The initial value of PIR (PIRi) was calculated from fitting kinetics of DM intake in function of the mean PIR: PIRi = 2.0 PIR [$n = 4$, $R^2 = 0.99$, RMSE = 0.23].

The proportion of large particles (retained by screen sieves of 1.18 mm of aperture) in the swallowed bolus (PLPS, %) is a function of the forage NDF content: PLPS = −10.91 + 0.777 NDF [$n = 7$, $R^2 = 0.88$, RMSE = 1.3]. This relation was ignored in the previous model.

The *in vivo* potential digestibility of NDF (NDFd, %) is estimated by the potential degradability of forage DM estimated with long time incubations *in sacco* (ISPD, %): NDFd = 0.92 ISPD [$n = 11$, $R^2 = 0.70$, RMSE = 4.3].

The *in vivo* organic matter digestibility (OMd%) from the content in non digestible NDF (ndNDF, %DM) measured either *in vivo* (OMd = 85.6 − 0.78 $\mathrm{ndNDF_{vivo}}$, $n = 126$, $R^2 = 0.79$, RMSE = 3.1) or *in sacco* (ndNDF = 80.4 − 0.70 $\mathrm{NDF_{sacco}}$, $n = 62$, $R^2 = 0.48$, RMSE = 4.0).

The *in sacco* degradation rate of digestible NDF (kdNDF = $0.05 \pm 0.02\ \mathrm{h^{-1}}$) is predicted from forage NDF from a data base of C4 grass: kdNDF = 0.313 − 0.0035 NDF [$n = 74$, $R^2 = 0.53$, RMSE = 0.012].

The transit is assessed through AdLignin, as such measurement was performed. For that, a specific new sub-model of kinetic of lignin in the rumen was developed. Moreover, to evaluate digestive flows of raw materials, a second specific new submodel of kinetic was also developed for water phase.

Model evaluations

They were performed through comparisons between observed and simulated values of kinetics of rumen DM and lignin compartments, kinetics of particles and of pH after the meal, daily means of DM intake, of chewing and ruminating times, of duodenal flows of NDF and of organic matter digestibility in the whole tract. The two practical contexts for the evaluation procedure corresponded, firstly, to 4 stages of regrowth of Pangola grass (14, 21, 28 and 56d, Archimède *et al.*, 2000) and, secondly, to individual variations linked to BW. First results are globally encouraging despite predictions are not very accurate at this stage, however the model will have to be developed further particularly by integrating the nitrogen aspects which are important to explain and predict the feeding values of tropical forages (Leng, 1990). Moreover, the issue of the scale of palatability in function of the stage of regrowth was also put in evidence and will merits a specific focus.

References

Archimède H, Boval M, Alexandre G, Xandé A, Aumont G and Poncet C 2000. Anim Feed Sci and Technol 87, 153–162.

Assoummaya C 2007. PhD thesis, AgroParisTech, Paris.

Leng RA 1990. Factors affecting the utilization of ‘poor-quality’ forages by ruminants particularly under tropical conditions. Nutr Res Rev 3, 277–309.

Sauvant D, Baumont R and Faverdin P 1996. J of Anim Sci 74, 2785–2802.

doi:10.1017/S2040470010000622

Ecological assessment and productivity of natural pasture in Arly National Park (Burkina Faso, West Africa)

Oumarou Ouedraogo[1†], Adjima Thiombiano[1], Karen Hahn-Hadjali[2] and Sita Guinko[1]

[1]*Laboratoire de Biologie et Ecologie Végétales, Unité de Recherches en Sciences de la Vie et de la Terre (UFR/SVT), Université de Ouagadougou, 03 BP 7021 Ouagadougou 03, Burkina Faso;* [2]*Institute for Ecology, Evolution and Diversity, J. W. Goethe-University, Siesmayerstr. 70, 60054 Frankfurt/M, Germany*

Introduction

In Burkina Faso (West-Africa), protected areas annually produce a high herbaceous biomass which is completely reduced to ashes when burning is used as a management tool. This biomass is an opportunity for rural populations to resolve the critical problem of forage during dry season. In 2007, the authority permitted an exceptional pilot project in the eastern area where farmers where allowed to collect biomass herbaceous for storage fodder. However this arrangement could compromise biodiversity conservation if there is no information on the floristic composition and the carrying capacity of these natural pastures. The aim of this study was to determine a typology of pasture, evaluate the net primary productivity and to analyise the effects of ecological aspects on productivity and spatial distribution of pasture. This study was carried out in Arly National Park, the site of the pilot project.

Materials and methods

Some 138 phytosociological relevés (100 $\mathrm{m^2}$ plot) were identified along topographic gradients in the park. Floristic data were submitted to multivariate analysis (DCA) in order to discriminate pasture. For determination of above ground biomass of each pasture, all herb species were clipped to 1 cm above ground height and separated by gramineae and other herbs. Fresh weight of each fraction was measured.

† E-mail: ouedraogooumar@yahoo.fr

100 g of the fresh material were dried in the sun and at the laboratory. Afterwhich the dry weight was determined. In addition soil samples were taken for physical and chemical analysis. The effects of environmental conditions as soil nature, woody cover on pasture productivity and their spatial distribution were studied by direct ordination. (CCA).

Results

Indirect ordination (DCA) permitted six types of pasture to be described, three each in inundated and non inundated land. The carrying capacity fluctuated from 0.12 to 0.73 tropical livestock unit ha in floody channel to 1.0 in alluvial plains where the soil was fertile. The CCA analysis showed soil parameters has selected effects on patterns of distribution and productivity of pasture (Osem *et al.*, 2004). The rate of magnesium, calcium, sand, clay, pH value and soil deep are the drivers of spatial distribution of pasture along topographic gradients. But the capacity of herbaceous biomass production of pasture is also related to soil deep, pH and the rate of silt. In the savannah zone where woody and grass coexist, the effect of woody cover on herbaceous biomass are less significant than soil properties.

Conclusion

Floristic composition and pattern of productivity of pasture are influenced by soil aspects. The detailed data on species composition, carrying capacity can be used to evaluate the pastoral value of protected areas of the Eastern part of Burkina Faso for the sustainable use of fodder without biodiversity extinction.

Acknowledgements

The project would like to thank the Biota project for the financial support.

Reference

Osem Y, Perevolotsky A and Kigel J 2004. Site productivity and plant size explain the response of annual species to grazing exclusion in a Mediterranean semi-arid rangeland. Journal of Ecology 92, 297–309.

doi:10.1017/S2040470010000634

Data engineering for creating feed tables and animal models in the tropical context

Daniel Sauvant[1†], Gilles Tran[2], Valérie Heuzé[2], Denis Bastianelli[3] and Harry Archimède[4]

[1]AFZ&UMR INRA-AgroParisTech MoSAR; [2]AFZ (Association Française de Zootechnie); [3]CIRAD; [4]INRA UR143, 97170 Petit Bourg, France

Introduction

The availability of reliable feed tables is an essential factor for the improvement of animal feeding and for the optimization of feed resources, particularly in emerging and developing countries. In the past decades, several factors have made it easier to create such tables. There are now public and private feed databases, such as the French Feed Database, that contain large amounts of raw data suitable for creating tables. In addition, an increasing number of feed evaluation data are becoming readily available through internet search engines. All those data can now be processed using powerful statistical and modelling methods implemented in user-friendly software packages. However, while these developments make feed data analysis much more efficient than before, good practices for data validation, processing and modelling are even more necessary. A 4-phase methodological framework for building modern feed tables suited for the tropical context is proposed.

Phase 1. Creation of data sets and establishment of feed typology

1. For every feed group (i.e. rice and its by-products), data are collected from scientific literature and databases. This data must be representative of the variations observed throughout the world for the feed group if the target is to have global tables. This is particularly important in the tropics where agronomic and technical conditions are extremely diverse.
2. For the main analytical parameters, the detection of outliers and the identification of major factors of variation, such as geographical origin or physiological stage, will be carried out using one-dimensional (histograms, distributions of values) and multi-dimensional (scatter plots with two or more parameters) analysis.

† E-mail: sauvant@agroparistech.fr