeplot and also around the cattle shed.

There is no doubt about the improvement it can bring in terms of animal production but it was not possible to rectify this based on production as farmers under this study were doing well even without homeplot. Nevertheless homeplot scheme could be the only answer when the cattle population in the region increases beyond the carrying capacity of the native pasture available in the region.

The farmers with homeplot studied had about 0.16 Ha ($\frac{1}{4}$ acre) of Napier with 10 leucaena trees. First farmer feeds his animals with this homeplot pasture when they are about 4 weeks old especially on rainy days when not possible to go for grass cutting. The other farmer is able to maintain 1 matured crossbred bull solely on about 0.16 hectare ($\frac{1}{4}$ acre) of Napier.

Though the MCC provides subsidy for homeplot development by providing ploughing facilities, fencing material, fertilizer and seed, the scheme is still not popular among the farmers due to many constraints. The major constraint is the limited availability of land which is currently rated around $50,000/Ha and the opportunity cost involved is too high therefore farmers prefer to grow cash crops which give greater return. More than 70% of the farmers do not possess land of their own especially those in estates. The farmers also fail to recognise pasture as a crop which brings in return in terms of improved cattle production. Thus, they do not show favourable response to the scheme. They also lack knowledge in maintaining the established pasture on their own and mostly neglect them after 2 or 3 cuttings. Forage is quite readily available from estate areas and wasteland thus the farmers do not feel the real need for homeplot. Lack of staff and facilities to render more effective extension service with close supervision could also contribute to the poor response for the homeplot scheme.

It is generally regarded that native pasture is very poor in quality with low crude protein and very high fibre content. This is not very true as can be seen from the analysis of 21 day cut native grass (as shown in appendix 1c) which gives fairly good crude protein level of 11.5% and 13.0% with an ADF of 33 and 34% respectively compared to crude protein level of 14.5% and ADF

of 30% in Napier. Even fairly matured grass obtained from oil palm estate and cut grass from free grazing area give a crude protein level of 10.3 and 9.4% with ADF of 38 and 37% respectively. This is supported by Wan Mohamed and Abraham (1975) whose analysis of herbage found under mature rubber with composite samples of paspalum, Axonopus, Ottechloa, Mikania and mimosa with some ferns gave a crude protein level of 14.44% and a crude fibre level of 29.8%. These findings proved contradictory to that made by Whyte (1975) who stated that wild tropical grasses are notoriously low in protein even at their optimal stage of growth and for most of the year they are little better than straw.

6. CONCLUSION

There is no significant difference in milk production between free grazing and "cut and carry" system. However more dairy animals can be managed under free grazing system due to leee labour requirement. It is possible to maintain high milk production with quality native pasture given in sufficient quantity and supplemented with 2 - 3 Kg of concentrate per animal per day.

It might not be economical to grow pasture on productive land but is very feasible to utilize idle land or plant pasture grass as intercrop in immature rubber and even in mature coconut plantations. All these need further detail study for a longer duration.

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Appendix 1a.

Composition of Concentrate mix given to the milking cows.

	Free grazing		"Zero" grazing
	Farmer A	Farmer B	Farmer C
Commercial Feed (Kg)	-	2.4	3.5
Linseed cake (Kg)	0.6	0.5	0.3
Bread crump (Kg)	0.5	0.1	-
Rice bran (Kg)	0.8	-	-
Soybean skin (Kg)	0.5	-	-
Molasses (Kg)	-	-	0.3
Total amount (Kg) per An/day	2.4	3.0	4.1

Appendix 1b.

Chemical Composition of Feed Consumed

by animal

	Dry matter%	Crude Protein %	Ash %	MADF %	In vitro %
1. Forage fern grazing Area	27.0	10.3	5.3	38.0	42.8
2. Cut grass (free grazing)	25.8	9.4	5.3	37.0	34.3
3. Cut grass (cut & carry)	28.4	7.3	5.0	41.2	39.2
4. Commercial concentrate	97.6	13.2	7.5	30.0	46.9
5. Linseed cake	96.3	24.7	13.7	7.9	69.0
6. Bread crump	93.8	7.5	8.5	1.0	-
7. Rice bran	97.3	17.3	4.8	5.7	84.5

Appendix C.

Chemical Composition of 21 day cut native pasture compared to improved pasture (Napier).

	DM%	Ash%	Crude Protein%	MADF %
Grazing Area Forage (oil palm estate)	22.6	7.0	13.0	34.0
Forage Cutting Area (Rubber estate)	24.6	5.2	8.0	34.0
Road Side Forage	21.3	6.5	11.5	33.0
Homeplot Napier	11.8	11.8	14.5	30.0

Appendix D.

Botanical Composition of forage obtained from different places (%)

	Native grass	Legume	Broad leave weed	Cypracae
Grazing Area I	86	14	-	-
Grazing Area II	53	20	27	-
Cutting Area	95	-	5	-