Digestibility of *Ficus roxburghii*, *Castanopsis indica* and *Ficus cunia* on growing buffalo from Western Hills of Nepal

N.P. Osti¹, P.B. Chapagain², M.R. Tiwari², C.R. Upreti¹

¹ Animal Nutrition Division, National Animal Science Research Institute (NASRI), Khumaltar, Nepal

² Regional Agriculture Research Station, Lumle, Nepal

Corresponding author: N.P. Osti. Animal Nutrition Division, National Animal Science Research Institute (NASRI), Khumaltar, Nepal - Tel. +977 1 523039/4880682 - Fax: +977 1 4262500 - Email: n_osti@yahoo.com

ABSTRACT: Nine buffalo calves were subjected to three fodder tree species namely; *Ficus roxburghii* (Nimaro), *Castanopsis indica* (Dhalne Katus) and *Ficus cunia* (Rai Khanyu) for digestibility trial during November 27 to December 3, 2005 in Regional Agricultural Research Station (RARS), Lumle, Kaski Nepal. Animals were kept 7 days for adaptation for these fodders. Weighed amount of fodder tree leaves including twigs and small branches were fed two times a day and observation on fodder offered, refused and faeces voided were recorded daily. Chemical composition of fresh matter and faeces voided were carried out for dry matter (DM), crude protein (CP), neutral detergent fiber (NDF), acid detergent fiber (ADF), lignin, calcium (Ca) and phosphorous (P). The mean DM content and their dry matter digestibility (DMD) of these three fodder tree species were found 27.86, 46.02, 34.72, 73.21, 65.93 and 71.28 percent respectively. There were strong negative correlations (r=-0.75 to -0.78; p<0.05) observed between Ca. and CP with fiber fraction (NDF and ADF). The weak correlation was also observed between P and other constituents with respect to digestibility. From the results, if there could be provision of low fiber content in dry season, the three main nutrients (Ca, P and CP) may easily be absorbed by the animals.

Key words: Fodder tree, Digestibility, Nutrients, Buffalo.

INTRODUCTION - About 39.6 percent of the total land of Nepal is covered by forest and shrub. Fodder and leaf litter from forest, fodder tree from crop lands, grasses legumes available from bunds and fallow lands, crop by products from agricultural crops are the major sources of feed for ruminant animals (Joshi, 1989). Fodder trees from terrace risers and marginal lands are lopped for supplementing green fodder from December to June, which is the feed scarcity period in the hills and mountain of Nepal (Sherchand and Pariyar, 2002). Even though, the protein contents of fodder tree leaves are moderate, the animals loose their body weight and milk production drops drastically during winter months when animals are mainly provided with fodder tree leaves and rice straw. This problem may be due to seasonal rainfall, upland areas where there is decrease in soil moisture, deciduous plant species particularly in mid hills across the country and composition and availability of nutrients present in the plant species during moisture stress condition. Nutrient composition of fodder tree leaves, tree fodder, grasses and legumes were evaluated (Pandey and Osti 1995, Pandey 1992 and
Subba, 1998), but studies on nutrient availability from these feeding resources to the animals are very limited. Review of literature shows very few fodder tree species have been studied for nutrient availability to the animals (Rana, 1997 and Subba, 1998). In this study, efforts have been made to find out the digestible co-efficient of nutrients of fodder tree foliage such as Ficus roxburghii, Ficus cunia and Castanopsis indica and side by side to point out the positive and negative relation among the constituents under fresh and digestible basis.

MATERIAL AND METHODS - Nine growing buffalo calves about one and half year age (male and female) were allotted to three treatments i.e. Ficus roxburghii, Castanopsis indica and Ficus cunia and replicated three times. Animals were kept under metabolic shed, weighed amount of fodder tree leaves including twigs and small branches were provided two times a day for the experiment period of 7 days. Observations on fodder offered, refused and feaces voided were recorded daily. Fodder and fecal samples were collected in morning and evening for 7 days experimental period. The average maximum and minimum temperature recoded in samples collection site was 20.61°C and 12.22°C respectively and the total rainfall of the site was 5833.60 mm and average was 5303.1 mm per year (Annual Report, 2001). Collected tree foliage and fecal samples were dried at constant heat in hot air oven at 72°C for over night (24 hours). Dried fodder and fecal samples were ground to passes through 1 mm sieves in hammer mill and stored for chemical analysis. After dry matter determination, nitrogen content was determined by the Micro Kjehldal method (AOAC, 1991). The crude protein (CP) was calculated as N x 6.25. Neutral detergent fiber (NDF), acid detergent fiber (ADF) and acid detergent lignin (ADL) were determined by the method developed by Van Soest et al (1991). Calcium (Ca) and phosphorous (P) were measured by titration and spectrophometry method respectively. One-way analysis of variance (ANOVA) was carried out to compare the chemical composition and digestibility values with species of fodder tree as the main factor by using General Linear Model (GLM) procedure (Stiastitix, 1993). Simple correlation analysis was used to establish the relationship between the chemical constituents as fresh and digestible basis.

RESULTS AND CONCLUSIONS - The mean chemical constituents are presented in table 1, there is positive and negative relationship observed among the chemical constituents. Protein, calcium and phosphorous content in feed are very important for milk production from milking animals, fiber content in fodder tree leaves have strong negative correlation with these nutrients. When commencing dry season plant tend to increase fiber content in the leaves, which lead to decrease these two minerals content during the winter or dry season.

| Name of fodder       | Chemical constituents |
|----------------------|-----------------------|
|                      | DM        | CP        | NDF       | ADF       | Lignin     | Ca        | P         |
| Ficus roxburghii     | 27.86     | 14.27     | 54.00     | 52.46     | 32.53      | 2.82      | 0.49      |
| Castanopsis indica   | 46.02     | 11.38     | 65.13     | 64.52     | 21.82      | 0.76      | 0.23      |
| Ficus cunia          | 34.72     | 13.61     | 43.63     | 41.08     | 20.55      | 2.47      | 0.37      |
| Mean                 | 36.20     | 13.08     | 54.25     | 52.69     | 24.97      | 2.01      | 0.36      |
Digestibility of chemical constituents present in *Ficus roxburghii*, *Castanopsis indica* and *Ficus cunia* were similar. Positive correlation was observed in digestibility of all constituents except phosphorous to other constituents. Phosphorous has weak correlation to other constituents in terms of digestibility. This low phosphorous content in fodder tree leaves may have negative effect on absorption of nutrient present in the fodder tree leaves specially lactating animals. Among the 30 fodder tree species found in the hills of Nepal (Osti *et al.* 2006), the calcium content was found to be high (2.20%) whereas phosphorous level was low (0.25%). Similarly Subba, (1998) analyzed over 75 tree fodder species and found 0.10 to 0.90 percent total phosphorous content and 26.5 mmol/kg to 689 mmol/kg calcium content with majority of species containing more then 100 mmol/kg calcium. This low level of phosphorous and negative correlation between calcium and phosphorous with fiber fraction may be the one factor for low milk production during dry season in the hills and mountain of Nepal. This finding is closely supported with the finding of Davies *et al.* (1938) who reported that the presence of soils low in plant available phosphorous results in herbage with subnormal phosphorous content and occurrence of a dry period in each year when the plants are dry and mature and the seed is set accentuated or prolong this effect. Calcium and phosphorous are the major minerals required for proper milk formation in the body of milking animals, this low phosphorous contain in fodder tree leaves also have another possibility of binding to other nutrients like protein with phytate to form protein phosphorous complex which lead to low absorption of these nutrients in the animal body. The protein content of plant falls with phosphorous and also energy because all soluble carbohydrates ultimately non available with increase in dry matter content in dry season (Lapkin *et al* 1961). There is also quantitative ratio (2:1) between calcium and phosphorous required for proper functioning of milk secretion and for 1.5 part of calcium there should be 1 part of phosphorous in the diet. If the ratio is narrower than 1:1 and wider than 2.5:1 there will be incidence of milk fever and other deficiency diseases appeared (Wattiaux, 1994). This low phosphorous contain in fodder tree leaves open the another room for further research in this area with respect to milk production in the hills and mountainous region. Strong negative correlation was observed between fiber fraction (NDF & ADF) of fodder tree leaves with Ca, P and CP. But there is weak correlation was observed between P and digestibility of other constituents. If there could be provision of low fiber content in dry season these three nutrients (Ca, P and CP) may absorbed easily by the animals.

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