UNIVERSITI PUTRA MALAYSIA

REPLACEMENT OF CONCENTRATE WITH THREE SPECIES OF TREE FORAGES (*Artocarpus heterophyllus, Gliricidia sepium* AND *Leuceana leucocephala*) ON THE PERFORMANCE OF CROSSBRED DORPER SHEEP FED NAPIER SILAGE BASED FEED

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By

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ENDORSEMENT

This project report entitled **REPLACEMENT OF CONCENTRATE WITH THREE SPECIES OF TREE FORAGES (Artocarpus heterophyllus, Gliricidia sepium AND Leuceana leucocephala) ON THE PERFORMANCE OF CROSSBRED DORPER SHEEP FED NAPIER SILAGE BASED FEED** is prepared by **MUHAMMAD FAJRUL BIN KELANA** and submitted to the Faculty of Agriculture in fulfillment of the requirement of SHW 4999 (Final Year Project) for the award of the degree of Bachelor of Agriculture (Animal Science).

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LIST OF ABBREVIATIONS

ºC	Celcius
%	Percentage
BW	Bodyweight
ANOVA	Analysis of Variance
DM	Dry Matter
CP	Crude Protein
NDF	Neutral Detergent Fibre
ADF	Acid Detergent Fibre
ADL	Acid Detergent Lignin
EE	Ether Extract
g	gram
kg	Kilogram
SEM	Standard Error
SAS	Statistical Analysis System
UPM	Universiti Putra Malaysia

ABSTRACT

The aim of this study is to determine the effects of using multiple species forage which are Jackfruit (*Artocarpus heterophyllus*), Glirisidia (*Gliricidia sepium*) and Leuceana (*Leuceana leucocephala*) as sheep feeds. In addition, evaluate the average daily gain (ADG), bodyweight gain, digestibility and dry matter intake of sheep. The digestibility analysis conducted by using *in vitro* gas-production. Proximate analysis was conducted at Nutritional laboratory, Department of Animal Science, Faculty, UPM. Twelve female crossbred Dorper sheep are raised in intensive system. Mineral block and clean drinking water were provided *ad libitum*. Four treatment diets were formulated in which containing 70% Napier grass silage +30% pellets as T1, 70% Napier grass silage + 10% Tree Forage mixture (Jackfruit, Glirisidia and Leuceana) + 20% pellets as T2, 70% Napier grass silage+ 20% Tree Forage mixture (Jackfruit, Glirisidia and Leuceana) + 10 % pellets as T3, 70% Napier grass silage + 30% Tree Forage mixture (Jackfruit, Glirisidia and Leuceana) as T4. The experimental design was a Complete Randomized Design. 1000 kg of Napier grass is harvested and prepare for silage making and addition of molasses by using 5% of silage weight. Furthermore, 12 female Dorper sheep are rear at growing stage under intensive system by grouping pens. Sheeps were allocated into four dietary treatments with three sheep in each group. The feeding trial for sheep is carried out with different percentage of pellet and three species of tree forages (based on the treatment) with 3 replicates.The diets given were 3% of bodyweight of the sheep. The parameters recorded in this experiment is the determination of nutritive value of the feeds and weekly bodyweight gain of sheeps. During the feeding trial, the average daily gain (ADG), average dry matter feed intake and digestibility also will be taken into consideration. Thus, one-way analysis of variance (ANOVA) will be carried for the

experimental data by using Statistical Analysis Software (SAS). The bodyweight gain, average daily gain and average dry matter intake were determined by each treatment within period for 6 week. There was no significant ($p>0.05$) differences of bodyweight gain and average dry matter intake between all treatment and also between period. However, treatment 1 which is served as control is significant ($p>0.05$) with treatment 2, 3 and 4. In contrast, the average daily gain (ADG) of the sheep on week 1 until week 3 shows the significant difference ($p>0.05$). The feeds were analysed for chemical composition and digestibility. Generally, nutrient digestibility for treatment 2 was highest compared to other treatment. Eventhough the gas production was high, there was no significant ($p>0.05$) different of nutrient digestibility on different treatment. In conclusion, the three species of tree forages (Jackfruit, Glirisidia and Leuceana) can replaced partially of concentrate as a feed resource for the sheeps.

ABSTRAK

Tujuan kajian ini adalah untuk mengenal pasti kesan menggunakan pelbagai foraj spesies iaitu Nangka (Artocarpus heterophyllus), Glirisidia (Gliricidia sepium) dan Petai Belalang (Leuceana leucocephala) sebagai makanan biri-biri. Di samping itu, menilai purata pertambahan harian (ADG), pertambahan berat badan, penghadaman makanan dan kadar pengambilan bahan kering oleh biri-biri. Analisa penghadaman dilakukan dengan menggunakan teknik gas-pengeluaran in vitro. Dua belas ekor betina kacukan biri-biri Dorper diternak dalam sistem intensif. Blok mineral dan air minuman yang bersih diberi ad libitum. Empat rawatan pemakanan telah dirangka di mana ia mengandungi 70% silaj rumput Napier + 30% dedak sebagai T1, 70% silaj rumput Napier + 10% pokok foraj campuran (Nangka, Glirisidia dan Petai Belalang) + 20% dedak sebagai T2, 70% silaj rumput Napier+ 20% campuran pokok foraj (Nangka, Glirisidia dan Petai Belalang) + 10% dedak sebagai sebagai T3, 70% silaj rumput Napier + 30% campuran pokok foraj (Nangka, Glirisidia dan Petai Belalang) sebagai T4. Reka bentuk kajian adalah Reka Bentuk Rambang Lengkap. 1000 kg rumput Napier telah dituai dan digunakan untuk membuat silaj dengan penambahan molases menggunakan 5% daripada berat silaj. Tambahan pula, 12 ekor betina biri-biri Dorper diternak pada peringkat pembesaran di bawah sistem intensif secara kandang perkumpulan. Biri-biri telah ditempatkan kepada empat rawatan pemakanan dengan tiga ekor biri-biri dalam setiap kandang kumpulan. Elemen makanan percubaan untuk biri-biri dilakukan dengan komposisi dedak dan campuran tiga spesies foraj pokok (berdasarkan rawatan) yang berbeza dengan 3 diet replikasi . Pemakanan diberikan adalah 3% daripada berat badan. Parameter direkodkan dalam eksperimen ini ialah penentuan

nilai nutrien makanan dan pertambahan berat badan mingguan. Semasa percubaan makanan, purata pertambahan harian (ADG), purata pengambilan bahan kering dan kadar penghadaman juga akan diambil kira. Oleh itu, analisis varian sehala (ANOVA) akan dijalankan untuk data eksperimen dengan menggunakan Statistical Analysis Software (SAS) . Pertambahan berat badan, purata pertambahan harian dan purata pengambilan bahan kering ditentukan bagi setiap rawatan selama enam minggu. Tidak ada perbezaan yang signifikan (p> 0.05) untuk pertambahan berat badan mingguan dan purata pengambilan bahan kering antara semua rawatan dalam tempoh kajian. Walau bagaimanapun, rawatan 1 (T1) yang berfungsi sebagai makanan dimalarkan adalah signifikan (p> 0.05) terhadap rawatan 2 (T2), 3 (T3) dan 4 (T4). Sebaliknya, pertambahan purata harian (ADG) biri-biri pada minggu 1 hingga minggu 3 menunjukkan perbezaan yang signifikan (p> 0.05). Makanan rawatan dianalisis untuk melihat komposisi kimia dan kadar penghadaman. Secara umumnya, kadar penghadaman nutrien rawatan 2 (T2) adalah tinggi berbanding rawatan yang lain. Walaupun pengeluaran gas adalah tinggi, tidak ada perbezaan yang signifikan (p> 0.05) bagi kadar penghadaman nutrien pada semua rawatan makanan. Konklusinya, tiga spesies pokok foraj (Nangka, Glirisidia dan Petai Belalang) boleh digantikan sebahagiannya dedak sebagai sumber makanan untuk biri-biri.

CHAPTER 1

INTRODUCTION

1.1 Background of Study

The feeding cost for livestock production is estimated about 70% of the total production cost. An increase price of animal feed supplements is one of the challenges in the livestock industries all over the world (Olorunnisa kola, 2012). Thus, alternative feed is needed to minimize the cost.

Napier grass have yields with very large quantities of dry matter, but is low in protein content. Generally consists of fresh greenery herbage derived from grasses, legumes and non-legume crops. Grasses are very palatable forage, easy to obtain because it has the ability to grow high, especially in the tropical country. Legumes are grown agriculturally, primarily for their food grain seed for livestock forage and silage, and as soil-enhancing green manure. Legumes are notable in that most of them have symbiotic nitrogen-fixing bacteria in structures called root nodules. *Leucana leucocephala* are highly palatable to most grazing animals and Glirisidia have high nutritive value especially in crude protein content. The abundance of tree species in Malaysia could be good feed resources for goats and sheep. The tree such as jackfruit leaves has been used as small ruminant feed by the villagers for palatability, safeness and nutritive quality of the herbage. It is suggested that forage tree legumes have considerable potential to supplements low quality diets. Jackfruit leaves are a good source of protein diet for ruminant.

An alternative way to improve the mutton industry in Malaysia is by evaluating new breeds. The Dorper sheep from South Africa, is a synthetic breed by crossing Dorset Horn and Blackhead Persian. Dorper sheep is a meat purpose breed that can adapt harsh climate. The Dorper sheep are known to have good growth and reproductive performance. A Dorper is a fast growing meat producing sheep. The sheep industry has recently been under a period of sustained financial pressure and improvements in production efficiency are required to unpin the future sustainability of sheep production, especially in hill areas (Annett et al., 2011; Speijers et al. 2009).

1.2 Research problems

- To evaluate the effectiveness of feeds by using high nutritive value of multiple tree forage species (Leuceana , Jackfruit, and Glirisidia) which can reduce the concentrate usage in feeding livestock
- Sheep are both browser and grazer and prefer to eat multiple species of forage.
- Feeding the sheep with mixture of grass and concentrate cause high cost in feeding

1.3 Research hypothesis

The use of multiple species forage of high nutritive value can replace the usage of concentrate feeds on sheep.

1.4 Objective

1.4.1 The General Objective Study

- To determine the effects of using multiple species forage of high nutritive value which are Jackfruit (*Artocarpus heterophyllus*), Glirisidia (*Gliricidia sepium*) and Leuceana (*Leuceana leucocephala*) as sheep feeds.

1.4.2 The Specific Objectives Study

- To determine the nutritive value of sheep feeds mixture which is from Napier grass silage and three species of tree forage (*Artocarpus heterophyllus*, *Gliricidia sepium* and *Leuceana leucocephala*).
- The use of multiple species forage of high nutritive value can replace the usage of concentrate feeds on sheep.
- Evaluate the bodyweight change, average daily gain (ADG), digestibility, dry matter intake and feed conversion ratio of sheep.

1.5 Significant of study

The study was conducted to establish options of improving nutrition and to determine the bodyweight change, average daily gain (ADG), digestibility, dry matter intake and feed conversion ratio of sheep fed on mixture of multiple species forage.In addition, new information by using jackfruit leaves has high nutritive value for growing small ruminant (Das and Ghosh, 2001). and other tree forage has high protein content for growing sheep. Thus, reduces the usage of high cost of concentrate in feeding livestock.

CHAPTER 6

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