

content was different ($P < 0.05$) and was valued at 16.6, 25.7 and 26% of DM for concentrates C1, C2 and C3 respectively. The voluntary intake of the three concentrates was similar ($P > 0.05$) and was valued at 2.20, 2.15 and 2.16 kg DM/d for concentrates C1, C2 and C3 respectively. Protein supplementation had a significant effect ($P < 0.05$) on the voluntary ingestion of straw which was 5.95, 8.64 and 8.74 kg DM/d for groups 1, 2 and 3, respectively. Protein supplementation also had a significant effect ($P < 0.05$) on milk production of cows in groups 2 and 3 (4.0 and 4.2 kg/d vs. 2.8 kg/d for group 1). The average daily milk offtake was higher ($P < 0.05$) in groups 2 and 3 (2.4 and 2.5 kg/d vs. 1.5 kg/d for group 1). In addition, the quantity of milk consumed by calves was higher ($P < 0.05$) in groups 2 and 3 (1.6 and 1.7 kg/d vs. 1.3 kg/d for group 1). There were no significant differences ($P > 0.05$) in the chemical composition of cow's milk. The average daily weight gain of the cow was higher ($P < 0.05$) in groups 2 and 3 fed the protein supplement (49 and 51 g/d vs. 13 g/d for group 1). Protein supplementation improved ($P < 0.05$) growth of calves from 30 to 90 days of age from 141 g/d for group 1 to 181 and 190 g/d, for groups 2 and 3 respectively. Cost of feeding was significantly different ($P < 0.05$) in the three groups (19912 vs. 24129 vs. 29030 FCFA respectively for groups 1, 2 and 3). Cost of feed per kg of milk produced was also significantly different ($P < 0.05$) in the three groups (100.5 vs. 86.1 vs. 98.6 FCFA respectively for groups 1, 2 and 3). Net benefit was significantly higher ($P < 0.05$) in groups 2 and 3 (45980 and 44563 vs. 29591 FCFA for group 1).

Conclusions

This experimental trial showed that protein supplementation during the dry season increased dry matter intake and improved milk production of Borgou cows while maintaining their body weight and increasing the growth of their calves.

Acknowledgements

The authors gratefully acknowledge funding from NPT/BEN/183/FA-UP/WU.

References

- Association of Official Analytical Chemists 1990. Official methods of analysis, 15th edition. AOAC, Arlington, VA, USA.
- Ayantunde AA 1998. Influence of grazing regimes on cattle nutrition and performance and vegetation dynamics in Sahelian rangelands. PhD, Wageningen Agricultural University.
- Rivière R 1991. Manuel d'alimentation des ruminants domestiques en milieu tropical. Collection Manuels and Précis d'élevage. IEMVT, Ministère de la Coopération, France.

doi:10.1017/S2040470010000737

Seasonal variation of the nutritive value of natural forage and effect on cattle performances in Cameroon

Victor Deffo^{1†}, Ombionyo Messine¹, Tendonkeng E. Pamo², Médard Lieugong³ and Michel Tchotsoua⁴

¹IRAD Regional Research Centre, Wakwa, P.O. 65 Ngaoundéré, Cameroon; ²University of Dschang, P.O.Box 222 Dschang, Cameroon; ³University of Yaoundé 1, P.O.Box 47 Yaoundé, Cameroon; ⁴University of Ngaoundéré, P.O.Box 454 Ngaoundéré, Cameroon

Introduction

The Adamawa plateau (Cameroon) is the major cattle farming region in Cameroon. The plateau is characterised by a mild highland subtropical climate with a precipitation of 1600–1700 mm per annum falling between April and October. Grass species such as *Hyparrhenia*, *Panicum* and *Seteria* dominate natural pastures found on granitic and basaltic parent rock-based ferralols. The woody vegetation is mainly composed of *Lophira* and *Daniella* sp. In this region, natural forage remains the major feed for ruminant livestock. However, the nutritive value of this resource, affected by many factors, is variable (Enoh *et al.*, 2005). Thus rationing in the sense of complete feed formulation and decision making in terms of livestock sector improvement are difficult. Therefore, studies aiming to generate more information on the variation of the nutritive value of forage and its impact could be of great importance for the sector. From 2006 to 2009, a study was carried out in the region to assess the effect of seasonal variation of climate on the nutritive value of forage and the consequences on cattle performances.

Material and method

Data were collected monthly on a representative rangeland (comprising the four main effective pasture types found in the region and identified by their level of degradation) using forage sampling methods (Levang and Gouzis, 1980). Every two months, samples of forage

† E-mail: vdeffo@yahoo.fr

collected were thoroughly mixed and analysed in the laboratory to estimate the average nutritive value. Data on cattle performances were collected using diachronic observations (i.e. continuous follow up) on a sample of 144 head of Gudali zebu breed of cattle grazing on the above mentioned rangeland. This sample was selected from 25 cattle herds through a stratified random sampling using a successive draw with remittal. During these investigations, cattle live weight estimation was done using barymetry (thoracic perimeter) method. The experiment was repeated twice (2 years). Descriptive statistics were used for data analysis. Student-test was used to compare the nutritive value and the cattle performances in the rainy and dry seasons.

Results

Pastures in the Adamawa (Cameroon) had an average forage yield of 1.67 t/ha containing 4.7% crude protein, 8.5% ash and 34.2% crude cellulose. There was a significant seasonal variation of these characteristics ($P = 0.05$) (Table 1) with the rainy season being the better period for livestock farming (6.2% crude protein in the forage against 3.1% in the dry season). These seasonal changes had significant effects on cattle performances; 14.6 kg monthly weigh gain, 31.2% calving rate and 273 litres of milk per cow were registered in the rainy season against –10.7 kg, 9.3% and 149 litres in the dry season. This drop in performance corresponded to an economic loss estimated at about 242, 559, 488, 600 FCFA (i.e. 373, 168, 623 euros) per year.

Table 1 Seasonal variation of the nutritive value of natural forage in the Adamawa (Cameroon)

Season	Period/month	Forage yield (t/ha DM)*	Ash (%DM)	Crude Protein (%DM)	Crude Cellulose (%DM)
Rainy season	May–June	0.62	10.34	6.90	31.87
	July–August	0.98	9.39	6.19	31.48
	Sept.–Oct.	2.06	9.75	5.53	32.21
Dry season	Nov.–Dec.	2.20	7.36	3.05	35.00
	Jan.–Feb.	2.22	7.22	3.13	36.61
	March–April	1.95	7.02	3.13	37.72
	Average	1.67 ± 1.06	8.51 ± 1.86	4.66 ± 1.83	34.15 ± 3.52
	Rainy season average	1.22 ± 1.03	9.83 ± 2.00	6.21 ± 1.34	31.85 ± 3.36
	Dry season average	2.12 ± 0.9	7.20 ± 1.02	3.1 ± 1.27	36.44 ± 2.64

Conclusions

The results show that each year, from November to April, significant decrease occurred in the nutritive value of forage causing between 45–73% decrease in cattle performances. The period from August to October was the best period during which the surplus forage, generally burnt in the dry season, could be transformed into hay or ensilage to be used in the dry season to reduce the above losses. There was an urgent need for the development of more effective dry season feed supplement in Cameroon.

Acknowledgements

We would like to express our gratitude to the International Foundation for Science (IFS) and the United Nation University (UNU) of Tokyo for their financial support; we also give a special thank to the group of farmers who provided cattle for the two years data collection.

References

- Levang F and Gouzis M 1980. Mesure de la Biomasse Fourragère and Recouvrement. In: Aménagement des Forêts naturelles des Zones Tropicales Sèches. Guide de la Conservation de la FAO N° 32, Département des Forêts, FAO: Rome.
- Enoh MB, Kijora C, Peters KJ and Yonkeu S 2005. Effect of stage of harvest on DM yield, nutrient content, in vitro and in situ parameters and their relationship of native and *Brachiaria* grasses in the Adamawa Plateau of Cameroon. *Livestock Research for Rural Development* 17, www.cipav.org.co/lrrd/lrrd17/1/enoh17004.htm (accessed on 29/11/2008).