UNIVERSITI PUTRA MALAYSIA

EFFECTS OF DATE PALMS (*Phoenix dactylifera linn*) AND FIG FRUITS (*Ficus caricalinn*) ON RUMEN FERMENTATION PROFILES AND KINETICS OF CATTLE

NUR IMANINA FAKHIRA MOHD NASPI

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FACULTY OF AGRICULTURE
UNIVERSITI PUTRA MALAYSIA
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BY

NUR IMANINA FAKHIRA MOHD NASPI

A project report submitted to 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 Agriculture (Animal Science)

Faculty of Agriculture

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This project report entitled .....Effects Of Date Palms (*Phoenix Dactylifera Linn*) And Fig Fruits (*Ficus Carica Linn*) On Rumen Fermentation Profiles And Kinetics Of Cattle.....is prepared by …Nur Imanina Fakhira Mohd Naspi.. 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 ABREVIATIONS

DM- Dry matter

CP- Crude protein

CF- Crude fibre

NDF- Neutral detergent fibre

ADF- Acid detergent fibre

ADL- Acid detergent lignin

IVDMD- *In vitro* dry matter digestibility

VFA- Volatile fatty acid

Kg – kilogram

g- gram

mM- milimol

ppm- parts per million

M- mol

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ABSTRACT

This study was conducted to determine the effects of date palms (*Phoenix dactylifera Linn*) and fig fruits (*Ficus carica Linn*) on rumen fermentation profiles and kinetic of cattle. Grinded date palm fruit (Dabbas variety) and fig fruit (BMT6 variety) were used. The samples were then undergone nine types of proximate analysis which are dry matter, ash, crude protein, crude fibre, crude fat, neutral detergent fibre, acid detergent fibre, acid detergent lignin and energy determination. After the samples had undergone the nine proximate analysis, *in vitro* fermentation analysis was conducted to identify its digestibility and the rumen fermentation profiles and kinetic. In *in vitro* fermentation analysis, six treatments were used which were Blank rumen, Control 1 (Standard hay), Control 2 (Standard concentrate), Treatment 1 (Figs), Treatment 2 (Dates) and Treatment 3 (50% of Dates and 50% of Figs). Readings were recorded at 3, 6, 9, 12, 24, 48, 72 and 96 hours for total gas production with two replicates where rumen collection and *in vitro* fermentation analysis were done in two different weeks. The pH value was recorded at the beginning and the final time of the analysis. The media of the analysis were preserved after the final time of the analysis for VFA and ammonia determination and the samples that were not digested were determined in IVDMD. The result in proximate analysis shows significance difference ($P<0.05$) except for the crude fibre content. For the *in vitro* fermentation analysis, there is significance difference ($P<0.05$) between the treatments for final pH reading, IVDMD, and VFA content. The results of all the analysis showed positive effect and thus, showing that the date palms and fig fruits are good to be given as supplement feed for ruminants.

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ABSTRAK

Kajian ini dijalankan untuk menentukan kesan kurma (Phoenix Dactylifera Linn) dan buah ara (Ficus carica Linn) pada profil penapaian rumen dan kinetik lembu. Buah kurma (variasi Dabbas) dan buah ara (variasi BMT6) telah dikisar dan digunakan. Sampel tersebut kemudian menjalani sembilan jenis analisis proksimat iaitu bahan kering, abu, gentian protein, gentian serat, gentian lemak, serat detergen neutral, serat detergen asid, asid detergen lignin dan penentuan tenaga. Selepas sampel telah menjalani sembilan jenis analisis proksimat, ia telah menjalani analisis in vitro untuk mengenal pasti penghadaman dan profil penapaian rumen dan kinetik. Di dalam analisis in vitro , enam sampel telah digunakan iaitu rumen kosong, Kawalan 1 (rumput kering standard), Kawalan 2 (konsentrat standard), Sampel 1 (buah ara), Sampel 2 (buah kurma) dan sampel 3 (50% buah kurma dan 50 % buah ara). Bacaan gas telah dicatatkan pada 3, 6, 9, 12, 24, 48, 72 dan 96 jam untuk jumlah pengeluaran gas dengan dua replika di mana cecair rumen dan analisis in vitro telah dilakukan dalam masa dua minggu yang berbeza. Nilai pH telah dicatatkan pada awal dan akhir masa analisis. Media analisis telah dipeliharan selepas akhir masa analisis untuk penetuan asid lemak meruap dan ammonia, dan sampel yang tidak dihadamkan telah ditentukan dalam IVDMD. Hasil analisis proksimat menunjukkan perbezaan yang signifikan ($P<0.05$) kecuali kandungan gentian serat. Dalam analisis in vitro, terdapat perbezaan yang signifikan ($P <0.05$) antara sampel untuk bacaan pH akhir, IVDMD, dan kandungan VFA. Keputusan semua analisis telah menunjukkan kesan positif dan oleh itu, ia menunjukkan bahawa buah kurma dan buah ara baik untuk diberikan sebagai makanan tambahan untuk ruminan.

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CHAPTER ONE

1.0 INTRODUCTION

Date or date palm (*Phoenix dactylifera Linn*) and figs *(Ficus carica Linn*) are the most important fruits in some countries such as Middle East, Mediterranean and North Africa. There are several types of date palm and fig, and each of the types has different nutritive value. The most famous date palm in Malaysia is Ajwa' date while for fig fruits; due to lack of knowledge about fig fruits in Malaysia, there are no specific preferences. However the most famous type in the world is Celeste and Brown Turkey fig.

For fig fruits, in some countries, it's been use as traditional medicine by giving energy to patients who seek recovery from serious injuries. Like in some Middle East countries such as Iraq, small quantities of date wastes are used in making animal feed (Lattieff, 2016). Other than that, it was also used as traditional animal feed or turned into non-caffeinated coffee.

Both of the fruits are high energy fruits and have antioxidants properties. Date palm consists of 73-79% carbohydrates, 14-18% total dietary fibres, 2.5% ash, 2.1-3.0 % protein (Elleuch *et al*., 2008), and 2.0-3.2% fat (Al-Farsi *et al*., 2007), depending on the variety of the date fruit. The high nutritive and high sugar content of date palm wastes are very good sources for microbial fermentation potential toward bioenergy production (Gupta and Kushwaha, 2011). For dried figs, it consists of 73.5% carbohydrates, 4.67% protein, 3.68% total dietary fibres, 4.65% ash and 0.56% fat (Neha Soni *et al*., 2014), depending on the variety of the fig fruit.

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The use of date palm leaves, date pits and the fig leaves as ruminant feed has drawn many attention from researches worldwide. However, to our least knowledge, information on the date flesh and fig fruits as animal feed is still scarce. As mentioned earlier, both date palm and fig fruits contain high energy and it is suitable to be given to dairy and pregnant ruminants. Thus, it is necessary to investigate if date palm and fig fruits can be given as a supplement for ruminants. Hence, by feeding the date palm and or fig fruits to ruminants can improve the rumen digestion and also can increase its health and preventing them from harmful disease such as cardiovascular disease and cancer.

Most of the local animal feeds in Malaysia are lacking in some nutrients such as energy, protein and most of them are high in fibre. Since the date palm fruits and fig fruits production are increasing in Malaysia, therefore, supplementing date palm and or fig fruits in ruminant feed, it could increase some of the nutrients that are lacking in the animal feed. Due to this limitation of important nutritive values in most of the local feed, a study was conducted to study the effect of date palm fruit and fig fruit on rumen fermentation profile. The specific objectives are to determine the effect of date palm (*Phoenix dactylifera L*.) and fig fruit (*Ficus carica L*) on rumen fermentation profile in cattle using *in vitro* fermentation method, and to evaluate the effect of date palm (*Phoenix dactylifera L*.) and fig fruit (*Ficus carica L*) on rumen fermentation kinetics.

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