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.

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

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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.

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3. Meta-analysis and clustering methods will be used for the objective identification of feed sub-groups and the establishment of the final feed typology, in relation to existing nomenclatures.

Phase 2. Establishment of consistent composition profiles

As there are large differences in the number of raw data between parameters, using simple averages can lead to inconsistent composition profiles (e.g. the average crude protein can be inconsistent with the average tryptophan). In order to create consistent profiles, the concept of "pivot" parameter is proposed.

1. Pivot parameters are chemical parameters with high numbers of individual values and that are well correlated with other parameters. Crude protein is a typical pivot parameter, as protein values are usually measured and are often well correlated with other main components (eg fibre, amino-acids).
2. Regression equations are established between the pivot parameters and other parameters.
3. Averages are calculated for the pivot parameters, and those averages are used as input in the regression equations obtained in the previous step for the calculation of the whole composition profile.

Phase 3. Establishment of consistent nutritive values

Parameters of nutritive value are closely linked to the *in vivo* digestibility of chemical components and energy. The digestibility values can be used as such or can be transformed into more sophisticated parameters that cannot be measured directly, such as net energy or metabolizable protein values. As in Phase 2, the goal is to create nutritive values that are consistent with the entire profile.

1. *In vivo* data are collected with the associated chemical composition, *in vitro* and *in sacco* measurements.
2. Regression equations are calculated between *in vivo* data and *in vitro*, *in sacco* and chemical predictors. Several issues will have to be solved. First, *in vivo* data are produced in small numbers and their variability depends on many experimental conditions, which makes outliers and factors of variation harder to identify. Also, the large variety of *in vitro* and *in sacco* analytical procedures can be an impediment to establishing the practical predictive use of such values. Moreover, while the prediction of ruminant feed values is often based on Van Soest fibre fractionation, many *in vivo* data are only accompanied by crude fibre values.
3. Digestibilities and other nutritive values are calculated using the equations obtained previously or found in the literature.

Phase 4. Modelling animal responses to diets and feeding practices

The mathematical modelling of animal performances and animal responses to diets has progressed significantly in the past decades. However, most of the published animal models have been built and validated for intensive livestock production in temperate areas. The current challenge is to adapt these models to the harsher conditions of animal production in tropical climates, or build new models taking into account those conditions. This requires the collection of large sets of animal responses measured in tropical conditions, followed by meta-analysis of those data.

The following types of animal responses are under consideration:

1. Level of feed intake. There are many published data concerning a large – if not overwhelming – range of experimental conditions. In ruminants, a major issue is that most experiments use animal kept in stables or in digestibility crates and fed cut-and-carry forage, so that using these data is questionable for animals on pasture.
2. Environmental impact of the feeds (eg carbon footprint and outflows of N, P and CH_4)
3. Impact on the composition and quality of animal products
4. Impact on animal safety and welfare

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