WJARR

World Journal of
Advanced
Research and
Reviews

World Journal Series
INDIA

(RESEARCH ARTICLE)

Current ruminant feeding practices in N'Djamena livestock markets

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Abstract

In the context of rapid urbanization in Chad, the livestock markets of N'Djamena play a central role in the commercialization of ruminants. The deterioration of animal body condition during transportation to these markets makes on-site feeding essential to optimize their market value. This study aims to analyze current ruminant feeding practices in six livestock markets of N'Djamena to assess their effectiveness and propose avenues for improvement. A survey was conducted between July and October 2024 involving 50 randomly selected feed traders. Data were collected using a structured questionnaire and analyzed through descriptive statistics (Excel, Student's t-test). The results show that the majority of feed sellers are men (68%), with an average age of 42.4 years, and a high illiteracy rate (78%). The main feed types used include oilseed cakes (cottonseed and groundnut), cereal bran, peanut and cowpea haulms, sorghum stalks, and various types of straw. These feeds are primarily sourced from Moundou and the outskirts of N'Djamena. Distribution is collective, often using half-barrels (67%). Sheep (42.5%) and cattle (40%) are the most commonly fed species. A total of 97.5% of respondents consider the feeds effective, particularly the concentrates (cakes and bran), which promote rapid fattening and faster animal sales. Major constraints identified include the lack of feed preservation techniques (60%), the high cost of concentrates (40%), and insufficient storage infrastructure (30%). Feeding practices in N'Djamena's markets rely on locally available resources, combining concentrates with coarse forages. Despite their effectiveness, feed accessibility and preservation remain major challenges. It is recommended to develop appropriate storage infrastructures, train stakeholders, and secure peri-urban supply chains.

Keywords: Current ruminant feeding practices, Livestock markets; N'Djamena

1. Introduction

In sub-Saharan African countries, livestock plays a major economic and social role, representing an important source of income, food security and social stability (FAO, 2009). In Chad, ruminants (cattle, sheep, goats) are particularly important for the rural and urban economy. The city of N'Djamena, as the main urban Center, hosts several livestock markets where intense animal marketing activity takes place, often preceded by a short fattening phase on site.

However, the conveyance of animals from production areas to markets leads to stress, weight loss and reduced body condition (Anonymous, 2001). Thus, market feeding practices become essential to restore the condition of ruminants before they are sold. The food used is often derived from agro-industrial or agricultural by-products, distributed under varying conditions depending on the means of the traders-breeders.

This work aims to analyze current ruminant feeding practices in N'Djamena's livestock markets in order to improve animal performance and profitability for actors in the sector.

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2. Materials and methods

2.1. Study area

The study was conducted in N'Djamena, the political and administrative capital of Chad. Located in the Centre-West at the confluence of the Chari and Logone rivers, on the right bank of the Chari, it extends between 12- and 13°-degrees north latitude and 15- and 16°-degrees east longitude. The climate of the city is dry tropical with two seasons: the dry season and the rainy season (long and short respectively). The average annual rainfall was 928.2 mm for the year 2024. The average temperature is around 37°C, with a minimum of 18°C in January and February and a maximum of 45°C between April and May.

The city of N'Djamena is experiencing increasing urbanization. Its population was estimated at 993,492 in 2009, or 41% of Chad's urban population (MEP, 2009).

The study was conducted in six livestock markets in the city of N'Djamena between July and October 2024. These markets are strategic places for the sale of ruminants, attracting breeders, traders and consumers alike.
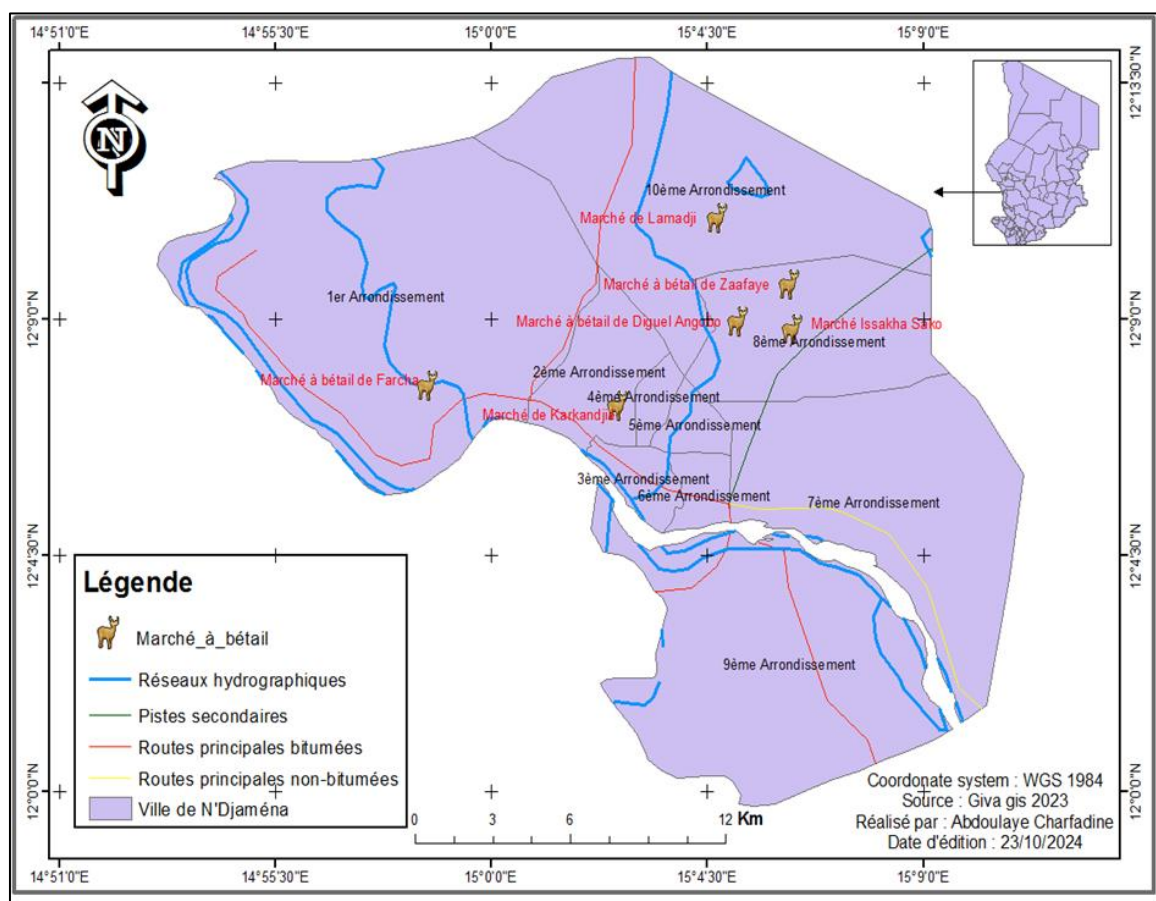

Figure 1 Map of Location of livestock markets in N'Djamena (CNRD, 2024)

2.2. Sampling and data collection

A sample of 50 livestock feed traders was randomly selected from the six markets. Data were collected using a structured questionnaire on the types of feed used, sourcing methods, distribution practices, costs, and perceptions of the performance of the animals being fed.

2.3. Data analysis

The data were processed by descriptive statistics (means, frequencies, percentages) using Excel software. Differences between food types were tested by comparisons of means (Student's test).

3. Results

3.1. Merchant Profile

68% of food vendors were men, with an average age of 42.4 ± 8.8 years. The majority (86 per cent) were married and 78 per cent were illiterate.

Table 1 Socio-economic characteristics of feed traders at livestock markets in N'Djamena

Character	Variable	Actual	Proportion (%)
Sex	Man	34	68
	Wife	16	32
Marital status	Married	33	66
	Other (single, divorced, widowed)	17	34
Level of education	Illiterate	39	78
	Primary	9	18
	Secondary	2	4
Religion	Muslim	50	100
Ethnic group	*Boulala*	22	44
	Gourane	13	26
	Daddy	8	16
	Others (*Masmadjé, Arab...*)	7	14
Activities	Food Sale	50	100
Criterion of motivation in the activity	Profitability, gain	50	100

The average age of the respondents was 42 ± 4 years. Males were older (43.6 years on average) than females (40.5 years) (P > 0.05). The average number of wives was 1.5 women with about 8 children and one dependant (Table III).

Table 2 Age and marital status of livestock feed traders in the markets of N'Djamena

Characteristics	Average	Standard deviation	Miniomum	Maximum
Age (years)	42.4	± 8.8	25	76
Number of wives	1.6	± 0.8	0	4
Number of children	7.9	± 5.4	0	24
Number of assets	0.8	± 0.9	0	4

Overall, the average length of time in the labor force was ± 10-6.02 years, with a minimum of 2 years and a maximum of 23 years (P < 0.05). In terms of work experience, the average duration of the activity of selling feed was 10.1 ± 6.1 years. Women (10.75 years) were on average more experienced than men (9.17 years) (P >0.05). They are older in the business of selling livestock feed than men. Males had an average of (9.17 years) versus (10.75 years) for females.

3.2. Types of food sold

The most common foods are cottonseed and groundnut cake, cereal bran (64%), followed by groundnut and cowpea tops, sorghum stalks, and various types of straw (Poaceae, Fabaceae).

Table 3 Type of feed marketed in the different livestock markets in N'Djamena

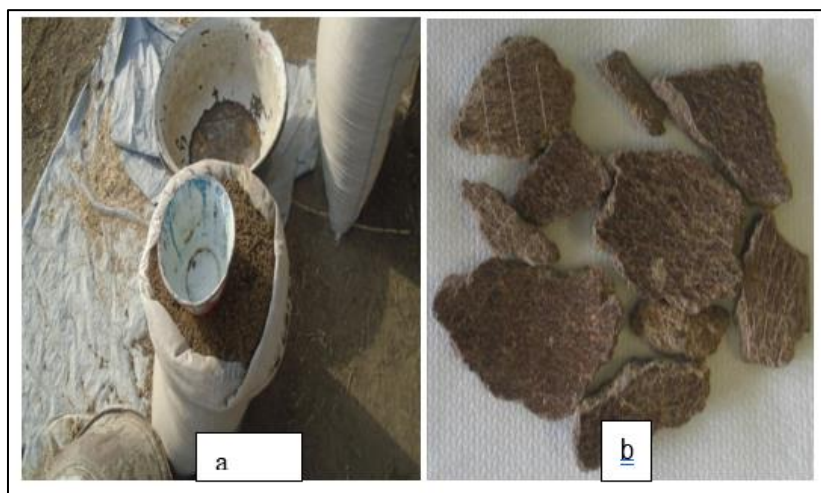| Character	Variable	Actual	Proportion (%)
Type of food marketed	Cottonseed/groundnut meal	17	34
	Cereal bran	15	30
	Sorghum stalks	7	14
	Grass straw, peanut tops	6	12
	Other (natron, rest kitchen)	5	10
Origin of food	City of Moundou	22	44
	N'Djamena peri-urban area	18	36
	N'Djamena urban area	10	20
Method of Acquiring Food	Purchase	42	84
	Harvest	8	16

Figure 1 Cottonseed meal (a) and groundnut meal (b) (Photo. Abdoulaye 2024)

Figure 21 Cereal bran sold by Koro in livestock markets (Photo: Abdoulaye 2024)

Figure 3 Sorghum stalks sold by bundle in livestock markets (Photo. Abdoulaye 2024)

Figure 4 Groundnut tops sold by the bag in livestock markets (Photo. Abdoulaye 2024)

Figure 52 Green grass straw (a) sold by the bunch and Dry grass straw (b) (Photo. Abdoulaye 2024)

3.3. Origin and frequency of supply

80% of the food comes from Moundou and the outskirts of N'Djamena. Supplies are daily (46%) or biweekly (38%).

Table 4 Feed supply in the various markets of N'Djamena

Character	Parameter	Squad(n)	Proportion (%)
Method of food delivery	50 Kg bag	19	38
	Koro	16	32
	2 Kg Forage Bundle	8	16

	Others (old utensil...)	7	14
Frequency of supply	Daily	23	46
	Twice a week	19	38
	Once a month	5	10
	Twice a month	3	6
Frequency of sale	Daily	35	70
	Three times a week	15	30
Feed supply period	All year round	36	72
	During the holidays	9	18
	Dry season	5	10
How food is stored	Bag	39	78
	Storage	11	22

3.4. Distribution of the food and species concerned

Sheep account for 42.5% of the animals fed, followed by cattle (40%) and goats (13.75%). Concentrates are served in half barrels (67%), while coarse feed is placed on the ground (18.8%). Feeding is done in groups in 100% of cases.

Table 5 Animal feeding practices at the livestock markets of N'Djamena

Character	Variable	Actual	Proportion (%)
Type of animals fed at market level	Sheep	34	42.5
	Cattle	32	40
	Goats	11	13.75
	Other	3	3.75
Category of animals fed	Poor sales	59	73.75
	Feeder animals	13	16.25
	Both at the same time	8	10
Feeding period	In all seasons	67	83.75
	During the holidays	8	10
	In the dry season	5	6.25
Type of food used	Forages (green and dry)	57	71.25
	Crop residues	23	28.75
Type of add-in used	Cottonseed cake	41	51.25
	Cereal bran	38	47.5
	Spent grains	1	1.25
Distribution method	In a group	80	100
	Half barrel	54	67.5

Equipment used for food distribution	On the ground	15	18.75
	Old utensil	11	13.75
Equipment used for water distribution	Half barrel	74	92.5
	Old utensil	6	7.5

The animal feed supplements in the markets of N'Djamena were served in half barrels. These containers were used both as feeders and waterers for the majority of the respondents (Figure 15).

Figure 63 Equipment used for food distribution (Photo: Abdoulaye 2024)

3.5. Performance and perception

More than 97.5% of respondents consider food to be effective. Animals that are well fattened in the markets are sold more quickly than those coming directly from rural areas.

Table 6 Performance of feed marketed in livestock markets in N'Djamena

Character	Parameter	Workforce (n)	Proportion (%)
Performance assessment criteria	Fattening status	78	97,5
	Appetence	2	2,5
Top Performing Foods	Concentrates	63	78.75
	Crop residues	11	1375
	Both	6	7.5
Feeding techniques	Mixing sounds with cakes	44	55
	Sorghum stalk mix with groundnut tops	36	45
Animals fed at the market level	Sold more than others	42	52.5
	Same as animals from other areas	38	47.5

3.6. Constraints encountered

The main constraints as shown in the table are the following:

- Lack of conservation techniques;
- High cost of concentrates;
- Insufficient storage infrastructure.

Table 7 Major constraints encountered in food at the N'Djamena livestock market

Types of constraints	Parameter	Actual	Proportion (%)
Food (N=50)	Lack of technicality in food preservation	30	60
	Insufficient and high cost of concentrated feed	20	40
Markets (N=50)	Insufficient infrastructure	20	40
	Lack of organization of the activity	30	60

4. Discussion

The study highlights the growing importance of feed in livestock markets as a lever for valuing animals before sale. The predominance of agro-industrial by-products (oilcake, bran) as sources of concentrated feed is consistent with other work carried out in West Africa (Kouassi et al., 2010). These foods are rich in protein and allow for a rapid improvement in body condition.

However, their high cost is a barrier for many traders. Coarse feeds like haulms and straws are still widely used to keep costs down, despite being less nutritious.

These results are contrary to those obtained by Manjeli et al (1996) in goats in Garoua and Maroua; Pitala et al (2012) in sheep in Togo; Daouda (2004) and Ardo et al (2013) in cows in Dschang (Cameroon) and Nigeria respectively and Nana et al (2014) in goats (Cameron), which are found to suppurate in the first half of gestation;

The breeding of small ruminants constitutes a live savings that can be easily mobilized (ITRA 2005). In case of need (dowry, school expenses, marriage, expenses related to other agricultural activities, funerals, ceremonies, etc.), the breeder sells his animal without taking into account its age or physiological state (Pitala et al 2012).

Thus, the losses observed over 3 months in the Farcha slaughterhouse amount to 1328 fetuses (double gestation 1152 + 174 single pregnancies).

This result is comparable to that observed by pitla, et al (2012) in Togo, These results are superior to the impact of the slaughter of pregnant goats on the breeding of small ruminants in Cameroon in goats in Cameroon

Several methods were used to estimate the age of the fetuses. These methods are based on different measurements such as the development of the embryonic vesicles, more particularly the rump length of the embryo, and the measurement of weight.

The most reliable and easy-to-obtain measurements for determining the age of the embryo or fetus are the size of the embryo or fetus and the biparietal diameter (El-Amiri et al 2003). The relationship between the age of the fetuses and their weight is given by the function: $y = 0.002x^2 - 0.021x + 0.105$. In contrast to Schrick and Inskeep's (1993) equation $Y = 14.05 + 1.16 X - 0.012 X^2$, which is a relationship between the size and age of the embryo or fetus between gestation days 20 and 40, the formulas in this study cover the entire gestation period. The correlation coefficient between mean weights and average lengths is high ($R^2 = 0.95$) and the equation of the regression line is: $y = 73.90 x - 1021$, where y: the weight in grams and x: the direct length in centimeters. However, it should be noted that the correlation coefficient of our study is close to that ($R^2 = 0.97$) obtained by Sivachelvan et al (1996) with the same parameters.

Local and peri-urban supply shows an opportunity to organize a local urban food sector. However, infrastructural deficiencies (lack of sheds, silos) compromise the conservation and quality of products, especially in the wet season.

The heavy dependence on informal circuits also limits the regulation and standardization of the feeds distributed, which could have effects on animal health in the medium term.

5. Conclusion

This study on the livestock markets of N'Djamena shows that:

- The feed of ruminants on the market is based on a combination of concentrated and coarse feed;
- Traders-breeders favour local products (cake, haulms, straw) for reasons of cost and availability;
- Animals that are locally fed in markets sell better because of their good body condition;
- The main constraints remain access to quality food, conservation, and the organization of the sector.

Recommendations

- Encourage the establishment of storage infrastructure in markets;
- Train traders on rationing and food preservation techniques;
- Support peri-urban supply chains to secure food availability.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

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