



UNIVERSITI PUTRA MALAYSIA

**EFFECT OF HARVEST AGE ON NUTRITIVE VALUE OF KING GRASS
(*Pennisetum purpureum*) MEASURED USING CONVENTIONAL AND
NIRS METHODS**

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CONVENTIONAL AND NIRS METHODS**

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CERTIFICATION

This project report attached here entitled:

**Effects of harvest age on nutritive value of King Grass (*Pennisetum purpureum*)
measured using conventional and NIRS methods**

And submitted by **Muhamad Nizam Bin Amahd Unonis**

In partial fulfillment of the requirement of PRT 4999 (Final Year Project) for the award
of the degree of

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ABSTRACT

King Grass or *Pennisetum purpureum* is common forage that has been used as animal feed. It is a tropical perennial grass and native to the African grassland. The experiment was conducted to study the effect of harvest age on nutritive value of King Grass. The objective of this experiment is to identify the differences in nutritive value of King Grass according to its harvest age and to identify the differences in the analysis of nutritive value based on chemical method and Near Infrared Spectroscopy (NIRS). This experiment was conducted at Field 2, Universiti Putra Malaysia (UPM) in a period of 4 months starting on March until June 2014. The experiment was conducted using Randomized Complete Block Design (RCBD) with 4 replications. Three ages of harvest were used as a treatment which is 3, 5 and 7 weeks. Conventional and NIRS methods were used to measure the Crude protein (CP), Acid detergent fiber (ADF) and Neutral detergent fiber (NDF) of King Grass. The result showed that the NDF and ADF value were increased as the harvest age increased. Crude protein concentration decreased with later harvests. Based on the result of this experiment the best time to harvest King Grass was at week 5 because it gave the optimum value in term of quality and yield. The nutritive quality measurements using the NIRS technique was not correlated with that of the chemical method as a result of poor calibration of the equipment.

ABSTRAK

Rumput Gajah atau *Penissetum purpureum* merupakan pastura yang sering dijadikan makanan haiwan ternakan. Ia merupakan rumput saka tropika yang berasal dari Afrika. Eksperimen ini dijalankan untuk menentukan kesan umur tuaian terhadap kualiti Rumput Gajah dan mengenalpasti perbezaan terhadap dua kaedah analisis kualiti pemakanan iaitu secara konvensional dan Near Infrared Spectroscopy (NIRS). Eksperimen ini telah dijalankan di Ladang 2 Universiti Putra Malaysia bermula dari bulan Mac dan berakhir pada bulan Jun 2014. Reka bentuk Rawak Lengkap Berblok (RCBD) telah digunakan sebagai reka bentuk eksperimen dengan 4 replikasi. Tiga umur tuaian telah dipilih sebagai rawatan iaitu 3, 5 dan 7 minggu. Kaedah secara konvensional dan NIRS telah digunakan untuk menganalisa Protein kasar (PK), Serat detergen acid (SDA) dan Serat detergen neutral (SDN). Keputusan ujian menunjukkan nilai SDN dan SDA meningkat dengan peningkatan umur tuaian namun. Namun, nilai PK menurun dengan peningkatan umur tuaian. Berdasarkan keputusan yang di peroleh, waktu terbaik untuk menuai Rumput Gajah adalah pada minggu ke 5 kerana ia memberikan hasil dan nutrisi yang optimum. Nilai pemakanan yang diperolehi daripada kaedah NIRS tidak menunjukkan korelasi dengan yang didapati daripada kaedah konvensional disebabkan oleh kelemahan kalibrasi peralatan. .

CHAPTER 1

1.0 INTRODUCTION

Feed accounts about 70% of total cost of production of the animal. A wise producer must be flexible and critical in determining the best feed that can be fed to the animal with the most minimum capital investment needed. In tropical surroundings, local pasture and crop residues are low in quality and provide insufficient nutrients to grazing livestock (Bayble et al., 2007). One of the most common forage that has been used as animal feed is King Grass or its scientific name *Pennisetum purpureum*. King Grass could be fed fresh, as silage or directly grazed in the field (Woodard and Prine, 1991).

Each plant has their own factor that can give a tremendous effect on their production. Most of crops or plant production is affected by the way of its growth management. For King Grass there are two factors that give an impact on its production, which is harvesting frequency and genotype (Woodard and Prine, 1991). Therefore, good management and strategies for managing the growth of King Grass that can help in improving the nutritive value is necessary in order to overcome this problem.

One of the practices that can optimize the production and the nutritive value of King Grass are by altering its harvesting age (Steen, 1992). Different harvesting age will give the different nutrient content and nutrient availability of the King Grass. Like other

tropical grasses, King Grass is considered to be high in structural cell wall carbohydrates that increase rapidly with the advance in maturity, but its CP content and digestibility decrease as it grows (Van Soest, 1994). To this effect, we were using three different ages of harvesting, which is 3 weeks, 5 weeks and 7 weeks. From that, we could find at what age that the King Grass will have the highest nutritive value. At the end of this study, we expect that the CP content will decrease as the age of the King Grass increase and the Neutral detergent fiber and Acid detergent fiber will increase. The forage sample will be analyzed by using conventional or chemical method and by using Near-Infrared spectroscopy (NIRS).

This research is conducted in order to know the nutritive content (dry matter, CP, Neutral detergent fiber (NDF) and Acid detergent fiber (ADF) of King Grass when cut at different harvest age. Based from another study, we assume that there are significant differences in the nutritive value of King Grass between the harvested ages. Beside that this research are also conducted to test whether there are significant differences from the result of nutritive analysis based on conventional method and NIRS.

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