Forage plants in Daloa city livestock market: specific diversity, market practices and economic land

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Abstract— *The sale of forage is little known to the majority of people in Côte d'Ivoire. The target of the study is to identify the forage species marketed in the livestock markets of Daloa and to estimate the financial profitability of this activity in the socio-economic life of the actors of the sector. Semi-structured surveys were conducted from September to December 2018 among 45 vendors in the forage marketing chain. Nine forage species divided into five genera and four families were identified. The study showed that these plants come from the non-agglomerated areas of the city, fallows and old plantations. The main species are f forage Moraceae, especially Ficus exasperata, highly sought after by customers. The average selling price of a forage species boot is around 100 to 150 FCFA. The estimated average daily financial income per player is FCFA 750 and varies between 18,750 to FCFA 37,500 per month for a monthly average of FCFA 26,125 and oscillate between 225,000 to FCFA 450,000 for an annual average of 313,500 FCFA. However, although the harvesting and sale of forage trees is a pathway generating substantial income, it is a source of degradation of plant formations already overexploited in Côte d'Ivoire.*

Keywords— Forage plants, livestock markets, financial income, actors, Daloa, Côte d'Ivoire.

I. INTRODUCTION

In Côte d'Ivoire, the economy is essentially based on agriculture, which employs more than 2/3 of the active population, and contributes 34 percent of total GDP and export income for 66 percent [1].

Livestock farming, which for a long time remained the poor relation of Ivorian agriculture, is enjoying renewed interest. Despite the difficulties encountered, the animal resources sector contributes about 4.5 percent to agricultural GDP and 2 percent of total GDP, and employs around 360,000 people [2]. Livestock farming is practiced throughout the Ivorian territory and plays an important role in the national economy.

Today, the coverage rate of national meat and offal requirements is 26.69 percent and will increase to 61.62 percent, a challenge that remains to be achieved for Côte d'Ivoire by 2020 [1]. In this perspective, in many Ivorian cities, there is no less important livestock markets, where urban and traditional livestock farming activities, whether for-profit or not, are carried out by the population [3].

Activities in these livestock markets make an essential contribution to the domestic economy of cities [4-5]. Also, the feeding of domestic ruminants remains a challenge to be mainly forage spontaneous plants from the islets of natural formations and fallow land in the peripheral areas of cities in the tropical regions of Africa [6].

According to [7], the grazing of spontaneous species from these natural formations is generally the only way to feed cattle, sheep and goats in urban areas. Indeed, in these African cities, and in particular in Daloa, for livestock feed requirements, livestock owners are resorting more and more to forage crops. They are collected very often in areas not yet agglomerated in the city, fallows or lowlands and sold on livestock markets of small ruminants. The main issue is the financial profitability of commercial forage activity in urban Daloa.

This study is a contribution to the collection of useful information on the collection and sale of forage crops in Daloa livestock markets. The general target of this study is to identify the forage species marketed on the Daloa cattle markets and to estimate the financial profitability of this activity in the socio-economic life of the actors of the sector.

Specifically, this will involve: (1) investigating forage plants marketed in livestock markets in the City of Daloa; (2) identifying forage species sold; (3) knowing their areas of provenance and (4) estimating the financial profitability of this activity of collection and sale of forage plants in the socio-economic life of the actors of the sector.

II. MATERIAL AND METHODS

2.1 Study sites

The study was conducted in Daloa, a city in west-central Côte d'Ivoire, in the Haut-Sassandra region with geographic coordinates of 6º53 N latitude and 6º27 W longitude (Figure 1).

[2]The climate of the study area belonging to the equatorial domain is of tropical type with two rainy seasons (april-july) and (september-november), two dry seasons (december-march) and (july-september). The rainfall varies 1300 mm between the driest month and the wettest month of 1800 mm.

The choice of this study area is justified by the fact that Daloa, because of its agricultural potential, is a cosmopolitan city where many ethnic groups coexist, some of which are traditionally breeders in which the activity of urban breeding is practiced. In addition, the transport of forage plants by means of various means is used on the urban roads in order to supply livestock markets for small ruminants and slaughterhouses. Also, in these markets, the marketing of forage plants is a daily practice that occupies more and more a certain frank of the population.

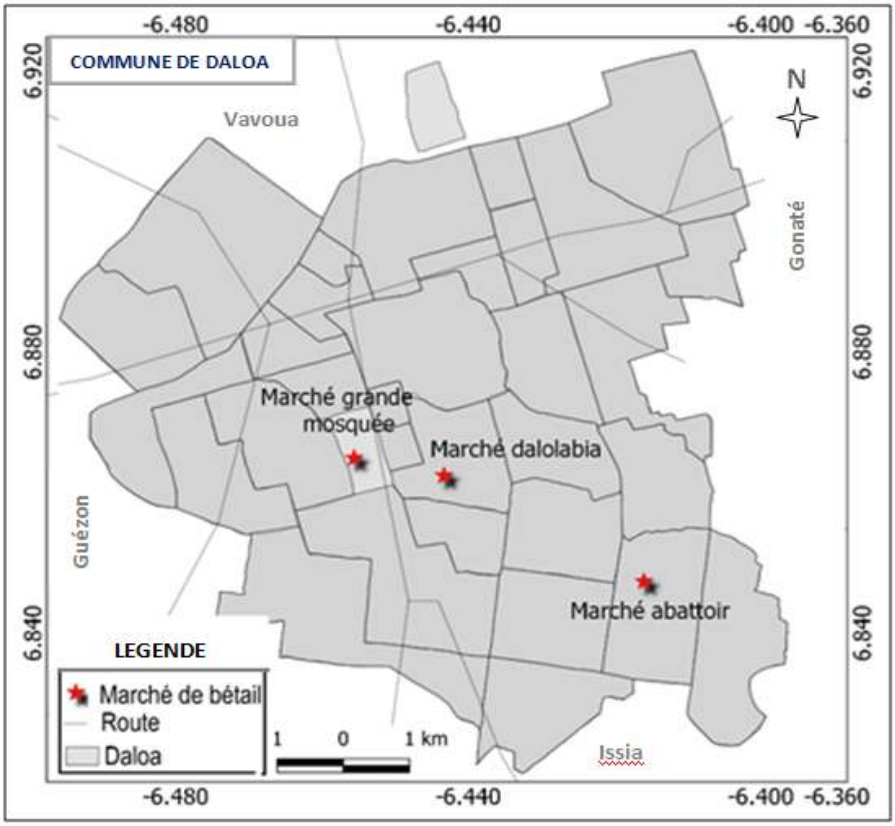

FIGURE 1: Presentation of survey sites in the city of Daloa

2.2 Surveys and identification of forage plant species

The investigations were conducted from september to december 2018 on three cattle markets in the city of Daloa with geographical coordinates: big mosque market (06º87, 203'N and 006º44, 341'W), slaughterhouse market (06º87, 411'N and 006º44, 853'W) and dololabia market (06º87, 309 and 006º44, 418'W) on which forage plants are sold for feeding to ruminants (Figure 1).

To conduct this study well, an exploratory survey was carried out in the city in september 2018 and allowed to identify 98 individuals, actors in the chain of sale of forage plants. These people served as a sampling base. From this basis, a random

draw was used to retain forty-five (45) forage vendors regardless of gender, age and ethnicity. Surveys of these forage vendors were conducted using semi-structured interviews.

The interview was conducted in French sometimes, in local languages with the help of interpreters, sometimes followed by sampling of commercialized forage plants.

The estimate of sales by bundles and not in kilograms of forage plants was made, first on the basis of the daily sale, then on the basis of the number of days of sale in the week, the value of sales per week, then by month and finally by year.

The sections of the survey sheet cover the socio-economic characteristics of the sellers of forage plants, their areas of provenance, the names of the forage species sold, the selling price of forage species and the profitability of the marketing activities of forage plants have been mentioned. The obtained plant samples were identified at the National Floristic Center (CNF) of Abidjan.

III. RESULTS

3.1 Socio-demographic characteristics of the sellers of the forage value chain

For this study, forty-five (45) actors in the forage chain were interviewers in three markets in the city of Daloa (Figure 2). The majority of the actors interviewed are men (100 percent). The age of the respondents varies between 23 and 52 years with a majority of over 46 years (Table 1).

The results of the surveys conducted on the marketing sites for woody forage species made it possible to identify the main strategic players in the fodder trade chain. These are simple transporters, simple collectors, collectors/sellers, wholesalers and customers (livestock traders). Of the 45 actors interviewed, 40 percent were men over 44 (Figure 3) and 46, 66 percent of young people over 25 years old.

For the forage traders surveyed, the sale of forage species is a permanent activity for 46.67 percent of salesmen with more than four (4) years of experience. Also, the sale of these forages is an activity carried out by several ethnolinguistic groups with a sub-regional predominance of two majority ethnic groups: Peuhl (31.11 percent of the ethnic groups) from Mali and 15.56 percent by the Mossis (Burkina Faso).

FIGURE 2: Slaughterhouse market and forage sale site in Daloa

TABLE 1
SOCIO-DEMOGRAPHIC CHARACTERISTICS OF THE INTERVIEWED OPERATORS

Characterstics		Number of individuals	Frequencies
Genus	Man	45	100
	Women	0	0
Age	≤ 25 years	3	6,67
	> 25 to ≤ 35 years	21	46,66
	> 35 to ≤ 45 years	18	40
	> 45 years	3	6,67
Year of experience	≤ 1 years	20	44,44
	> 1 to ≤ 5 years	21	46,67
	> 5 years	4	8,89
Level of study	Illiterate	36	80
	Primary	2	4,44
	Secondary	7	15,56
Main ethnic groups	Mossi	7	15,56
	Peul	14	31,11
Nationality	Burkinabe	13	28,89
	Ivorian	8	17,78
	Malian	24	53,33
Distribution of actors interviewed by market	Slaughterhouse market	11	24,44
	Big mosque market	25	55,56
	Dalolabia market	9	20
Distribution of actors encountered	Carriers	3	6,66
	Collectors / sellers	18	40
	Vendors wholesalers	8	17,77
	Customers	16	35,56

FIGURE 3: A forage trader interviewed in the livestock market in Daloa

3.2 Diversity of forage plants marketed

A total of nine (9) commercial forage species were identified (Table 2) in three (3) livestock markets in Daloa city (big mosque market, slaughterhouse market and Dalolabia market). These forage species are divided into five (5) genera and four (4) families. The most represented family is the family of Moraceae with five (5) species, either 55.56 percent (Table 2). Of

these nine (9) woody forage species, seven (7) are shrubs, either 77.78 percent, and two (2) are trees (22.22 percent). Ficus exasperata is the most sought-after and best-selling forage species on the three (3) markets.

TABLE 2
FORAGE SPECIES IDENTIFIED ON THE DALOA LIVESTOCK MARKETS

Scientific name	Family	Common names	Biological type	Interest
Albizia zygia (DC.) J.F Macbr	Fabaceae	Sili	Tr	**
Baphia nitida Lodd.	Fabaceae	Bènbe	Sh	*
Ficus capensis Thunb	Moraceae	Grattoir	Sh	**
Ficus exasperata Vahl	Moraceae	Grattoir, folokâ	Sh	***
Ficus sur Forssk.	Moraceae	Grattoir	Sh	**
Ficus umbellata Vahl	Moraceae	Popo	Sh	**
Ficus vallis-choudae Delile	Moraceae	Grattoir	Sh	**
Gmelina arborea Roxb. Ex Sm	Verbenaceae	Nanuyi, gopo	Tr	*
Griffonia simplicifolia (DC.) Benth.	Caesalpiniaceae	Npèku,	Tr	**

Tr - Tree; Sh - shrub; * - Lowly sought species; ** - Moderately sought species; ***- Highly sought after species

3.3 Areas of origin of fodder marketed in the city

In the three livestock markets, the main periurban forage supply routes identified are of the order of three (3). These are the Gonaté-Daloa, Vavoua-Daloa and Issia-Daloa road. The Gonaté-Daloa axis alone provides 68 percent of the supply of the three markets for spontaneous forage species. Among the nine (9) fodder species marketed, *Ficus exasperata* is the forage species highly sought after by all stakeholders in the value chain of forage species interviewed.

Survey results show that the marketed forage comes mainly from fallow land, small patches of natural formations, old plantations and fields along the major roads of the periurban areas of Daloa. These harvesting areas are generally located on a 15 km radius around the city of Daloa over the three (3) identified supply routes. Spontaneous forage plants are sold in bundles fresh and not in kg.

3.4 Economic impact of the forage trade

The marketing of fodder plants is an economic activity that generates a variable daily profit depending on the actors of the trade in forage species. The transport of forage trees to livestock markets is carried out using tricycles, motorcycles and bicycles (Figure 4).

Transport costs range from 250 to 1000 FCFA depending on the distance. Forage plants are sold fresh in bales (Figure 5). The unit price of sale of forage species /boot varies from 100 to 150 FCFA depending on the season and the various holiday periods.

The average daily income is 750 FCFA and ranges from 18,750 to 37,500 FCFA per month or an average of 26,125 FCFA and ranges from 225,000 to 450,000 FCFA per year, or an average of 313,500 FCFA (Table 3)

FIGURE 4: Collectors and transporters of forage plants using bicycles

FIGURE 5: Forage boots sold on livestock markets

TABLE 3
ACTORS IN FORAGE MARKETING AND ECONOMIC LAND

Title	Actors of the chain of sale of forage species									
	Single conveyors		Collectors / carriers		Single collectors		collectors / sellers		wholesalers	
	D	R	D	R	D	R	D	R	D	R
Average fodder transport cost / tricycle trip	250	1000	250	-	-	-	200	-	-	-
Average price for transporting 10 bunches of forage species	-	-	25	-	-	-	50	-	-	-
Average selling price of 10 fodder boots	-	-	-	1 300	-	-	250	1750	250	1150
Average daily income / actor of the sector	750		1275		400	1200	1500		900	
Average monthly income /sector actor (25 days)	18 750		31875		20 000		37500		22 500	
Average annual income /sector actor (300 days)	225 000		382 500		240 000		450 000		270 000	

D - Expense; R - Income

IV. DISCUSSION

The study of commercialized forage plants revealed nine (9) species belonging to five (5) genera and four (4) families. Studies have been conducted in some cities in Côte d'Ivoire and other cities in African countries on the sale of forage plants. In Mali, [8] and in Niger, [9] identified respectively 30 forage species belonging to 7 families in twenty-one markets in twenty-one markets and 34 species (14 families) in twenty-two points of sale in two cities. In Ivory Coast, [10] inventoried 37 forage species in 3 communes of the city of Abidjan. The number of species recorded is smaller and can be explained by the number of outlets and the cities where the surveys took place. Indeed, our investigations took place in the city of Daloa alone and only in three markets.

This study shows that the marketing of forage species in Daloa, which is not a new practice in Côte d'Ivoire, is practiced by men, either 100 percent of respondents. This result confirms those [11] realized on the marketing of spontaneous forage plants, especially trees and shrubs in the city of Bouaké, Côte d'Ivoire. But, it differs from those of [8] conducted in Burkina Faso, which revealed that 93 percent of the salespeople in the study sample were men and 7 percent women.

The results of the surveys show that the supply of the three livestock markets for forage crops is mainly provided by the periurban areas of the Gonaté-Daloa, Vavoua-Daloa and Issia-Daloa axes of the city of Daloa. Surveys indicate that the Gonaté-Daloa axis provides more than 55.89 percent of woody forage from fallows, old plantations and islands of natural formations.

Of the 45 stakeholders interviewed in the forage chain, most are nationals (82.22 percent) of neighboring countries (Mali and Burkina Faso). There is less Ivorian (17.18 percent) in this sector of activity. These results are consistent with the work of [12] on the Bouaké cattle market. This situation could be explained by the absence of pastoral tradition of Ivoirians populations, unlike nationals of neighboring countries, and also by the fact that Ivoirians are very little informed about the employment opportunities offered by the livestock sector.

The importance of commercial forage plants, as well as their economic benefits were recognized by the 45 actors interviewed in livestock markets in the city of Daloa. According to them, the average estimated financial income per day of an actor in the chain of sale of forage trees is 750 F CFA and varies between 18 750 to 37 500 F CFA per month, an average of 26 125 F CFA and oscillate between 225 000 to 450 000 F CFA, an average of 313 500 F CFA. As can be seen, the sale of forage plants is an essential source of income for many people who by this activity to meet their socio-economic needs as for any other job. These results are in agreement with the work of [3] which revealed a daily income of 875 F CFA, that is to say an average of 26 250 FCFA per month.

V. CONCLUSION

This work made it possible to know the forage sector, its actors involved in the marketing chain of ligneous fodder and the income derived from this sector. The forage species sold on the three (3) livestock markets in Daloa city are trees and shrubs

that belong mainly to the Moraceae families with five (5) species, either 55.56 percent. The supply of forage plants from the markets comes from the non-agglomerated areas of the city, fallows, islands of natural formations and old plantations especially on the Gonaté-Daloa axis. The commercialization of ligneous forage in the city is an economic activity which generates a significant profit for the actors of the sector and thus of the economic spin off per bundle of forage species sold varying on average 750 F CFA per day, either a monthly average of 26 125 F CFA. But, it is important to note that, although the harvesting and sale of woody forage plants generates substantial income, it is a source of degradation of natural formations already overexploited.

ACKNOWLEDGEMENTS

The actors of the livestock markets marketing chain investigated in this study (big mosque, Dalolabia and slaughterhouse battling markets).

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