NUTRITIONAL EVALUATION OF SELECTED TROPICAL BROWSE PLANTS FOR RUSA DEER (*Cervus timorensis*) IN CAPTIVITY

Dissertation submitted to the Institute of Postgraduate Studies and Research,
University of Malaya, Kuala Lumpur
for the degree Master of Philosophy (MPhil)

by

IDAYU ZAINAL AMRAN
Institute of Postgraduate Studies and Research
University of Malaya
Kuala Lumpur
(1998)

ABSTRACT

The deer industry is a new growing industry in Malaysia with the existence of several new deer farms in the country. The importation of rusa deer (*Cervus timorensis*) from various countries indicate a growing interest in this industry. This study was done to gain more insight in the management of these animals and in particular their nutritional requirements with regards to local plant material.

In the experiment, 37 out of 80 selected plants were evaluated for their potential as deer feed. The proximate and fiber analysis were done on the selected plants using conventional methods. The mineral content of the plant was analysed using the ICP and the anti – nutritional factors such as saponin, terpenoid and alkaloid in the plants were detected using TLC plate. Apart from general analysis, *in vitro* digestibility of the plants were also done on selected potential plants. The metabolisable energy of 9 plants were detected using the gas test while the dry matter disappearance of 11 plants were analysed in RUSITEC fermentation system.

The present studies showed that browse plants including trees, shrubs fodder and legume plants have the potential to be used as deer feed when mixed with grasses or legumes. The browse plants were found to have a high percentage of CP (20 % - 40 %) and a moderate amount of CF (8 % - 39 %). Fiber components in the plants showed low level of lignin but high in cellulose and hemicellulose depending on the parts of plants eaten, type of plants and maturity of the plant. Mineral contents in the browse plants were in moderate amount and sufficient enough for the deer consumption especially the Ca, P, K, Na, Cu, Mn, Zn and Fe. The gas test showed that generally plants have a higher ME in the beginning of the year rather than in the middle or the end of the year, with an average of 7.5 kJ/kg. Dry matter disappearance in the plants showed that with the increase of time, the rate of dry matter disappearance also increases but at different pace.

The use of browse plants should be encouraged in commercial deer farming as they are easier to grow, more economical and found in abundance. Apart from being deer feed, it can provide shade to the animals and hedge to the farm. There are several other potential browse plants to be explored in the tropical forest which can be utilized as deer feed. Further research on this potential plants hopefully can help to upgrade and provide better feed to the deer feed industry.

**Apart from this, the thesis has been presented (poster form) in Malaysian Society of Animal Production (MSAP) conference in Penang(1995) and in International Symposium of Herbivore in France (1995).

IDAYU ZAINAL AMRAN
MPhil 98

ACKNOWLEDGEMENT

I wish to express my most sincere thanks and gratitude to Dr. Ahmad Salihin Hj. Baba for his patience and guidance throughout the course of the project. Not forgetting Dr. Kamar Khazmi Md. Zain as my co-supervisor.

I owe much also to the Department of Veterinary Services (DVS) especially the Director (R), Dr. Mustapha Babjee in his cooperation in granting the permission to use the lab, farm and library facillities and assistance from the DVS staff.

There were individuals and groups whom provided various aids and taken the trouble to help me in this project; En. Rashid Kudus, En Ahmad Shuhaimi (DVS HQ), En. Khalid Omar (AMDB), En Yusuf and DVS staff in Sabak Bernam; Dr. Siti Salmiah (DVS Selangor); En Jumali and En. Hassan (Unit Agronomi, DVS); Dr. Yusuf, Pn. Normah, En. Sharip, Pn. Fatimah and En.Padhil (Inst. Haiwan, Kluang); staff of DVS Unit Kesihatan Gerombok; En. Ismail (DVS PJ lab); Unit Rusa Perak; En Danial and staff of DVS Siliau; En. Ibrahim and Dr. Zainal Aznam (UPM).

I also take this opportunity to grant my most grateful thank to Puan Noraida Ismail, staff of IPT and fellow colleagues for their constructive advice and assistance while doing this thesis.

I would like to thank them for the constructive suggestions which have been an immense help for the writing of this thesis. Major improvement were done to this thesis with their help, in order to make it as it is now.

Last but not least to my loving husband and families for their support and patience to see me finishing my MPhil.

Idayu Zainal Amran
MPhil 98

CONTENT Page

CONTENT Page

ABBREVIATION

DM = Dry matter
CP = Crude protein
CF = Crude fiber
EE = Ether extract
NFE = Nitrogen free extract
ME = Metabolizable energy
NDF = Neutral detergent fiber
ADF = Acid detergent fiber
DMD = Dry matter digestibility
VFA = Volatile fatty acid
ANF = Anti - nutritional factor
wt = weight
g = gram
°C = degree Celsius
cm = centimeter
ml = millilitre
ppm = part per million
kg = kilogram
kJ = kilojoule
MJ = mega joule
h = hour
L = litre
ha = hectare
min = minutes
Mcal = Megacalories
N = nitrogen
m = metres
mm = millimetres
mg = milligram

LIST OF FIGURES

LIST OF PLATES

LIST OF TABLES

LIST OF APPENDICES

Introduction

Nutrition is the process whereby the animals procures and processes portions of its external chemical environment for the continued functioning of internal metabolism. Chemical analysis determines the quantities of nutrients present in a given sample of feedstuff. Feeding value of forages is affected by morphological, anatomical and chemical characteristic which vary between species, maturity, temperature, water balance and nutritional conditions of plant growth. These characteristics also influence the acceptability, edibility and digestibility of plants material and the amount and balance of nutrient desired (Egan et al., 1985).

Studies on the nutritive values of existing and potential feed are an integral part in the management of domestic and wildlife animals. The nutritive value of animal feed is conventionally classified into these components i.e. digestibility, voluntary feed intake and energetic efficiency (Fonnesback, 1977). For forages, the nutritive value is determined by the level of intake, in addition to digestibility and chemical (mineral) composition of the feeds. The presence of toxins or anti-nutritive factors would affect both digestibility and nutrients availability.

To date, few attempts have been made to evaluate the nutritional value of plants available to captivated ungulates in the humid tropics. The present studies were carried to meet the following objectives :

1) to evaluate the nutrients content in selected browse plant samples eaten by deer in captivity.
2) to determine the relative level of saponin, alkaloid and terpenoid in the plant samples.
3) to estimate the digestibility of selected browse plants
4) to evaluate certain type of plants which is suitable for mass cultivation which has promising potential browse plants as supplementary feed in addition to pellet/concentrates in deer farming.