



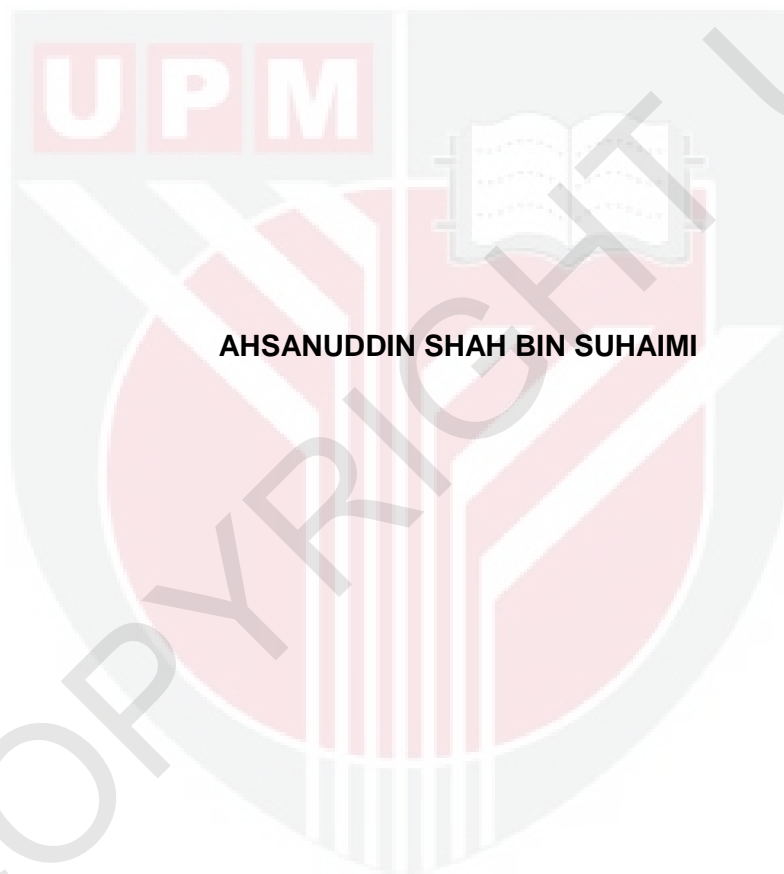
UNIVERSITI PUTRA MALAYSIA

**THE IN VITRO DIGESTIBILITY STUDY OF RUMEN FLUID WITH THE
SUPPLEMENTATION OF GUAVA SEEDS**

AHSANUDDIN SHAH SUHAIMI

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SERDANG SELANGOR

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CERTIFICATION

This project entitled “The *In Vitro* Digestibility Study of Rumen Fluid With The Supplementation of Guava Seed” is in prepared by Ahsanuddin Shah bin Suhaimi and submitted to the Faculty of Agriculture in fulfilment of the requirements of the course SHW 4999 (Final Year Project) for award of the degree of Bachelor of Agriculture (Animal Science).

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LIST OF ABBREVIATIONS

DM	Dry Matter
CP	Crude Protein
NDF	Neutral Detergent Fibre
ADF	Acid Detergent Fibre
ADL	Acid Detergent Lignin
IVDMD	<i>In Vitro</i> Dry Matter Digestibility
g	Gram
ml	Millilitre
L	Litre
SSPS	Statistical Package for the Social Sciences

**THE *IN VITRO* DIGESTIBILITY STUDY OF RUMEN FLUID WITH THE
SUPPLEMENTATION OF GUAVA SEED**

BY

AHSANUDDIN SHAH BIN SUHAIMI

ABSTRACT

The study on guava seeds have been done for human consumption but it is not widely used yet. In Malaysia, guava fruit is very popular among Malaysian citizen, but how about it seed? The seed mostly will be tossed away and only the flesh of the guava will be eaten. Napier grass is very popular among farmers and is widely used as a livestock feed diet. A study was carry out to see the performance of the guava seed (*Psidium guajava*) as a supplement towards the main feed diet which is Napier grass (*Pennisetum purpureum*) in different amount of supplementation which are 2%, 4% and 6%. The proximate analysis which are dry matter (DM), ash, neutral detergent fibre (NDF), acid detergent fibre (ADF), acid detergent lignin (ADL) and crude protein (CP) and also the main study which are *in vitro* digestibility gas production and *in vitro* digestibility dry matter (IVDMD) were carried out. 12 samples were collected randomly for Napier Grass and Guava Seeds. Each sample plants were divided into Treatment 1 which consist of 100% Napier Grass (n=3), Treatment 2 consist of 98% Napier Grass 2% Guava Seeds (n=3), Treatment 3 consist of 96% Napier Grass 4% Guava Seeds (n=3), and Treatment 4 consist of 94% Napier Grass 6% Guava Seeds (n=3). The Napier grass was planted at Ladang 2 until 6 weeks old and harvested randomly. The guava seeds were collected from the fruit

stalls around Serdang. The result has shown that the dry matter (DM), ash (OM) and crude protein (CP) have the best significant different ($p < 0.005$) than the others which are neutral detergent fibre (NDF), acid detergent fibre (ADF), acid detergent lignin (ADL), *in vitro* gas production digestibility and *in vitro* dry matter digestibility (IVDMD). Even though in *in vitro* gas production digestibility has not shown any significant differences, it still can be applied by adding more percentage of the guava seed as a supplement either 8% or 10% as 6% is not the best amount. As a recommendation, small ruminant feed industry should fully utilise the guava seed which is also known as agriculture by-product as it is low in cost and rich in nutrient content and good for ruminal digestibility.

**KAJIAN PENGHADAMAN RUMEN FLUID DENGAN SUPLEMENTASI BIJI
JAMBU SECARA *IN VITRO***

OLEH

AHSANUDDIN SHAH BIN SUHAIMI

ABSTRAK

Kajian ke atas biji jambu batu telah dilakukan bagi kegunaan manusia tetapi ia tidak digunakan secara meluas lagi. Di Malaysia, buah jambu batu sangat popular di kalangan rakyat Malaysia sendiri, tetapi bagaimana pula dengan biji benihnya? Biji itu kebanyakannya akan dibuang jauh dan hanya isi jambu batu sahaja yang akan dimakan. Rumput Napier amat popular di kalangan petani dan digunakan secara meluas sebagai diet makanan ternakan. Satu kajian yang telah dijalankan untuk melihat prestasi biji jambu batu (*Psidium guajava*) sebagai tambahan kepada diet makanan utama iaitu rumput Napier (*Pennisetum purpureum*) dalam jumlah yang berbeza daripada suplemen sebanyak 2%, 4% dan 6%. Analisis proksimat untuk bahan kering (DM), abu, gentian neutral detergen (NDF), gentian asid detergen (ADF), lignin detergen asid (ADL) dan protein kasar (CP) dan juga kajian utama iaitu *in vitro* pengeluaran gas penghadaman dan pencernaan *in vitro* bahan kering (IVDMD) telah dijalankan. 12 sampel diambil secara rawak untuk Napier Rumput dan Jambu Batu Benih. Setiap tumbuhan sampel dibahagikan kepada Rawatan 1 yang terdiri daripada 100% Napier Grass (n = 3), Rawatan 2 terdiri daripada 98% Napier Grass 2% Biji Jambu Batu (n = 3), Rawatan 3 terdiri daripada 96% Napier Grass 4% Biji Jambu Batu (n = 3), dan Rawatan 4 terdiri daripada 94% Napier

Grass 6% Biji Jambu Batu (n = 3). Rumput Napier ditanam di Ladang 2 sehingga berumur 6 minggu dan dituai secara rawak. Benih jambu batu telah dikumpulkan dari gerai-gerai buah-buahan di sekitar Serdang. Hasilnya menunjukkan bahawa bahan kering (DM), abu (OM) dan protein kasar (CP) mempunyai perbezaan yang ketara ($p < 0.005$) daripada yang lain yang gentian neutral detergen (NDF), gentian asid detergen (ADF), lignin detergen asid (ADL), *in vitro* penghadaman pengeluaran gas dan penghadaman bahan kering *in vitro* (IVDMD). Walaupun dalam *in vitro* penghadaman pengeluaran gas tidak menunjukkan sebarang perbezaan yang ketara, ia masih boleh digunakan dengan menambah peratusan biji biji jambu batu sebagai makanan tambahan sama ada 8% atau 10% kerana 6% bukan jumlah yang terbaik. Sebagai cadangan, industri ruminan kecil bagi makanan perlu mengaplikasikan sepenuhnya biji jambu batu yang juga dikenali sebagai produk sampingan pertanian kerana mempunyai kos yang rendah dan kaya dengan kandungan nutrien dan baik untuk penghadaman rumen.

CHAPTER 1

1 INTRODUCTION

The *in vitro* method of feed evaluation is less expensive and less time consuming compared with *in vivo* methods. The *in vitro* gas production system was more convenient as less quantity of feed utilization needed and its accuracy in describing digestibility has been validated to be not much difference against *in vivo* experiments. Although, gases produced during rumen fermentation are colossal waste product and of no nutritive value to the ruminant, but gas production test are used routinely in feed research as gas volumes are related to both the extent and rate of substrates degradation.

In the rumen, the chemical constraints that may be responsible for the decrease in fibre digestion are explored. A major factor appears to be rumen pH, moderate depression in pH, to approximately 6.0, results in a small decrease in fibre digestion, but numbers of fibrolytic organisms are usually not affected. Further decreases to 5.5 or 5.0 results in depressed growth rates and decreased fibrolytic microbes, and fiber digestion may be completely inhibited.

Proliferation of organisms on readily fermentable carbohydrates may increase the need for total nitrogen as both ammonia and amino acids. The value of amino acids to cellulolytic organisms appears to be primarily as sources of isobutyric, isovaleric, and 2-methylbutyric acids. This reinforces the need to establish dietary requirements for non-protein nitrogen, degradable protein, and isoacids.

In this project, *in vitro* experiment will be conducted to test the digestibility of napier grass when addition of guava seed applied as a supplementation. Gas production measurement will be used as indicator of digestibility. The napier grass

will be planted in Ladang 2 while the guava seed will be collected from the fruit seller before the seed been thrown in disposal bin. Guava seeds are very convenient and redundant as it is not a seasonal fruit from local orchard.

1.1 Objectives

1.1.1 General objectives:

- To evaluate the guava seeds as a ruminant supplement

1.1.2 The specific objectives are:

- To determine the guava seeds gas production in rumen.
- To determine the best percentage of guava seed supplement in *in vitro* fermentation.
- To measure IVDMD at post *in vitro* gas production.

1.2 Significance of the study

For better understanding of guava seeds nutrient content thus encourage farmer to use it as a ruminant supplement. Furthermore, guava seeds availability was extensively accessible from local fruit seller.

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