Pastures in production management in Madagascar

Isabelle H Hantanirina and Jean de N Rakotozandriny

Ecole Supérieure des Sciences Agronomiques, Département Elevage, Université d'Antananarivo, Madagascar, BP 175
Contact email: isabelleh2010@gmail.com

Keywords: Pasture, milk, feed efficiency, Madagascar.

Introduction

In Madagascar, natural pasture is found across extensive areas of the landscape and has inherently low productivity. There is limited management of these areas and limited management inputs, such as fertiliser or introduced sown pastures (Morat 1973). Natural pasture has a prominent place in animal production, however, consumer demand for milk, meat and other products mean that greater animal productivity is required than that achieved on natural pastures. This is the case for dairy farming in the highlands of Madagascar. The use of exotic pastures has become necessary for better production.

The aim of this study was to evaluate feed intake, digestibility, energy value and nitrogen content of some exotic pastures and forages.

Methods

The experiment was undertaken at ‘ARMOR-FIFAMANOR’ - Antsirabe - Antananarivo - Madagascar (19° 52' S, 47° 02' E) for a period of 36 months. Six bulls (Demarquilly and Weiss 1970) of the dairy breed "Norwegian Red Pie" that were 425 ± 50 days old with an average weight of 239 ± 35 kg. In the experimental studies, a set of six digestibility cages for cattle was used to evaluate 10 forages species; five grass species (Setaria sphacelata, Chloris gayana, Avena sativa (green oats), Zea mays and Pennisetum purpureum), four legume species (Desmodium intortum, Lupinus albus, Glycine max and Dolichos lablab) and one Cannaceae species (Canna edulis).

Forages were fed alone or in combination and as green fodder or as silage. Green fodder was cut to a height 10cm above the soil surface, chopped to 5 or 6cm and offered during the rainy season but silage was fed during dry seasons. The rations were offered twice daily in equal quantities (9:00 and 16 hours, respectively). Intake and digestibility measured. Each measurement is preceded by a period of adaptation to the diet (10 days) and the actual measurement period is 5 days. Digestibility in vivo was assessed by the method of total collection each morning. Laboratory analyses were used to determine contents of forages, refusals, faeces, crude ash, crude protein, crude fiber, fat, energy, neutral detergent fiber (NDF), acid detergent fiber (ADF) and acid detergent lignin (ADL) (AFNOR 1982). Data was analysed using Statview to determine the effect of the imposed treatments.

Results

Feed intake was better with green oats (118±7g per kg metabolic weight) compared to canna ensilage (44±3g per kg metabolic weight observed). A similar difference was observed with digestibility where green oats had energy digestibility (EBd) = 68%, organic matter digestibility (OMd) = 72% and crude protein digestibility (CPd) = 72% compared to canna ensilage where digestibilities were low at 58%, 59% and 23% for EBD, OMd and CPd, respectively. For all types of forage, CPd showed a high and positive correlation with CP content (0.920, range 0.895 to 0.968) as did OMd with EBD (0.890; range 0.819 to 0.992). The relationship between CPd and CP and EBD and OMd is described by the following equations: EBD = 1.019*OMd - 4.974, R² = 0.792, RSD = 2.711; CPd = 0.920*CP - 30.158, R² = 0.985, RSD = 2.668. For green forage the digestibility (EBD = 56%; OMd = 60%, CPd = 33%) and feed intake (64 ± 4 g per kg metabolic weight) of P. purpureum was lower than observed with oats. Also, a higher and positive correlation was found between both crude protein digestibility and crude protein (r² = 0.951) and energy digestibility and organic matter digestibility (r² = 0.945). The following relationships were established EBD = 1.091*OMd - 9.206, R² = 0.893, RSD = 2.210 and CPd = 0.921*CP - 30.504 (R² = 0.993, RSD = 2.317).

A mixture of Chloris gayana forage silage and green oats had reasonable digestibility (94 ± 4 g per kg metabolic weight). However, the digestibility of maize mixed with Lupinus albus silage was not as good (intake = 74g per kg metabolic weight) (EBD = 72%, OMd = 75%, CPd = 43%). A significant positive correlation was observed between crude protein digestibility and crude protein (R² = 0.894) and between energy digestibility and organic matter digestibility (R² = 0.984). Regression equations were allowed to predict the forage feed value for relationships: EBD = 0.959*OMd - 0.324 (R² = 0.969, RSD = 0.858) and CPd = 0.921*CP - 29.932 (R² = 0.965, RSD = 3.171). Thus, green oats alone or supplemented with other forages showed higher intake and digestibility. Also, low feed intake reflected lower organic matter digestibility.

Discussion

The experiment found the crude fiber content of forage increased with age of the plant material and the nitrogen content decreased over time. Green forage intake varied from 56 to 133 g per kg metabolic weight and 44 to 100g
per kg metabolic weight for conserved forage. These results are comparable to Minson (1981) who measured a variation of 30 to 140 g per kg metabolic weight. Feed intake decreases as forages advance in development (Milford and Minson 1965). Better organic matter and energy digestibility occur with early maturity forages (Gupta and Pradhan 1975, Minson 1981). Older forages are also characterized by low and inadequate crude protein content.

Tropical forages have poor nutritional value (crude protein) and rich membrane constituents (Demarquilly et al. 1980). Less mature forage stages support higher intakes, are more digestible and have higher feed efficiency. In comparison more mature forages have higher levels of crude fiber and cell wall components with lower protein content which reduces feed efficiency.

**Conclusion**

The results of this study show the importance of grazing management based on plant development stage for artificial and natural pastures. Using pasture as forage provides a better management of biomass resources. In addition, this research gives understanding for the development of dairy farming and highlights the importance of establishing artificial grassland in Malagasy highlands for this purpose.

**References**


Gupta, Pradhan (1975) cité par Faye B (1980) Prévision de la valeur alimentaire des fourrages tropicaux. Mémoire de DEA, Université de Clermont II


