

*Full Length Research Paper*

# Diversity and characteristics of green natural fodders sold in the city of Ouagadougou in Burkina Faso, West Africa

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## ABSTRACT

In Burkina Faso, small ruminants of urban cities are generally fed during all the seasons with marketed green natural fodders. This study was carried out to understand the functioning of these fodders marketing in the city of Ouagadougou and to inventory fodder species used in order to establish their chemical composition and their intensity of infestation in gastrointestinal nematodes. Thus, investigations were conducted in six sites in rainy season, in cold dry season and in hot dry season (march-may). Analysis of collected data revealed 15 species of green natural fodders marketed and composed of 8 gramineous and 7 leguminous. These species belong to 9 botanical families among which the Poaceae is the most dominant with 8 species and within which *Pennisetum pedicelatum* was the most available (25.2 %). Besides, parasitological analysis made did not find gastrointestinal nematode larvae's (L<sub>3</sub>) on the inventoried fodders. The chemical analysis indicate important average contents of organic matter (OM) and crude protein (CP) in gramineous (82.2 – 91.0 % and 6.5 – 17.4 %) and leguminous (83.8 – 90.6 % and 8.7 – 21.3 %). Therefore, all inventoried green fodders could improve the productions of small ruminants raised in all season through a good supplementation strategy.

**Keywords:** Survey, Green natural fodders, Chemical composition, Nematode larvae, Small ruminants, Ouagadougou.

## INTRODUCTION

Burkina Faso is a Sahelian country situated in West Africa and whose economy is mainly based on agriculture and livestock. The livestock sector occupies 80 % of active population and contributes for 18 % in the GDP (MRA, 2011). This contribution positions this sector as one of the economic activity which presents real opportunities on national and international market.

For a long time, raising domestic animals was considered as a rural activity but nowadays small ruminants is an activity practised in cities as Ouagadougou and its surrounding (Kaboré et al., 2011). This type of raising usually called urban or perurban raising is very important because it permits to satisfy a part of the needs in animal proteins of the population in perpetual increasing and to procure cash incomes to the smallholder farmers. In addition, this raising offers an opportunity of jobs to the young that want to invest in the livestock. Unfortunately, it is confronted to various constraints among which the food and the diseases of domestic animals whose the strength is important in

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perurban of Ouagadougou. In small ruminants composed of 161 867 sheep and 244 120 goats, this raising is practiced by 46.7% breeder according to an improved system for the production of meat in the perurban of Ouagadougou (MRA, 2004).

Currently, natural fodders constitute the basis of animal feed for breeders in the perurban of Ouagadougou where the lack and the low productivity of natural grazing and the urbanization constitute problems for raising animal. In addition, the increasing demand of the vegetable products entails the reduction of pastoral areas. Besides, concentrates are expensive and often unavailable. This report brought the majority of breeder to exploit natural resources (herbaceous and woody) as food for their animals. This situation associated to the importance of this perurban raising entailed the development of market sites of fodder in order to satisfy the feed of raised animals by people. The present survey was carried out in the city of Ouagadougou to understand the dynamics of this activity in view to establish the functioning and to make propositions of improvement. The main objectives of this study were to:

- identify the sites of natural fodder markets in the perurban of Ouagadougou in order to inventory the green fodders marketed by defining their potential activity in traditional veterinary pharmacopoeia;
- determine the chemical composition of those natural green fodders and their infestation level in gastrointestinal nematodes.

## MATERIALS ET METHODS

### Study area

This study was carried out in the city of Ouagadougou situated in Sudan-sahel area of the country. The climate is characterized by a short rainy season (3-4 months). The average annual rainfall oscillates between 600 and 800 mm. The average temperatures are 34°C in April-May with maxima of 42°C and oscillate between 21-28°C from December-January and in rainy season.

The vegetation of the area is a shrub savanna and clear forests characterized by ligneous species (*Butyrospermum parkii*, *Parkia biglobosa*, etc.) and herbaceous species (*Loudetia togoensis*, *Pennisetum pedicellatum*, etc.).

### Methodology of study

Three seasons adapted of Kaboré-Zoungrana et al. (2008) were considered: the rainy season (RS) (june-september), the cold-dry season (CDS) (october-february) and the hot-dry season (HDS) (march-may). Three investigations were carried out in each season: field survey, determination of chemical composition of green natural fodders and the determination of their

intensity of infestation in gastrointestinal nematodes.

### Field survey

Surveys were made among sellers and buyers of green natural fodders. Beforehand, a documentary research followed by a pre-investigation of exploratory type allowed to identify the market sites of green natural fodders in the perurban of Ouagadougou and to establish a list which served as base of sampling for surveys.

On the market sites identified, surveys were realized on actors' random sample (sellers and buyers). For that purpose, a formal questionnaire was elaborated and administered with the sampled actors. The parameters investigated were the profile of the actors, the places of sale, the species of green natural fodders marketed, their places of harvest, their sale prices, their use in traditional therapeutic in animals and the activity constraints.

### Chemical composition values of green natural fodders

A composite sample of 500 g of a mixture of each specie green natural fodder was taken on the market sites. This sample was put in bag and labelled indicating the date, the name of point market, the specie and the green weight. At once, the collected samples were forwarded in the laboratory for analyses. Each green natural fodder was dried before, ground to a fine powder and analysed for dry matter (DM), organic matter (OM), Mineral Matter (MM) and crude protein (CP) (N\*6.25) using standard AOAC methods (AOAC, 1985). Acid detergent fibre (ADF) and neutral detergent fibre (NDF) were determined according to Van Soest et al. (1991). Crude fibre CF was determined according Kaboré-Zoungrana (1995) cited by Nanglem (2001).

### Intensity of infestation in larvae (L<sub>3</sub>) of green natural fodders

To quantify the intensity of infestation in gastrointestinal nematode in larvae (L<sub>3</sub>), a sample of green natural fodder (500 g) was collected on market site. The collected samples were identified, weighed and forwarded in the laboratory to determine the intensity in larvae (L<sub>3</sub>) (per kilogram of green fodder weight) in each fodder according to Hansen and Perry (1994)

### Statistical Analysis

Collected data were coded and analysis for a descriptive statistics and subjected to analysis of variance (ANOVA) using CoStat, version 6.204 for CoHort Software at 5%.

**Table 1.** Natural fodders markets surveyed in Ouagadougou

Saisons	Sites*
Rainy season	Baskuy, Bouens-yaaré, Patte d'oie, Tabtenga, Tanghin
Cold dry season	Bangr-weogo, Bouens-yaaré, Patte d'oie, Tabtenga
Hot dry season	Bangr-weogo, Baskuy, Bouens-yaaré, Patte d'oie, Tabtenga, Tanghin

\* : in local names

**Table 2.** Social Profile of the actors of green natural fodder markets in the city of Ouagadougou

Parameters	Respondents	
	Sellers	Buyers
Number	106	77
Sex (%) :		
- femelles	5.7	9.1
- males	94.3	90.9
Education (%) :		
- illiterate	76.5	36.4
- literate	23.5	63.6
Age (years)	43.6 ± 14.8	41.5 ± 13.1

## RESULTS

### Market sites

In the city of Ouagadougou, six market sites of natural fodders were identified (table 1). In these sites, 106 sellers and 77 buyers were interviewed during the surveys.

### Profile of respondents

Table 2 gives the social profile of the interviewed actors of fodder marketing in the area of study. We notice that the women are the actresses the least represented in this activity in the city of Ouagadougou. The total percentage of the sellers investigated during the study was 48.1 % in rainy season, 30.2 % in cold dry season and 21.7 % in hot dry season. Majority of these actors achieve both functions of collectors and sellers without any intermediary. The green natural fodders were harvested in the fallows, the protected areas, the shallows and the surrounding of villages (table 3 and 4).

The distances between the market sites and the harvest sites of those fodders vary between 100 m (Park of Bangré-weogo) and 60 km (surrounding of Nag-bangré village).

In the city of Ouagadougou, fodder buyers are from various social categories: state employees (34.2), tradesmen (32.3%), traditional breeders (31.5%), housewives (1.3%) and other individuals (0.7%). Fodders bought by these actors are used to feed various domestic animals composed by sheep (78%), goats (9.8%), horses

(6%), cattle (4.9%) and donkeys (1.3%). According to the buyers, fodders are purchased in all the seasons. Their consumption did not caused health problems to animals for 78.6% of investigated buyers against 21.4% which noticed diarrhoeas as digestive disorders to animals in the rainy season and in the cold dry season.

72.5 % of the buyers find the prices affordable, particularly in rainy season when fodders are abundant and available in pastures. The figure 1 shows that harvested average quantity decreases from rainy season (75%) to hot dry season (60%), translating the availability importance. On the other hand, the sale and the sale price increase during the same periods.

### Species and medicinal activities

#### Species

Fifteen (15) species of green natural fodders composed of eight (8) gramineous and seven (7) leguminous and belonging to nine (9) botanical families were sold during the three seasons in the city of Ouagadougou (table 5). Only the species of *Cynodon dactylon*, *Oriza barthii* and *Oxocarium cubens* are the three species that were sold in all the seasons.

Besides, the most available of the green natural fodders on the six market sites are gramineous (64.5%), in particular *Pennisetum pedicelatum* (25.4%) followed by *Oriza barthii* (20.9%) and *Oxocarium cubens* (16.4 %). For the leguminous (35.5%), *Exclipta prostrata* (32.8%), *Ipomea eriocarpa* (19.7%) and *Ludwigia cubens* (17.2%) are the most frequent on the market sites.

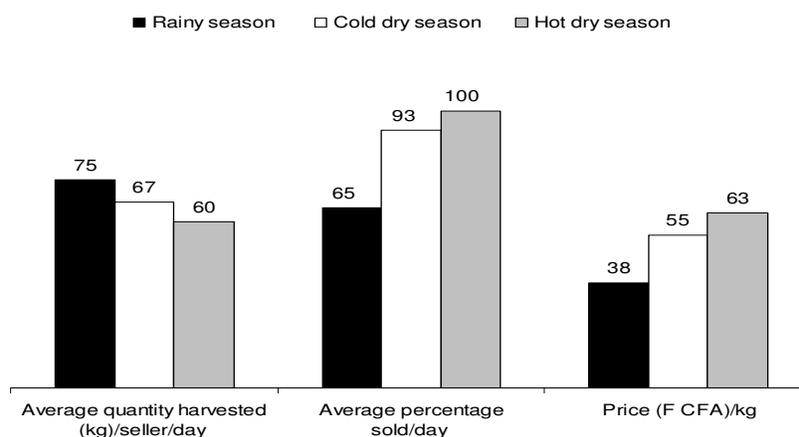
**Table 3.** Green natural fodders harvesting sites according to the seasons

Harvest sites*	Rainy season (RS)	Cold dry season (CDS)	Hot dry season (HDS)
Bangr-wéogo	-	X	X
Baskuy	-	X	-
Yagma	X	-	-
Bassinko	X	-	-
Boulbi	X	X	X
Komsilga	X	-	-
Boulmiougou	X	-	-
Kamboinsé	X	-	-
Kossodo	X	X	X
Kouritenga	X	-	-
Loumbila	X	X	X
Nag-bangré	X	X	X
Nakamtenga	X	-	-
Université de Ouaga	X	-	-
Ouaga 2000	X	-	-
Tanghin	X	X	-
Pabré	-	-	X
Pissi	X	-	-
Ponsomtenga	X	-	-
Projet Zaca	X	-	-
Rimkèta	-	X	-
Saaba	X	-	-
Tabtenga	-	X	-

\* : in local names    x : exploited    - : not exploited

**Table 4.** Places of harvest of green natural fodders according to the seasons

Seasons	Places of harvest
Rainy season	fallows, protected areas and surrounding of villages
Cold dry season and hot dry season	protected areas and shallows

**Figure 1.** dynamics of market of green natural fodder markets according to the seasons in the city of Ouagadougou

For the harvest of these natural fodders, the used material is the sickle (94.7 %), the hand (4.7 %) and the

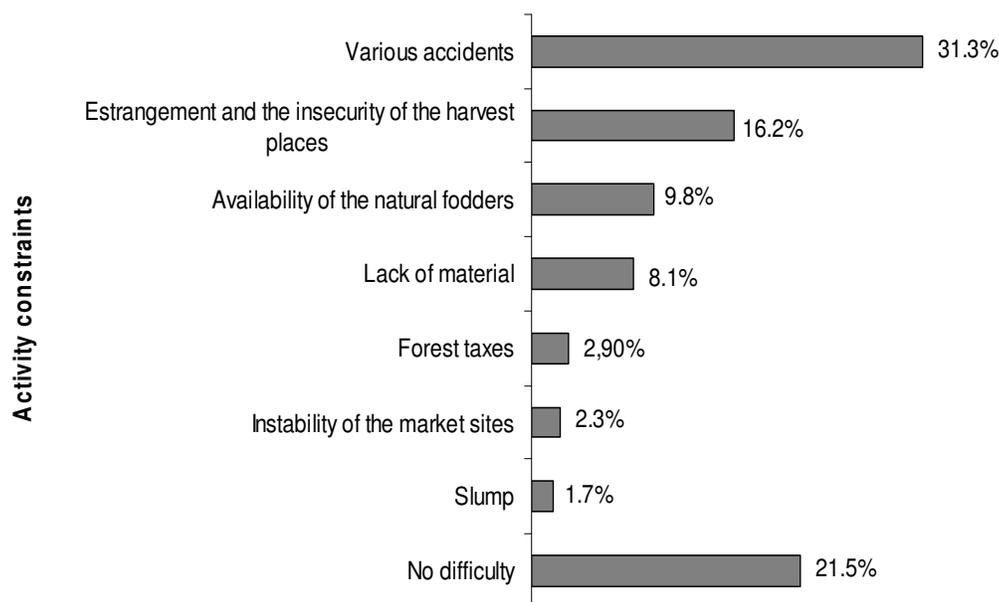
knife (1.7 %). Their transport from the sites of harvest to the market sites is achieved by barrows (0.6 %), carts (8.1

**Table 5.** Green natural fodders marketed according to the seasons in the city of Ouagadougou

<b>Names of Fodders</b>					
<b>Botanic</b>	<b>Local *</b>	<b>Families</b>	<b>RS</b>	<b>CDS</b>	<b>HDS</b>
<i>Alysicarpus ovalifolius</i>	Remsa	Fabaceae	x	-	-
<i>Andropogon gayanus</i>	Pitou	Poaceae	x	-	-
<i>Brachiaria sp.</i>	Koala	Poaceae	x	-	-
<i>Cassia obtusifolia</i>	Katrinagouni	Mimosaceae	-	-	x
<i>Commenlina benghalensis</i>	Bouanga	Commenlinaceae	-	x	-
<i>Cynodon dactylon</i>	Kuitamsom	Poaceae	x	x	x
<i>Eleusine indica</i>	Targanga	Poaceae	x	-	-
<i>Exclipta prostrata</i>	Roumba	Asperaceae	-	x	x
<i>Ipomega eriocarpa</i>	Guiniguitou	Convolvulaceae	x	-	x
<i>Ludwigia cubens</i>	Molissé	Onagraceae	-	x	x
<i>Oriza barthii</i>	Banguinsango	Poaceae	x	x	x
<i>Oxocarium cubens</i>	Roda	Cyperaceae	x	x	x
<i>Pennisetum pedicatum</i>	Kiemgo	Poaceae	x	-	-
<i>Polygonum lanigerium</i>	Kuitaba	Polygonaceae	-	x	x
<i>Rottboelia oxaltata</i>	Kalyanga	Poaceae	-	x	-

x : Present - : absentee \* : in local names

RS: Rainy season CDS: Cold dry season HDS: Hot dry season

**Figure 2.** Main constraints of green natural fodders marketing in the city of Ouagadougou.

%), motorcycles (9.8 %), bikes (73.8 %) and on the head (7.5 %).

### Main constraints of the activity

According to 21.5 % of the sellers, the activity presents no constraints. For the others (78.5 %), the main constraints of the activity are presented in the figure 2.

The most important are the accidents (31.3 %) and the estrangement and the insecurity of the harvest places of fodders (16.2 %).

### Fodder species of medicinal interest

Among all the fodder species quoted by the sellers during the study, three species are used as medicinal plants. Table 6 presents these plants, the treated diseases and

**Table 6.** Natural fodders with their medicinal effect and their methods of use

Names of fodders		Treated diseases	Treated animals	Parts used	Method of administration
botanic	Local *				
<i>Commelina benghalensis</i>	Bouanga	Diuretic	All animal species	whole plant	<i>Per os</i>
<i>Ipomega eriocarpa</i>	Guiniguitou	Constipation	Small ruminants	whole plant	<i>Per os</i>
<i>Pennisetum pedicellatum</i>	Kiemogo	- Wounds / wound - Antiparasitic	- All animal species - All animal species	- plante entière - plante entière	- apply on the wound - <i>Per os</i>

\* : in local names

the methods of use. The collected information has been provided by three respondents because the others refused to share their traditional knowledge on medicinal plants.

### Intensity of infestation in larvae (L<sub>3</sub>)

The results of parasitological analysis carried out on the samples collected in the six market sites showed no larvae L<sub>3</sub> of gastrointestinal nematode parasites during all seasons of the study.

### Chemical composition of green natural fodders

The average values of chemical constituents in the green natural fodders available on the market sites during the study are summarized in table 7. For gramineous, the averages values of chemical constituents vary between 93.6-96.9 % for dry matter (DM), 8.9-17.7% for mineral matter (MM), 82.2-91.0% for organic matter (OM), 6.5-17.4% for crude protein (CP) and 27.4-31.3% for crude fibre (CF). For leguminous, these values vary between 94,1-97,1% for DM, 9,0-16.1% for MM, 83.8-90,6% for OM, 8.7-21.3% for CP and 11.9-22.7% for CF. For all fodder species marketed during all season, the averages values varied significantly ( $P < 0.05$ ) with the season. *Rottboelia exaltata* (17.4 %) and *Bracharia sp.* (14.8 %) were the species containing the strongest values of crude proteins for the gramineous and *Commenlina benghalensis* (21.3 %) and *Alysicarpus ovalifolius* (18 %) for the leguminous. Besides, average value of crude fibre in all fodders is relatively low.

## DISCUSSION

Marketing practice of green natural fodders in the city of Ouagadougou is an activity achieved by men and women to satisfy the daily needs of family. In our study, the high proportion of men compared to the women practicing this

activity could be explained by their capacity to travel a long distance to harvest the green natural fodders contrary to the women.

Besides, the sensitive reduction of the number of sellers of green natural fodders observed from the rainy season to the dry season could be due to the rarity of the natural resource and to the constraints for its harvest.

Towards the obtained information, the main constraints of the sellers are essentially at two levels. First, the accidents that occur at the places of harvest (snakes, bites of insects, thorns) and on the roads during the transportation of fodders. Secondly, the instability of the market sites that entails the insecurity indirectly. Probably, all these constraints would explain more the weak number of women that practices this activity of green fodders marketing.

In our study, 97.1% of the respondents refused to share their knowledge on the medicinal activities of the fodder species marked. It is can be due to their distrust. To mitigate this problem, it would have been necessary to associate the contribution of the extension agents of breeding of the area for the good quality of the social relationships that exists between them and the sellers of fodders (Abadome, 1994; Barry et al., on 2001). The medicinal activities of three forage plants indicated by the respondents order to be verified their effect by scientific approach because they are advantages or potentialities to be exploited against animal diseases. So, it is necessary to carry out biological assays to validate the efficiency of the proposed recipes.

We notice in our study that the proportion of the buyers of green natural fodders whose main activity is not animal breeding is more important than the proportion of traditional breeders (68.5 % against 31.5 %). In our opinion, this report must be taken into account by the technical authorities in charge of promoting animal raising in the perurban area of Ouagadougou in order to satisfy the population's needs in animal proteins

On the market sites, the number of sellers are high than that of the buyers in rainy season compared to the dry season. The market structure in this period of rainy season is characterized by the fact that the small number

**Table 7.** Average values (extremes) of chemical constituents of green natural fodders marketed in the city of Ouagadougou

N°	Nom du fourrage naturel vert	Type	Averages of chemical constituents (extremes) (%DM)						
			DM (%)	MM	OM	CP	NDF	ADF	CF
1	<i>Alysicarpus ovalifolius</i>	Leguminous	94.1 (94.0-94.2)	9,0 (9,2-9,3)	90,6 (90,0-90,7)	18 (17,8-18,2)	50,6 (50,5-50,6)	39,1 (39,0-39,1)	22,7 (22,6-22,7)
2	<i>Andropogon gayanus</i>	Gramineous	95.1 (95.0-95.2)	8,9 (8,8-9,1)	91,0 (90,8-91,1)	6,5 (4,0-9,12)	69,5 (69,4-69,5)	33,5 (33,4-33,5)	31,3 (31,2-31,3)
3	<i>Brachiaria</i> sp.	Gramineous	94.7 (94.5-94.9)	16,1 (16,1-16,2)	83,8 (83,7-83,8)	14,8 (13,1-16,6)	63,4 (63,3-63,4)	36,7 (36,6-36,7)	28,5 (28,4-28,5)
4	<i>Cassia obtusifolia</i>	Leguminous	96,7 (96,0-97,7)	13,4 (13,1-13,7)	86,5 (86,2-86,8)	17,8 (17,1-18,5)	38,6 (38,5-38,6)	33,6 (33,5-33,6)	17,4 (17,3-17,4)
5	<i>Commenlina benghalensis</i>	Leguminous	95,5 (95,5-95,6)	14,7 (14,7-14,8)	85,2 (85,1-85,2)	21,3 (20,6-22,0)	34,8 (34,7-34,8)	32,6 (32,5-32,6)	15,6 (15,5-15,6)
6	<i>Cynodon dactylon</i>	Gramineous	96,9 (94,8-99,5)	13,5 (9,4-19,6)	86,4 (80,3-90,5)	13,3 (10,2-15,9)	60,9 (52,6-66,9)	34,1 (28,9-43,7)	27,4 (23,7-30,1)
7	<i>Eclipta prostrata</i>	Leguminous	97,0 (94,9-99,1)	16,1 (11,5-20,8)	83,8 (79,1-88,4)	13,9 (11,0-16,9)	26,5 (25,8-27,2)	21,5 (20,9-22,1)	11,9 (11,6-12,2)
8	<i>Eleusine indica</i>	Gramineous	93,8 (93,7-93,9)	9,7 (9,5-9,9)	90,2 (90,0-90,4)	13,4 (11,6-15,2)	62,1 (62,0-62,1)	34,1 (34,0-34,1)	27,9 (27,8-27,9)
9	<i>Ipomea ericarpa</i>	Leguminous	94,2 (93,4-95,0)	11,5 (9,3-13,5)	88,4 (86,4-90,6)	11,9 (8,3-15,2)	39,4 (33,7-45,0)	28,8 (20,8-36,8)	17,7 (15,1-20,2)
10	<i>Ludwigia cubens</i>	Leguminous	95,2 (94,5-95,9)	14,6 (14,1-15,2)	85,3 (84,7-85,8)	17,6 (15,8-20,0)	36,7 (34,0-39,4)	32,1 (27,9-36,4)	16,5 (15,3-17,7)
11	<i>Oriza bathii</i>	Gramineous	96,8 (94,2-99,2)	16,5 (12,9-18,8)	83,4 (81,1-87,0)	9,0 (6,4-11,2)	60,9 (56,1-69,0)	34,9 (32,9-36,3)	27,4 (25,2-31,0)
12	<i>Oxocarium cubens</i>	Gramineous	94,4 (93,7-95,3)	13,0 (8,6-20,4)	86,9 (79,5-91,3)	12,6 (6,4-16,0)	65,1 (56,1-69,0)	46,6 (35,7-61,7)	29,3 (25,3-31,4)
13	<i>Pennisetum pedicelatum</i>	Gramineous	93,6 (93,5-93,7)	17,7 (17,4-17,9)	82,2 (82,0-88,6)	11,2 (11,0-11,3)	62,1 (62,0-62,1)	34,9 (34,8-34,9)	27,9 (27,8-27,9)
14	<i>Polygonum lanigerum</i>	Leguminous	97,1 (95,0-99,2)	11,5 (11,3-11,7)	88,4 (88,2-88,6)	8,7 (6,2-11,8)	38,4 (36,1-40,6)	34,1 (29,9-38,2)	17,2 (16,2-18,3)
15	<i>Rottboelia exaltata</i>	Gramineous	94,1 (94,0-94,1)	14,2 (14,1-14,3)	85,7 (85,6-85,8)	17,4 (17,1-17,7)	69,3 (69,2-69,3)	41,1 (41,0-41,1)	31,2 (31,1-31,2)

DM: Dry Matter MM: mineral matter OM: organic matter CP: crude protein CF: crude fibre NDF: Neutral Detergen Fiber  
ADF: Acid Detergen Fiber CF: Crude Fiber

of buyers that seem to govern the prices of green fodders available. This situation results in a low sale price of the products and sometimes slumps. In hot dry season, the tendency takes more advantage for sellers because their low number and the high needs of the buyers in fodders which the prices are sharply affordable compared to the concentrates.

The digestive disorder (diarrhoea) observed in animals during rainy season and cold dry season following the consumption of green natural fodders could remind a gastrointestinal parasitism due to the infestation in larvae L<sub>3</sub> of fodders consumed. Indeed, gastrointestinal nematode parasites present a high hyperactivity during this period in the area of study according Belem et al. (2005a,b). However, the parasitological analysis done on the samples of fodders collected on the market sites didn't present any larvae L<sub>3</sub>. Two possible interpretations can explain this report. First, we could conclude that the harvest sites of green natural fodders are not usual pasture places of the ruminants raised in the study area. Secondly, we can suppose that diarrhoea observed in animals by the buyers would be due to quality of fodders. Thus, it would be necessary to carry out studies to identify the causes of this digestive disorder in animals.

Our results of chemical constituents of *Rotboelia exaltata*, *Pennisetum pedicellatum* and *Andropogon gayanus* are superior to those reported by Béchir et al. (2010) in Tchad. The averages contents of *P. pedicellatum* constituents are similar to those of Bokoum (2000) in the perurban of BoBo-Dioulasso, Burkina Faso. This variation of chemical component of these fodder species between the two countries could be explained by the quality of soils and the vegetative cycles of the plants. In the study, all the green natural fodders present a relative low fiber content associated with a relative high content in crude protein and mineral matters, limiting factors of the ruminant productions in the country (Gnanda, 2008). Except *Andropogon gayanus*, the contents of all the fodders in crude protein were superior to 8 %, the required standard to obtain optimum rumen function (Van Soest, 1994 cited by Alonso-diaz, 2009). The high content in CP observed in leguminous is probably due to their root systems which permit to exploit soils nutriment and their capacity to fix the atmospheric nitrogen. The low decrease of average contents of constituent observed in the fodders exploited during all season might be explained by their vegetative cycle at the time of harvest. Indeed, this finding showed that this stage goes from the headrug to the flowering/upstream, period also observed by Bougoum (2000) on natural fodders marketed in the perurban of Bobo-Dioulasso, where the selling prices of the natural fodders are lower to those of this study. This report could be due to the area of Bobo-Dioulasso where the annual rainfall is superior to 900 mm (Ouadba, 1997) and presents a lot of natural grazing for the animals.

## CONCLUSION

In conclusion, the study revealed the existence of fodders marketing by people with a high number of natural green fodders for animals in the city of Ouagadougou as animal feed. These fodders possess contents in chemical constituents' especially crude protein to valorize in the strategies of small ruminant feed to satisfy their nutritional needs in order to improve their production. Indeed, while waiting for the development of the forage cultures that is little applied in the country (MRA, 2011), the constitution of fodder reserves from the natural resources is a necessity if we want to improve the productions by covering the needs of production. Thus, it is necessary to carry out in-depth botany and digestibility studies of these fodder species in view of their characterization. This will permit to popularize them through a good strategy supplementation to improve sustainable animal productions in all season.

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## REFERENCES

- Abadome F (1994). Précautions méthodologiques. L'enquête et la fiche: quelques indications à l'intention de l'enquêteur en pharmacopée traditionnelle vétérinaire. In: *Métissages en santé animale de Madagascar à Haïti*. Actes du Séminaire d'éthnopharmacopée vétérinaire « KAGALA », un partage de savoirs. Eds Kasonia K. et Ansay M. Burkina Faso, Ouagadougou, 15-22 avril 1993. Presse universitaire de Namur/CTA/ACCT. 111-118.
- Alonso-Díaz MA, Torres-Acosta JFJ, Sandoval-Castro CA, Hoste H, Aguilar-Caballero AJ, Capetillo-Leal CM (2009). Sheep preference for different tanniniferous tree fodders and its relationship with *in vitro* gas production and digestibility. *Animal Feed Science and Technology*, 151: 75–85
- AOAC (1985). Association of Official Analytical Chemists. Official Methods of Analysis 12th ed. Washing, D.C.
- Barry MS, Oularé K, Diallo A, Camara Y, Camara M, Baldé MA (2001). La médecine traditionnelle au Fouta Djallon: République de Guinée. *Revue Méd. Pharm. Afr.*, Vol. 15, 95-102.
- Béchir AI, Grimaud P, Kaboré-Zoungrana C (2010). Facteurs de variation du poids vif et de l'état corporel du zébu Arabe en zone soudanienne du Tchad. *Sciences & Nature*, 7(2): 143 – 153.
- Belem AMG, Kaboré A, Bessin R (2005a). Gastrointestinal helminthes of sheep in the central, eastern and northern parts of Burkina Faso. *Bull. Anim. Hlth. Prod. Afr.*, 53: 13-23.
- Belem AMG, Kaboré A, Bessin R (2005b). Variations saisonnières des helminthes gastro-intestinaux chez la chèvre du plateau central du Burkina Faso. *Revue Elev. Méd. Vét. Pays trop.*, 58(1-2): 37-43.
- Bokoum A (2000). Contribution des issues de céréales et des fourrages dans l'alimentation des animaux des élevages périurbains. Mémoire de fin d'études IDR, Université Polytechnique de Bobo-Dioulasso/Burkina Faso, 92 pages.

- Gnanda BI (2008). Importance socio-économique de la chèvre du Sahel burkinabé et amélioration de sa productivité par l'alimentation. Thèse de Doctorat Unique en Développement Rural, option Système de Production Animale, Spécialité Nutrition et alimentation, Institut du développement rural (IDR), Université polytechnique de Bobo-Dioulasso (UPB), Burkina Faso. 188pages+annexes.
- Hansen J, Perry B (1994). The Epidemiology, Diagnosis and Control of Helminth Parasites of Ruminants. ILRAD/ILCA, 2<sup>d</sup> édition, Addis Abéba, 171 pages.
- Kaboré A, Traoré A, Gnanda BI, Nignan M, Tamboura HH, Belem AMG (2011). Constraints of small ruminant production among farming systems in periurban area of Ouagadougou, Burkina Faso (West Africa). *Advances in Applied Sciences Research*, 2(6):588-594.
- Kaboré-Zoungrana C, Diarra B, Adandedjan C, Savadogo S (2008). Valeur nutritive de *Balanites aegyptiaca* pour l'alimentation des ruminants. *Livestock Research for Rural Development* 20 (4). Consulté le 30/12/2011.
- MRA (Ministère des Ressources Animales) (2004). Deuxième enquête nationale sur les effectifs de cheptel, tome II. Ouagadougou/Burkina Faso, 86 pages.
- MRA (Ministère des Ressources Animales) (2011). Rapport annuel d'activités du ministère des ressources animales, Année 2010. Ouagadougou, 32 pages.
- Nanglem NS (2001). Evaluation de la production de biomasse ligneuse accessible au caprins. Mémoire de fin d'études IDR, Université Polytechnique de Bobo-Dioulasso/Burkina Faso. 105 pages.
- Quadba JM (1997). Elaboration d'une monographie nationale sur la diversité biologique: Collecte de données biologique, considération écologiques. Minist. Envir. et de l'Eau, Ouagadougou, p. 45.
- Van Soest PJ, Robertson JB, Lewis BA (1991). Methods for dietary fiber, neutral detergent fiber, and nonstarch polysaccharides in relation to animal nutrition. *J. Dairy Sci.* 74: 3583–3597.