UNIVERSITI PUTRA MALAYSIA

THE EFFECT OF CUTTING INTERVAL ON NUTRITIVE VALUE AND *IN SACCO* DEGRADABILITY OF *KLIENHOVIA HOSPITA*

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This project reports submitted to the Faculty of Agriculture, Universiti Putra Malaysia, in fulfillment of the requirement of SHW 4999 (Final Year Project) for the award of the degree of Bachelor of Animal Science.

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CERTIFICATION

This project entitled “The effect of cutting interval on nutritive value and *in sacco* degradability of *Klienhovia hospita*” was prepared by Mohd Afiq bin Azmi and submitted to the Faculty of Agriculture in fulfillment of the requirement of the course SHW 4999 (Final Year Project) for the award of the degree of Bachelor of Agriculture (Animal Science).

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TABLE OF CONTENT

LIST OF FIGURE

LIST OF PLATES

LIST OF ABBREVIATION

%	Percentage
^{o}C	Degree Celsius
CRD	Complete Randomize Design
DM	Dry Matter
CP	Crude Protein
ADF	Acid Detergent Fiber
ADL	Acid Detergent Lignin
NDF	Neutral Detergent Fiber
SAS	Statistical Analysis System
g	Gram
Kg	Kilogram
L	Litre
ml	Millimetre
H_2SO_4	Sulphuric Acid
W	Weight

ABSTRACT

TITLE: THE EFFECT OF CUTTING INTERVAL ON NUTRITIVE VALUE AND *IN SACCO* DEGRADABILITY OF *KLIENHOVIA HOSPITA*

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SUPERVISOR : TN. HAJI IDRIS BIN ABU BAKAR

KEYWORDS : *Klienhovia hospita,* fodder tree, nutritional value, cutting interval.

Nowadays, many developing countries, with high population growth rates, combined with limited and rapidly diminishing land for food and forage production, have created a need to intensify agricultural production in order to bridge the gap between requirement and supply of food to ensure proper human nutrition. In Malaysia, ruminants are mostly fed with low nutritive value forages. Most of our farmers feed their animals with forages of main diet of low digestibility and also low nutritive values that are sourced from poorly managed pasture. A study was conducted at Ladang 2, University Putra Malaysia, Serdang, Selangor to evaluate the effect of cutting interval on nutritive value and *in sacco* degradability pattern of *Klienhovia hospita* for the optimum harvesting age. The experiment consisted of three treatments of one variety of *Klienhovia hospita.* The fodder trees were sampled at 45 days, 60 days and 75 day cutting interval and used completely randomized design (CRD). The samples were analysed for leaf and stem percentage, dry matter content (DM), neutral detergent fiber (NDF), acid detergent fiber

(ADF), acid detergent lignin (ADL), crude protein (CP) and degradation pattern of DM of *Klienhovia hospita* and highly significant difference ($P<0.0001$) in DM, NDF, ADF, ADL, and CP were observed at different cutting interval. The result of dry matter percentage (DM) showed highly significant difference at ($P<0.0001$) for all treatments. As the cutting intervals increase the dry matter percentage also increased. Result showed that dry matter percentage was higher at 75 day cutting interval (30.6%) followed by 60 days cutting interval (28.89%) and 45 days cutting interval (27.33%). The leaves percentage showed highly significant difference at ($P<0.0001$), where the leaves percentage decrease as the plant grow older due to stem development. The result showed leaf percentage was the highest at 45 days cutting interval (58.66%) followed by 60 days cutting interval (51.21%) and 75 days cutting interval (48.54%). The result for crude protein (CP) showed there were highly significant different at ($P<0.0001$) among all treatments. Crude protein (CP) was higher at 45 days cutting interval (23.15%) followed by 60 days cutting interval (20.21%) and 75 days cutting interval (19.47%). The result of neutral detergent fiber (NDF) showed there were highly significant difference at ($P<0.0001$) among all of treatments. The highest of neutral detergent fiber (NDF) was found at 75 days cutting interval (43.95%) followed by 60 days cutting interval (42.04%) and 45 days cutting interval (40.6%). The result for acid detergent fiber (ADF) showed there were highly significant difference at ($P<0.0001$) among all of the treatments. The result showed that acid detergent fiber (ADF) was highest at 75 days cutting interval (41.6%) compared to 60 days cutting interval (39.26%) and 45 days cutting interval (38.53%). The result for acid detergent lignin (ADL) showed there were highly significant difference at ($P<0.0001$) among all of the treatment. The result also showed acid

detergent lignin was highest at 75 day cutting interval (11.01%) followed by 60 days cutting interval (9.54%) and 45 days cutting interval (9.21%). The result for rumen degradation of *Klienhovia hospita* show the highest degradation pattern was at 45 days cutting interval. It was observed that 45 days cutting interval was superior in term of crude protein, leaf percentage and rumen degradation. This study also showed the most preferable cutting interval for *Klienhovia hospita* was at 45 days where the nutrient content was at optimum level.

ABSTRAK

TAJUK : KESAN PEMOTONGAN BERSELANG TERHADAP NILAI PEMAKANAN DAN *IN SACCO* PADA *KLIENHOVIA HOSPITA*

NAMA : MOHD AFIQ BIN AZMI (168988)

PENYELIA : TN. HAJI IDRIS BIN ABU BAKAR

Kata kunci: *Klienhovia hospita*, pokok makanan, nilai pemakanan, pemotongan berselang,

Pada masa kini, banyak negara-negara membangun, yang mempunyai kadar pertumbuhan penduduk yang tinggi serta kekurangan tanah untuk pengeluaran makanan untuk manusia dan ternakan, telah berusaha sedaya upaya untuk meningkatkan pengeluaran pertanian bagi merapatkan jurang antara keperluan dan bekalan makanan dapat dicapai. Di Malaysia, penternak ruminan kebanyakannya memberi foraj yang rendah nilai pemakanan kepada ternakan mereka. Kebanyakan penternak kita memberi makan kepada haiwan mereka dengan foraj sebagai diet utama yang rendah nilai pemakanan dan penghadaman yang diperoleh daripada padang ragut yang tidak diuruskan dengan baik. Satu kajian telah dijalankan di Ladang 2, Universiti Putra Malaysia, Serdang, Selangor untuk menilai kesan pemotongan berselang pada nilai pemakanan dan corak degradasi *Klienhovia hospita* pada umur penuaian yang

optimum. Eksperimen ini terdiri daripada tiga rawatan satu spesis *Klienhovia hospita*. Pokok-pokok tersebut telah disampel pada 45 hari, 60 hari dan 75 hari selang pemotongan dan menggunakan rekabentuk Rawakkan lengkap (CRD). Sampel telah dianalisis untuk peratusan daun dan batang, nilai bahan kering (DM), gentian neutral detergen (NDF), gentian asid detergen (ADF), gentian asid lignin (ADL), protein kasar (CP) dan corak degradasi DM daripada *Klienhovia hospita* dan perbezaan yang signifikan ($P<0.0001$) dalam DM, NDF, ADF, ADL, dan CP pada selang pemotongan yang berbeza. Dalam kajian ini, hasil daripada nilail bahan kering (DM) menunjukkan perbezaan signifikan yang sangat ketara ($P<0.0001$) untuk semua rawatan. Sebagai meningkatkan jarak waktu memotong kira peratusan yang kering juga meningkat. Keputusan menunjukkan bahawa peratus kandungan berat kering adalah lebih tinggi pada 75 hari selang pemotongan (30.6%) diikuti oleh 60 hari selang pemotongan (28.89%) dan 45 hari selang pemotongan (27.33%). Peratusan daun menunjukkan perbezaan signifikan yang sangat ketara ($P<0.0001$), di mana penurunan peratusan daun berlaku apabila tumbuhan berkembang kerana lebih tua pokok akan mengekang pertumbuhan daun. Hasilnya menunjukkan peratusan daun lebih tinggi pada 45 hari selang pemotongan (58,66%) diikuti oleh 60 hari selang pemotongan (51.21%) dan 75 hari selang pemotongan (48.54%). Protein kasar (CP) menunjukkan terdapat perbezaan signifikan yang sangat ketara ($P<0.0001$) di kalangan semua rawatan. Protein kasar (CP) adalah lebih tinggi pada 45 hari selang pemotongan (23.15%) diikuti oleh 60 hari selang pemotongan (20.21%) dan 75 hari selang pemotongan (19.47%). Gentian neutral detergen (NDF) menunjukkan terdapat perbezaan signifikan yang sangat ketara ($P<0.0001$) di antara semua jenis rawatan. Gentian neutral detergent

(NDF) didapati di 75 hari selang pemotongan (43.95%) diikuti oleh 60 hari selang pemotongan (42.04%) dan 45 hari selang pemotongan (40.6%). Gentian asid detergen (ADF) menunjukkan terdapat perbezaan signifikan yang sangat ketara ($P<0.0001$) di kalangan semua rawatan. Hasilnya menunjukkan bahawa gentian asid detergen (ADF) adalah lebih tinggi pada 75 hari selang pemotongan (41.6%) berbanding dengan 60 hari selang pemotongan (39.26%) dan 45 hari selang pemotongan (38.53%). Gentian asid lignin (ADL) menunjukkan terdapat perbezaan signifikan yang sangat ketara ($P<0.0001$) di antara semua rawatan. Kajian ini juga menunjukkan gentian asid lignin (ADL) lebih tinggi pada 75 hari selang pemotongan (11.01%) diikuti oleh 60 hari selang pemotongan (9.54%) dan 45 hari selang pemotongan (9.21%). Keputusan untuk degradasi rumen daripada *Klienhovia hospita* menunjukkan corak degradasi tertinggi adalah pada 45 hari selang pemotongan. Ia menyimpulkan bahawa 45 hari selang pemotongan adalah lebih dari segi nilai protein kasar, peratusan daun dan kadar degradasi bahan kering. Ia adalah diperhatikan bahawa 45 hari selang pemotongan adalah lebih dari segi protein mentah, peratusan daun dan kemusnahan rumen. Kajian ini juga menunjukkan selang pemotongan yang paling lebih baik untuk *Klienhovia hospita* adalah pada 45 hari di mana kandungan nutrien pada tahap optimum.

CHAPTER 1

INTRODUCTION

1.1 Background

Fodder tree is the green forage biomass obtained from trees or shrubs. This includes leaves, twigs and even edible pods and barks of certain plant species. They are dicots and usually perennials. Due to their extensive deep rooting system, they can withstand drought and provide quality green fodder during dry periods. Fodder trees are found growing naturally, but also can be cultivated. Generally, they are not purposely grown for fodder, but for other purposes such as live fencing, shade, and supports. However, their green biomass is available for livestock feeding.

Fodder trees and shrubs represent an enormous potential source of protein for ruminants in the tropics. Until relatively recently, these feed resources have been generally ignored in feeding systems for ruminants, mainly because of inadequate knowledge on various aspects of their potential use, as well as initiatives associated with the development of more innovative systems of feeding.

Throughout the tropics, and especially in the humid regions, there exist a variety of feed resources. These include a variety of forage and abundant supplies of crop residues, agro-industrial by-products and also non-conventional feed resources. Among these, approximately 50 to 60% of the feeds produced are dry bulky roughages, mainly cereal straws and stoves. In Asia, the volume of production is increasing at about 3% annually. However, not all these feeds are put to maximum and efficient use. Inefficient utilization is identified with low levels of animal production in which the contribution from ruminants (buffaloes, cattle, goats and sheep) compared to non-ruminants are especially low.

The use of fodder trees and shrubs has been secondary to these efforts, despite their potential value in prevailing small farm systems (Devendra, 1983). These alternative feeds merit increased research and development in the future (Devendra, 1990). This paper highlights the potential value of fodder trees and shrubs as sources of feeds, draws attention to the results of work where there are clear demonstrable benefits, practical technologies that are potentially important, and emphasizes the need to accelerate their wider utilization in feeding systems for ruminants.

Broadly speaking, it seems that collaborative efforts among scientists must be particularly directed towards integrated patterns of use by ruminants and non-ruminants and towards the establishment and development of

innovative feeding systems, both intensive and extensive, using high protein fodders from promising species of trees and shrubs. In this respect, some research themes of major importance are: productivity, feeding behavior of animals, real nutritive value, ecological adaptation and natural regeneration ability. The objectives are to improve the availability of feed resources for livestock throughout the year and to provide an adequate strategic feed supplementation to animals over critical periods (FOA, 1992).

It must also be kept in mind that, apart from their potential role in animal feeding, trees and shrubs are valuable sources of fuel wood, shelter, timber, herbal medicines and food for people and have been since the first civilizations of hunter-gatherers. Later on, humans also learnt that trees and shrubs could help to maintain soil fertility and to control erosion. We now know that our planet cannot hope to survive very long without a drastic global policy to control the use of natural resources. Undoubtedly, trees and shrubs, whether or not they provide fodder for animals, do offer a partial, but adequate response to desertification problems, to environmental degradation and to changes in climate, problems which have begun to be observed with some anxiety in the last few years.

This is irrespective of their role as a source of income and employment, as a means to sustain the intensification of agriculture, to maintain biodiversity and to enable livestock to be kept as essential sources of meat, milk, fiber or draught power for the rural poor (FOA, 1992).

This study highlighted the potential of *Klienhovia hospita* harvesting age and foliage meal as a protein supplement to increase dry matter intake and digestibility in ruminants.

1.2 Objective

The objectives of this study are:

a. To measure and compare the nutritive value of *Klienhovia hospita* at the different cutting interval.

b. To determine the leaf to stem ratio of *Klienhovia hospita* at the different cutting interval.

c. To evaluate the rumen degradation pattern of *Klienhovia hospita* at the different cutting interval by nylon bag technique.

1.3 Significant of Study

New information on the cutting age (in term of nutritive value) that is suitable for harvesting and the rate of dry matter degradation of *Klienhovia hospita.*

1.4 Research Hypothesis

Cutting interval has a significant effect on the nutritive value and DM degradation pattern of *Klienhovia hospita.*

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