ASSESSMENT OF SELECTED LOCAL PLANTS FEED INTAKE AND REPRODUCTIVE PERFORMANCE IN FEMALE GOATS

NORHAZIRAH ABDUL HALIM

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By

NORHAZIRAH ABDUL HALIM

Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia, in Fulfilment of the Requirements for the Degree of Master of Science

January 2017
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By

NORHAZIRAH ABDUL HALIM

January 2017

Chairman : Mashitah Shikh Maidin, PhD
Faculty : Science

Malaysian goat production could be highly dependent on nutritional management. It is important to assess the effect of goats’ nutritional management especially feeding practices on the goat production for maximizing the reproductive efficiency of the goats. Therefore, our study was conducted with aims; 1) to assess the effect of different types of feed on the reproductive performance of female goats under intensive and semi-intensive farm systems in Peninsular Malaysia, and 2) to evaluate the effects of different pre-breeding dietary intake on reproductive performance of female goats. Goat farm surveys and experimental of animals were conducted to achieve the aims.

For farm surveys, a set of questionnaires were used to acquire data on feeding practices and goat reproductive performance including abortion and kidding performances from 212 respondents who involved with goat breeding for more than a year in Peninsular Malaysia. The surveys were conducted in about 8 months from January to August 2014.

While for the experimental of animals, thirty-two female goats were used and were assigned into four groups: Group 1 was given a maintenance (M) diet of Napier and Guinea grass, Group 2 was given 2M of Napier grass and commercial concentrate, Group 3 was given 2M of Napier grass and Chinese Violet and Group 4 was given 1M of Napier grass and Jackfruit leaves. The treatment diets were given daily for 10 days prior to their mating period (Day -9 until Day 0). Ovulation and pregnancy rates were determined from observation of corpora lutea and fetus scanned on Day 14 and Day 49 respectively after the mating period. Kidding and twinning rates were determined through the kidding performances. Progesterone level was determined from does’ blood samples taken every two or three days during the experiment.

The result of the survey revealed that the kidding rate of goats were higher in farms where additional feeds were given (1.27 ± 0.06) compared to not given (1.03 ± 0.06) (p<0.05). Intake of Chinese Violet, banana leaf and silage have a significant relationship with early abortion (p<0.05) while, intakes of Napier grass and silage have a significant relationship with late abortion (p<0.05). Additional feed intakes have a significant association with early abortion (X²=11.36, p<0.05) and twin kids (X²=10.44, p<0.05).

Feeding Chinese Violet, concentrate and Napier grass have significant association...
with twin kids (p<0.05). Meanwhile, the result of animal experimental shows that Group 2 does has highest ovulation rate (1.86 ± 0.34), pregnancy rate (57.2%), twinning rate (66.7%) and litter size (1.7) and lowest overall abortion rate (50.0%). Group 1 had highest progesterone level on Day 0, 9 and 22 (p<0.05). Overall, from present study, it showed that commercial concentrate could affect pregnancy rate, kidding rate, twinning rate and litter size of goats. In addition, this feed intake has potential as feed supplementation for female goats where it could increase the kidding rate.
Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk ijazah Master Sains

PENILAIAN PENGAMBIKAN MAKANAN IAITU TUMBUHAN TEMPATAN TERPILIH DAN PRESTASI REPRODUKSI KAMBING BETINA

Oleh

NORHAZIRAH ABDUL HALIM

Januari 2017

Pengerusi : Mashitah Shikh Maidin, PhD
Fakulti : Sains

Pengeluaran kambing Malaysia mungkin adalah amat bergantung kepada pengurusan pemakanannya. Adalah penting untuk menilai kesan pengurusan pemakanan terutamanya amalan pemberian makanan kepada pengeluaran kambing untuk memaksimalkan abiliti pembiakan kambing. Oleh itu, kajian kami dijalankan dengan matlamat; 1) untuk menilai kesan jenis makanan yang berbeza terhadap prestasi pembiakan kambing betina dalam sistem intensif dan semi-intensif di Semenanjung Malaysia, dan 2) untuk menilai kesan pengambilan makanan yang berbeza sebelum mengawan terhadap prestasi pembiakan kambing betina. Kaji selidik ladang kambing dan uji kaji haiwan dijalankan untuk mencapai matlamat ini. Untuk kaji selidik ladang kambing, satu set soal selidik digunakan untuk memperoleh data berkenaan amalan pemberian makanan dan prestasi pembiakan termasuk prestasi keguguran dan kelahiran kambing daripada 212 orang responden yang terlibat dengan pemeliharaan kambing selama lebih daripada setahun di Semenanjung Malaysia. Kaji selidik ini dijalankan selama lebih kurang 8 bulan dari bulan Januari hingga Ogos 2014. Untuk uji kaji haiwan pula, 32 dua ekor kambing betina digunakan dan dibahagikan kepada empat kumpulan: Kumpulan 1 menerima 1 tahap keperluan makanan (M) yang terdiri daripada rumput Napier dan Guinea, Kumpulan 2 menerima 2M rumput Napier dan konsentrat, Kumpulan 3 menerima 2M rumput Napier dan rumput Nyonya and Group 4 menerima 1M rumput Napier dan daun nangka. Diet tersebut diberikan setiap hari selama 10 hari sebelum tempoh mengawan (Hari -9 sehingga Hari 0). Kadar pengovulan dan kebuntingan telah ditentukan berdasarkan pemerhatian korpora lutea dan fetus yang diimbas pada hari ke-14 dan hari ke-49 selepas tempoh mengawan. Kadar kelahiran dan kambur ditentukan melalui prestasi bilangan anak yang dilahirkan. Kadar progesteron ditentukan dengan menggunakan sampel darah yang diambil setiap dua atau tiga hari semasa eksperimen itu. Keputusan kaji selidik ladang kambing menunjukkan bahawa kadar kelahiran kambing lebih tinggi di ladang di mana pemberian makanan tambahan diberikan (1.27 ± 0.06)
berbanding dengan tidak diberi (1.03 ± 0.06) (p<0.05). Pengambilan rumput Nyonya, daun pisang dan silaj mempunyai hubungan bererti dengan keguguran peringkat awal (p<0.05) manakala, pengambilan rumput Napier dan silaj mempunyai hubungan bereti dengan keguguran peringkat akhir (p<0.05). Pengambilan makanan tambahan mempunyai hubungan bererti dengan keguguran peringkat awal (\(X^2=11.36, p<0.05\)) dan anak kembar (\(X^2=10.44, p<0.05\)). Pemberian rumput Nyonya, konsentrat dan rumput Napier mempunyai hubungan bererti dengan anak kembar (p<0.05). Sementara itu, keputusan uji kajian haiwan menunjukkan kambing betina dalam Kumpulan 2 mempunyai kadar pengovulan (1.86 ± 0.34), kadar kebuntingan (57.7%), kadar kembar dua (66.7%) dan saiz seperinduk (1.7) yang tertinggi dan kadar keguguran keseluruhan (50.0%) yang terendah. Kambing Kumpulan 1 mempunyai tahap progesteron yang tertinggi pada Hari 0, 9 dan 22 (p<0.05). Secara keseluruhannya, kajian ini menunjukkan konsentrat komersial boleh memempengaruhi kadar kebuntingan, kadar kelahiran, kadar kembar dan saiz seperinduk kambing. Tambahan pula, pengambilan makanan ternakan ini mempunyai potensi sebagai makanan tambahan untuk kambing betina di mana ia boleh meningkatkan kadar kelahiran.
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I certify that a Thesis Examination Committee has met on 23 January 2017 to conduct the final examination of Norhazirah binti Abdul Halim on her thesis entitled "Assessment of Selected Local Plants Feed Intake and Reproductive Performance in Female Goats" in accordance with the Universities and University Colleges Act 1971 and the Constitution of the Universiti Putra Malaysia [P.U.(A) 106] 15 March 1998. The Committee recommends that the student be awarded the Master of Science.

Members of the Thesis Examination Committee were as follows:

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Date: 22 March 2017
This thesis was submitted to the Senate of Universiti Putra Malaysia and has been accepted as fulfilment of the requirement for the degree of Master of Science. The members of the Supervisory Committee were as follows:

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Signature: ________________________________
Name of Chairman of Supervisory Committee: Mashitah Shikh Maidin, PhD

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Name of Member of Supervisory Committee: Rosimah Nulit, PhD
TABLE OF CONTENTS

<table>
<thead>
<tr>
<th></th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABSTRACT</td>
<td>i</td>
</tr>
<tr>
<td>ABSTRAK</td>
<td>iii</td>
</tr>
<tr>
<td>ACKNOWLEDGEMENTS</td>
<td>v</td>
</tr>
<tr>
<td>APPROVAL</td>
<td>vi</td>
</tr>
<tr>
<td>DECLARATION</td>
<td>viii</td>
</tr>
<tr>
<td>LIST OF TABLES</td>
<td>xii</td>
</tr>
<tr>
<td>LIST OF FIGURES</td>
<td>xiv</td>
</tr>
<tr>
<td>LIST OF APPENDICES</td>
<td>xv</td>
</tr>
<tr>
<td>LIST OF ABBREVIATIONS</td>
<td>xvi</td>
</tr>
</tbody>
</table>

CHAPTER

1 INTRODUCTION

1.1 Introduction 1
1.2 Problem statement and significance of study 2
1.3 Objective of study 2

2 LITERATURE REVIEW

2.1 Goats industry in Malaysia 4
2.2 Feed and feeding regimes 5
  2.2.1 Napier grass 5
  2.2.2 Guinea grass 6
  2.2.3 Chinese Violet 7
  2.2.4 Jackfruit leaf 7
  2.2.5 Commercial concentrate 8
2.3 Nutrient requirements 8
2.4 Reproductive performance of female goats 10
  2.4.1 Oestrous cycle and follicular development 10
    2.4.1.1 Oestrous trait and synchronization of oestrous 11
    2.4.1.2 Luteal and follicular phases 12
    2.4.1.3 Importance of progesterone in reproduction 13
  2.4.2 Pregnancy and abortion 14
    2.4.2.1 Detection of pregnancy 14
2.5 Nutrition and reproductive performance 14
  2.5.1 Nutrition, ovulation and twinning 15
  2.5.2 Nutrition and embryo sustainability 15

3 GOAT FARM SURVEY

3.1 Introduction 16
3.2 Materials and methods 17
  3.2.1 Area of study 17
  3.2.2 Development of questionnaire 17
  3.2.3 Pre-test of questionnaire 18
  3.2.4 Respondent and survey method 18
  3.2.5 Statistical analysis 19
# Contents

3.3 Results
   3.3.1 General information of respondents and farm-survey
   3.3.2 Feed and feeding practices
   3.3.3 Goat breeding
   3.3.4 Goat reproductive performance

3.4 Discussion
   3.4.1 Respondents and farms
   3.4.2 Feed intake of goat
   3.4.3 Reproductive performance of goats
      3.4.2.1 Kidding performance
      3.4.2.2 Abortion
      3.4.2.3 Twinning ability

3.5 Conclusion

4 EXPERIMENTAL OF ANIMALS
   4.1 Introduction
   4.2 Materials and methods
      4.2.1 Feed analysis
      4.2.2 Experimental of animals
         4.2.2.1 Feeding and treatments
         4.2.2.2 Synchronization of oestrus and breeding
         4.2.2.3 Blood sampling and glucose test
         4.2.2.4 Hormone progesterone assay
         4.2.2.5 Reproduction measurements
      4.2.3 Statistical analysis
   4.3 Results
      4.3.1 Live body weight
      4.3.2 Concentration of glucose
      4.3.3 Observation of reproductive performance
      4.3.4 Concentration of progesterone
   4.4 Discussion
   4.5 Conclusion

5 GENERAL DISCUSSION

6 SUMMARY, GENERAL CONCLUSION AND
   RECOMMENDATIONS FOR FUTURE RESEARCH

REFERENCES
APPENDICES
BIODATA OF STUDENT
LIST OF PUBLICATIONS
# LIST OF TABLES

<table>
<thead>
<tr>
<th>Table</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1</td>
<td>Percentage of livestock meat self-sufficiency from year 2006 to year 2014</td>
<td>4</td>
</tr>
<tr>
<td>2.2</td>
<td>Wholesale and retail price of livestock meat from year 2006 to year 2012</td>
<td>4</td>
</tr>
<tr>
<td>2.3</td>
<td>Summary of nutrition contents in Napier grass, Guinea grass, Chinese Violet and jackfruit leaf</td>
<td>8</td>
</tr>
<tr>
<td>2.4</td>
<td>Nutrient requirements of mature does</td>
<td>9</td>
</tr>
<tr>
<td>3.1</td>
<td>Five-point scoring for Likert Scale statements used to identify the degree of agreement in a questionnaire</td>
<td>18</td>
</tr>
<tr>
<td>3.2</td>
<td>Section and type of information asked in questionnaire</td>
<td>18</td>
</tr>
<tr>
<td>3.3</td>
<td>Socio-demographic characteristics of respondents</td>
<td>21</td>
</tr>
<tr>
<td>3.4</td>
<td>Goat management system, number of goat and breed of goat in farms</td>
<td>22</td>
</tr>
<tr>
<td>3.5</td>
<td>Type of goat feed and number of respondent given the feed</td>
<td>23</td>
</tr>
<tr>
<td>3.6</td>
<td>Frequency of feeding goats in intensive and semi-intensive systems</td>
<td>23</td>
</tr>
<tr>
<td>3.7</td>
<td>Number and percentage of respondents giving additional vitamin or mineral in intensive and semi-intensive systems</td>
<td>24</td>
</tr>
<tr>
<td>3.8</td>
<td>Descriptive analysis on the statements used for assessing 212 respondents’ opinion on feed and feeding practices</td>
<td>25</td>
</tr>
<tr>
<td>3.9</td>
<td>Mode and percentage of missing values for buck, does and kid in a year</td>
<td>26</td>
</tr>
<tr>
<td>3.10</td>
<td>Kidding rate (mean ± SE) of main goat breeds under intensive and semi-intensive systems in Peninsular Malaysia</td>
<td>27</td>
</tr>
<tr>
<td>3.11</td>
<td>Kidding rate (mean ± SE) of goats with different feed intakes under intensive and semi-intensive systems in Peninsular Malaysia</td>
<td>27</td>
</tr>
<tr>
<td>3.12</td>
<td>Additional feed during pregnancy and kidding rate (mean ± SE) of goats</td>
<td>28</td>
</tr>
<tr>
<td>3.13</td>
<td>Descriptive analysis on the statements used for assessing 212 respondents’ opinion on pregnancy</td>
<td>29</td>
</tr>
<tr>
<td>3.14</td>
<td>Descriptive analysis on the statements used for assessing 212 respondents’ experiences regarding pregnancy and abortion of female goats</td>
<td>29</td>
</tr>
<tr>
<td>3.15</td>
<td>Chi-square analyses on the association between types of feed intake with early abortion in female goats</td>
<td>31</td>
</tr>
<tr>
<td>3.16</td>
<td>Chi-square analyses on the association between types of feed intake with late abortion in female goats</td>
<td>32</td>
</tr>
<tr>
<td>3.17</td>
<td>Chi-square analyses on the association between the presence of additional feed intake with early and late abortion in female goats</td>
<td>33</td>
</tr>
<tr>
<td>3.18</td>
<td>Descriptive analysis on the statements used for assessing 212 respondents’ experiences regarding kidding of female goats</td>
<td>34</td>
</tr>
<tr>
<td>3.19</td>
<td>Chi-square analyses on the association between types of feed intake with twin kids</td>
<td>35</td>
</tr>
</tbody>
</table>
4.1 Nutrient contents of Napier grass, Guinea grass, Chinese Violet, jackfruit leaf and commercial concentrate
4.2 Pre-breeding treatment diet in animal groups of eight (n=8)
4.3 Live body weight (± SE) of goats in Groups 1, 2, 3 and 4 before, during and after feeding treatment
4.4 Number of corpora lutea and ovulation rate (mean ± SE) of does in four treatment groups
4.5 Number of foetus and pregnancy rate (mean ± SE) of does until Day 49 in four treatment groups
4.6 Reproductive performance of female goats
4.7 The concentrations of progesterone (mean ± SE) after CIDR withdrawal (Day -1) in does on Days 0, 9 and 22
**LIST OF FIGURES**

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1</td>
<td>Hormonal profiles and follicle development in relation to the oestrus cycle</td>
<td>11</td>
</tr>
<tr>
<td>2.2</td>
<td>Hormonal patterns during oestrous cycle</td>
<td>12</td>
</tr>
<tr>
<td>2.3</td>
<td>The interactions among hypothalamus, pituitary gland, ovary and reproductive hormones</td>
<td>13</td>
</tr>
<tr>
<td>3.1</td>
<td>Schematic map of Peninsular Malaysia, Malaysia, showing the locations and numbers (n) of respondents for actual goat farm survey</td>
<td>17</td>
</tr>
<tr>
<td>3.2</td>
<td>Online farm-survey’s form</td>
<td>19</td>
</tr>
<tr>
<td>4.1</td>
<td>Schematic illustration of the experimental of animals</td>
<td>43</td>
</tr>
<tr>
<td>4.2</td>
<td>Concentrations of glucose in does given different feeding treatment diet</td>
<td>47</td>
</tr>
<tr>
<td>4.3</td>
<td>Concentrations of progesterone in anoestrus does between groups</td>
<td>50</td>
</tr>
<tr>
<td>4.4</td>
<td>Concentrations of progesterone in does having pregnancy failure between groups</td>
<td>51</td>
</tr>
<tr>
<td>4.5</td>
<td>Concentrations of progesterone in pregnant does between groups</td>
<td>51</td>
</tr>
</tbody>
</table>
# LIST OF APPENDICES

<table>
<thead>
<tr>
<th>Appendix</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>79</td>
</tr>
<tr>
<td>Questionnaire for farm-survey</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>86</td>
</tr>
<tr>
<td>Types of additional vitamin or mineral in intensive and semi-intensive systems</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>87</td>
</tr>
<tr>
<td>Independent samples T-test for main goat breeds under different farm systems</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>90</td>
</tr>
<tr>
<td>Independent samples T-test for goat with different feed intakes under different farm systems</td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>96</td>
</tr>
<tr>
<td>Independent samples T-test for additional feed during pregnancy and kidding rate</td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>97</td>
</tr>
<tr>
<td>Analysis of variance for live body weight of female goats</td>
<td></td>
</tr>
<tr>
<td>G</td>
<td>98</td>
</tr>
<tr>
<td>Statistical analysis for reproductive performance of experimental of animals</td>
<td></td>
</tr>
<tr>
<td>H</td>
<td>99</td>
</tr>
<tr>
<td>Figures during experimental of animals</td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>101</td>
</tr>
<tr>
<td>Concentrations of progesterone in goats in Groups 1 and 2</td>
<td></td>
</tr>
</tbody>
</table>
## LIST OF ABBREVIATIONS

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>%</td>
<td>Percentage</td>
</tr>
<tr>
<td>°C</td>
<td>Degree Celsius</td>
</tr>
<tr>
<td>ANOVA</td>
<td>Analysis of variance</td>
</tr>
<tr>
<td>AOAC</td>
<td>Association of Analytical Communities</td>
</tr>
<tr>
<td>BW</td>
<td>Body weight</td>
</tr>
<tr>
<td>CIDR</td>
<td>Controlled Internal Drug Releasing device</td>
</tr>
<tr>
<td>CL</td>
<td>Corpus luteum (singular) or corpora lutea (plural)</td>
</tr>
<tr>
<td>CP</td>
<td>Crude protein</td>
</tr>
<tr>
<td>CPM</td>
<td>Counts per minute</td>
</tr>
<tr>
<td>DCP</td>
<td>Digestible crude protein</td>
</tr>
<tr>
<td>DM</td>
<td>Dry matter</td>
</tr>
<tr>
<td>DMI</td>
<td>Dry matter intake</td>
</tr>
<tr>
<td>DVS</td>
<td>Department of Veterinary Services (Malaysia)</td>
</tr>
<tr>
<td>FSH</td>
<td>Follicle-stimulating hormone</td>
</tr>
<tr>
<td>GnRH</td>
<td>Gonadotrophin-releasing hormone</td>
</tr>
<tr>
<td>IACUC</td>
<td>Institutional Animal Care and Use Committee</td>
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<tr>
<td>Kg</td>
<td>Kilogram</td>
</tr>
<tr>
<td>LH</td>
<td>Luteinizing hormone</td>
</tr>
<tr>
<td>M</td>
<td>Maintenance (diet)</td>
</tr>
<tr>
<td>MAFF</td>
<td>Ministry of Agriculture, Fisheries and Food</td>
</tr>
<tr>
<td>ME</td>
<td>Metabolisable energy</td>
</tr>
<tr>
<td>MEm</td>
<td>Metabolisable energy for maintenance</td>
</tr>
<tr>
<td>MHz</td>
<td>Megahertz</td>
</tr>
<tr>
<td>min</td>
<td>Minute</td>
</tr>
<tr>
<td>ng/ml</td>
<td>Nanogram per millilitre</td>
</tr>
<tr>
<td>NRC</td>
<td>National Research Council</td>
</tr>
<tr>
<td>QC</td>
<td>Quality control</td>
</tr>
<tr>
<td>RIA</td>
<td>Radioimmunoassay</td>
</tr>
<tr>
<td>Rpm</td>
<td>Revolutions per minute</td>
</tr>
<tr>
<td>SD</td>
<td>Standard deviation</td>
</tr>
<tr>
<td>SE</td>
<td>Standard error</td>
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<tr>
<td>SEM</td>
<td>Standard error of mean</td>
</tr>
<tr>
<td>TC</td>
<td>Total count</td>
</tr>
<tr>
<td>TDN</td>
<td>Total digestible nutrient</td>
</tr>
<tr>
<td>USDA</td>
<td>United States Department of Agriculture</td>
</tr>
</tbody>
</table>
CHAPTER 1

INTRODUCTION

1.1 Introduction

About 10,000 years ago, the smallest domesticated ruminants; goats or scientifically known as *Capra hircus* has served mankind earlier and longer than cattle and sheep. They are reared for the production of meat, milk and wool, particularly in arid, semitropical or mountainous countries (Peters et al., 1999). The common goat breeds reared are Alpine, Nigerian Dwarf, Anglo Nubian, Toggenburg, Saanen, Boer, Kiko, Pygmy and Angora. Boer goat is one of the most desirable goat breed for meat production. It has gained worldwide recognition for excellent body conformation, fast growing rate and good carcass quality (Lu, 2002). Comparing it with the indigenous goat of Malaysia, Katjang, is smaller in size but more hardy, well-adapted, and nimble (Alimon, 1990; Devendra, 2007). The physical, characteristics as well as the importance of goat promote the prominence of goat as livestock where it is an important source of food security.

Many researchers have reviewed in general the importance of goats such as the goat meat and milk in numerous parts of the world (Devendra, 2007; Tsegaye, 2009; Devendra & Liang, 2012). In Malaysia, goat meat (chevon) is highly desired for many purposes compared to milk. Other than listed as a favourite menu on the table, it is also important for certain customs, religions and festive occasions. For example, it is slaughtered for Aqiqah and Qurban occasions for Muslims. Goat meat is a source of high quality animal protein with less fat and lower cholesterol than beef, lamb and pork (USDA, 2002). Meanwhile, in milk production, there is a slow but significant increase in the demand for goat milk generally due to the increase in society affluence and the traditional beliefs on the added health benefits of goat milk. Since there is a demand for goat milk but the local dairy goats are not available, dairy goat breeds such as Saanen, Alpine, Toggenberg, Anglo Nubian, Jamnapari, and Shami goats have been imported into Malaysia (DVS, 2013). Depending on the breed and farm management, daily goats could yield milk about 1 to 5 litres/head. Goat milk is generally sold for a high price of about RM 20/liter compared to cow's milk which is about RM 2.20/liter (Sithambaram & Hassan Nizam, 2014). Other than for meat and milk, goat is also useful in production of cheeses, soaps, cosmetic products, decoration, instrument and soil fertilizer (Lebbie, 2004; Devendra, 2007).

In Malaysia, the self-sufficiency of chevon and mutton (the meat of goat and sheep) were only about 13% which is far lower than the local’s demand (DVS, 2014). Thus, Malaysian government have to import more goats for local needs. It is very crucial to study on the factors affecting the production of local goat. Since, it has been reported that the intake of nutrition from feed could affect the production of goats (Mellado et al., 2004; 2006), it would be beneficial to focus on feed intake of goat. Low quality and unbalanced nutrient contents of feed resources could lower small ruminant
production but a wide range of alternative feed sources such as fodder shrubs and some natural compounds in plants (e.g. tannins and saponins) were proven to be efficient in improving sheep and goat performances and or reducing feeding cost (Salem, 2010).

1.2 Problem statement and significance of study

As mentioned earlier, low quality and unbalanced nutrient contents of feed could lower the production of goats through poor reproductive performance (Salem, 2010) and the self-sufficiency of chevon in Malaysia was very low (DVS, 2014). However, the study on local feed intake that could affect the reproductive performance of goats particularly in Malaysia is very little. Reviews have shown that the general area of nutrition and reproduction in goats requires more attention, particularly in nutritional adaptation to management, feed intake and reproductive performance. In Malaysia, goat farmers give many types of feed to their goats but, the type of feed that is not detrimental to reproduction and could improve the reproductive performance of goats is unknown or unclear. There are massive findings in literatures about sheep and nutrition, but there are little in goats.

Female goats have to be fed with better diet to improve their reproductive performances such as ovulation, embryonic growth and foetal development. Meanwhile, deficiencies in nutrition during the initial stage of reproduction could severely disturb the reproductive performance. Most of studies regarding these were done on sheep but, apparently, as their reproductive processes are very similar, we would expect the same will occur in goats. However, at a detailed level, there are differences that may alter the outcomes of nutritional manipulation. Therefore, it is crucial to study on the effects of nutrition or the different types of feed intake and feeding practiced by the goat farmers on reproductive performance of goats in Malaysia. Our study on these aspects of the reproductive performance could provide some contribution and at the same time help in formulating better nutritional management strategies for goat farmers and improve the goat production in our country.

1.3 Objective of study

The objectives of our study are:

1) To assess the effect of different types of feed on the reproductive performance of female goats under intensive and semi-intensive farm systems in Peninsular Malaysia, and
2) To evaluate the effects of different pre-breeding dietary intake on reproductive performance of female goats.
The study was divided into two main parts: i) goat farm survey and ii) experimental
of animal. The goat farm survey was conducted from January to August 2014, while
the experimental of animal was conducted from February to June 2015.
REFERENCES


