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EVALUATION OF *Calliandra calothyrsus* LEAVES AS SUPPLEMENT TO NAPIER GRASS ON INDONESIAN ETTAWAH CROSSBRED GOATS' PERFORMANCE

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ADF	Acid detergent fibre
BSA	Bovine serum albumin
Bu-HCl	Butanol-HCl
BW	Body weight
C. calothyrsus	*Calliandra calothyrsus*
CF	Crude fibre
CL	Crude lipid
CT	Condensed tannin
D1-D4	Diet 1 – Diet 4
DM	Dry matter
DMD	Dry matter digestibility
DMI	Dry matter intake
EE	Ether extract
FT	Free tannin
g	gram
GC-MS	Gas chromatography-mass spectrometry
HT	Hydrolysable tannin
IVDMD	In vitro dry matter digestibility
Kg	Kilogram
LC_{50}	Lethal concentration of 50 ppm
ME	Metabolisable energy
Mg/dl	Milligram per decilitre
MJ	Mega joule
MW	Molecular weight
N	Nitrogen
NDF	Neutral detergent fibre
NFE	Nitrogen free extract
NIST	National Institute of Standard Technology
OM	Organic matter
OMD	Organic matter digestibility
P	Probability
PAC	Proanthocyanidins

PEG	Polyethylene glycol
P-P method	Protein-precipitation method
ppm	Part per million
R1 – R4	Ration 1 – Ration 4
R^2	Correlation coefficient
SDS	Sodium dodecyl sulphate
SPC	Secondary plant compounds
TDN	Total digestible nutrient
TI	Tannin isolate
TF	Tannin bound to fibre
TP	Tannin bound to protein
VFA	Volatile fatty acid

1. INTRODUCTION

1.1. Background of the study

In Indonesia inadequate year-round feed supply is probably the most important factor contributing to low animal output. This constraint is not peculiar to Southeast Asia but is common in most tropical and subtropical countries. The supply of animal protein is commonly restricted by an insufficient supply of high-quality forage. Tropical grasses are generally low in quality and they do not sustain high levels of animal productivity. Their deficiencies lead to an increase in the time the animals take to reach marketable weight, resulting in the production of lower quality products (Palmer and Ibrahim, 1996).

Inadequate nutrition in ruminant animals has often been associated with heavy economic losses to the farmers because of animal weight and condition losses, reduction in reproductive capacity and increased mortality rates (Simbaya, 2001). The gap between the availability and requirement of energy (TDN) is not wide (21 %), but the deficiency of protein sources is critical (54 %) (Pradhan 1995). Further, the traditional protein sources available are used mainly for the feeding of dairy animals (cattle and buffalo). This has resulted in low productivity of small ruminants.

To obtain optimum production of sheep and goats, attention has been given to exploiting alternative protein sources (Singhi *et al.*, 2000). Commercial concentrates have been used as supplements to basal diets of goats. However, the cost of traditional concentrates are escalating due to low availability and high demand from non-ruminant livestock industries, which are also growing rapidly in Indonesia. Therefore, development of non-traditional feed resources to replace the commercial concentrate in the country is important.

In order to improve the productive and reproductive capacity of smallholder ruminant animals, there is a need to look at ways of producing these feeds on the farms. One potential way of increasing the feed supply under smallholder conditions may be through the use of fodder trees and shrub legumes (Simbaya, 2001). Tree legume forages supply relatively cheap sources of protein for livestock. Due to their high nitrogen content, they could be satisfactory substitutes for the more expensive protein supplements in ruminant feeds. Feeding tree legumes to cattle has resulted in increased intake and live weight gains