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Traditional Poultry Supply and Marketing in the City of N'Djamena in Chad

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Abstract: The study characterized the supply and the marketing of traditional fowls in the markets of the city of N'Djamena. It surveyed 104 tradesmen including 29 wholesalers retailers, 61 retailers and 14 peddlers chosen at random in six markets distributed in 5 districts of N'Djamena. The crosscutting and retrospective investigation is carried out among salesmen. Observations were made on chickens slaughtered for sale at the market. The tradesmen aged 35.4 ± 10.8 years are mostly (96%) Moslem and illiterate tradesmen (63%) who started (75%) their trade between the 1990s and 2000s. Wholesalers and retailers get their supplies especially (63%) in the Hadjer Lamis (39%), Western Tandjilé (18%) and Eastern Mayo-Kebbi (6%) regions. As for the peddlers (13%), they get their supplies from the markets in N'Djamena where the fowls are sold. Transportation is done using trucks (58%) and cabs (28%) by the other tradesmen and on foot (14%) downtown by the peddlers. Packing is especially made up of single cages (73%). Out of 542 fowls lost during transport, chickens constitute 91% of the losses, pigeons 8% and guinea fowls 1%. These losses are estimated at 1004150 F CFA. Major customers are housewives (34%) while 66% of others are found especially among restaurant owners and street meat grill operators. Out of 3701 fowls sold per day, 92% are chickens of an average live weight of 1047 G and a carcass weight of 681 G. About 2713 birds representing 73% of the fowls are slaughtered and plucked right at the market places. The average sale prices are 2660 F CFA for a chicken, 2270 F CFA for a guinea fowl, 2990 F CFA for a duck and 715 F CFA for a pigeon. The average gross gain made from the not well sold ducks is higher ($p < 0.001$) than that from the other species. The organization of the actors and an improvement of the constraints will allow a better supply of the markets with traditional poultry.

Key words: Traditional poultry, supply, marketing, N'Djamena, Chad

INTRODUCTION

In Africa, traditional poultry farming plays a strategic role of giving the peasants a feeling of security through its nutritional, economic and sociocultural role (Provost and Boredon, 1968; IEMVT, 1978; Almargot *et al.*, 1985; Grundler *et al.*, 1988; Gueye, 1998; Mopate *et al.*, 1998; Ly *et al.*, 1999).

In Chad, recent estimates made within the framework of the review of the poultry breeding sector is 47.9 million fowls (Mopate, 2010a) made up of 99% of poultry from the traditional sector. Chickens, ducks, guinea fowls and pigeons constitute by their order of importance the core of this livestock. Semi-industrial breeding is poorly developed and its production does not manage to meet the demand by the population of the city of N'Djamena of broilers and eggs for their consumption. This situation contributes to promote the practice of family poultry farming by 90% of the households in Chad and in all the agro-ecological zones of the country (Mopate, 2010a).

The second General Population and Habitat Census (RGPH2) estimated the population in the city of N'Djamena, capital of Chad, at 993.477 inhabitants (MEP, 2009). This population is characterized by a strong per annum growth rate, due to the movement of populations from the rural areas to the capital city, an internal increase through births and the development of new state and private services. This growth of the population is followed by an increasingly high demand for foodstuffs, in particular animal products of which the poultry products and poses a problem of supply. Moreover, the even modest improvement of the standard of living of city-dwellers results in a transformation of consumption modes.

If formerly the objective of traditional poultry farming were especially intended for hosting visitors and sacrifices, today the chicken and its by-products are more and more market oriented to provide the farmers some income (Alders, 2005).

In Chad, apart from the work done by Mopate (2010b), very few data exist on the contribution of traditional poultry farming to meeting the demand for meat. The objective of this study was to characterize the market supply and the marketing of traditional poultry in the city of N'Djamena.

MATERIALS AND METHODS

Site of study: The study was conducted in the city of N'Djamena, capital of Chad. The city lies between the 12th and the 13th degree North latitude and between the 15th and the 16th degree East longitude. N'Djamena is a city bordering Cameroun, established at the confluence of two major rivers in the country, Logone and Chari. The city is made up of 10 districts six of which have one market each for the sale of poultry. N'Djamena is the hub of political, economic, administrative, industrial (especially processing industries) and intellectual offices (with universities, great schools, colleges, high schools etc). The city is the seat of many diplomatic missions and Nongovernmental Organizations (NGOs). It hosts singularly 41% of Chad urban population. Thus, it constitutes a significant center for the consumption of agricultural, especially poultry-related products.

The city enjoys a dry tropical sahel-sudanian climate with one dry season (from November to- May) and a short rainy season (from June to October). The maximum temperatures (40-45°C) are reached from April to May. They decrease with the coming of rains to minima temperatures in December, January and February which are the coolest months of the year. During the months when temperatures are high, transportation of the fowls and their exposure at the various market places constitute difficult moments resulting in many losses.

Sampling and data-collection methods: A preliminary survey took place through visiting the various market places in order to locate the sites for the sale of poultries. Moreover, contacts were made with the delegates of the markets in the district constituencies and the representatives of the poultry sellers present at each market. Cages used for transporting poultries at each market were counted. The data were collected by crosscutting and retrospective investigation approach among 104 poultry sellers out of the 220 listed by the market delegates, representing a survey rate of approximately 47%. The surveyed tradesmen were selected at random among those selling at the markets. Interviews held with each actor at his work place related to the following points:

- Characteristics of the sellers (age, sex, ethnic group, religion, length of period of activity, marital status, educational background, family structure,

type or category of actors, major activity, frequency of attendance at the market).

- Supply practices (markets attended, means of transport used, packaging used, losses recorded during transportation, etc.).
- Marketing practices (poultry species concerned, purchase and sale prices, average daily sales, time of selling out the stock, number of collectors, retailers and peddlers, export of poultries towards other areas and weekly frequencies, major customers, slaughter of fowls bought by customers at the marketplace, etc.).
- Constraints to poultry supply and marketing.

The weight of live chickens marketed on the various market places was estimated by weighing of the fowls taken at random. A three-kilogramme capacity poultry balance of 20 g graduated range was used for this purpose.

About thirty sellers taken at random in the surveyed markets were monitored during 10 days, in order to better appreciate the number of fowls sold each day.

Data analysis: The data collected are processed using "Access" data base management software and later transferred onto the Winstat-Itcf processing software. The information gathered was synthesized in terms of percentages and average with standard deviations. Variables selected after a flat sorting out were subjected to variance analysis. The distribution of the averages was made in relation to the standard factors of sellers, customers and gender of marketed chickens. The significance of the averages was observed on the basis of 5% threshold. The quantity of meat carcass of chickens per annum was extrapolated on the basis of 220 listed sellers in the various sale markets. The various costs related to the expenses on chicken feed, transport and daily municipal tax were calculated. The net profit margin was calculated by taking into account these various costs, especially with regards to chickens.

RESULTS

Characteristics of the markets and the operators: The number of listed cages and the manpower of the poultry sellers per market provided by the market delegates highlighted the importance of Al Afia, Champs-de-fils and Dembé markets in the marketing of the poultries (Table 1).

The trade or the sale of poultries is an exclusively male activity. Out of 104 tradesmen covered by the survey, the average age is of 35.4±10.8 years. Depending on the categories of the operators, the average age varied: it was 43.7±9.5 years among 29 wholesalers retailers, 34.7±8.6 years among 61 retailers and 21.4±4.5 years among 14 peddlers. The average age difference between these actors was significant ($p < 0.001$). The

Table 1: Distribution of the number of cages and tradesmen in seven poultry markets in N'Djamena (Chad)

District	Market	Area	Number of cages	Number tradesmen
1 ^{er}	Farcha	Farcha	7	8
4 ^{ème}	Al Afia	Repos	45	64
	Mil	Sénégalais	9	13
5 ^{ème}	Champs de fils	Champs de fils	43	60
6 ^{ème}	Moursal	Moursal	3	2
7 ^{ème}	Dembé	Dembé	33	55
8 ^{ème}	Diguel	Diguel	22	18
Total			162	220

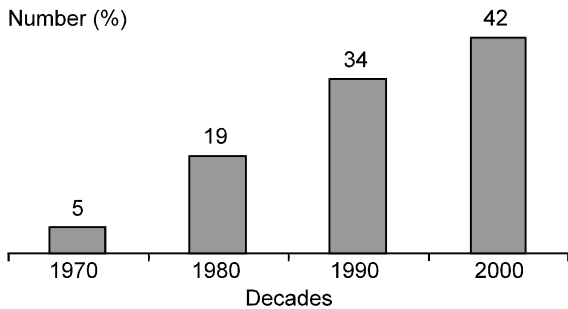


Fig. 1: Number (%) of the tradesmen per decade of starting the sale of poultry in Djaména (Chad)

wholesalers retailers were older and the peddlers much younger. Those who are married constituted 71% of the sample with an average of 1.3±0.5 women, 4.4±2.9 children and 2.2±1.2 active.

In general, the average length of period of seniority in the trade was 13.4±9.2 years. The wholesalers retailers totaled more years (20.2±9.4 years) of sale that the retailers (12.7±7.2 years) and the peddlers (2.3±1.4 years). The differences of years or experience in selling poultry were significant ($p < 0.001$). The majority of the tradesmen (76%) started their trade in the 1990s and 2000s (Fig. 1).

Moslems belonging to ethnic groups from northern Chad constituted the major group of tradesmen (96%). In terms of their educational background, 63% were illiterate, as against 37% who got some education out of whom 28% received some elementary education and only 9% some secondary education. Out of those who received some education, 25 were retailers, 9 peddlers and only 4 wholesalers retailers.

The great number (96%) of tradesmen has been selling poultry throughout the year while 99% attend the market each day.

Poultry supply and commercial practices: Means of transport used were mainly trucks (58%) and bush taxis (28%) by the wholesalers retailers and the retailers (Fig. 2), whereas the peddlers sell while walking (14%) around the market (Fig. 3).

Apart from 13% of peddlers who got their poultry supplies at various markets in N'Djamena, the majority (87%) of the sellers attended regional markets (Table 2).

Table 2: Attendance (%) at the regional supply markets and N'Djamena markets by the poultry tradesmen of this city in Chad

Regions and markets	Attendance by the tradesmen in %
Hadjer Lamis	39
Eastern Tandjilé (Kélo)	18
Eastern Mayo Kebbi (Bongor)	6
Batha	4
Western Mayo Kebbi	3
Chari Baguirmi	3
Upper Northern Cameroun (Kousseri)	1
Dembé market (N'Djamena)	13***

***Itinerant Salesmen who get their supplies from Dembé market in N'Djamena in order to sell them at other markets in the city



Fig. 2: Cage containing chickens on a minibush (bush taxi) at the Champ-de-fils market in N'Djamena, coming from Massakory (Chad)



Fig. 3: Peddlers at the market of Dembé in the 5th district of N'Djamena (Chad)

The packaging used for poultry transportation was mainly made of single cages (73%), both cages and

Table 3: Average purchase and sale price for all compound categories of sellers at the various surveyed markets in the city of N'Djamena (Chad)

Species	Average purchase price (F CFA)	Average sale price (F CFA)	Gross margin (F CFA)	Volume of sales	Number of sellers/species
Chicken	1870±420	2660±620	790	3405	104
Guinea fowl	1835±180	2270±330	435	102	10
Duck	2160±230	2990±370	830	26	5
Pigeon	420±070	715±050	295	168	10

Table 4: Absolute gross margin expressed as a percentage depending on types' of tradesmen on the markets of N'Djamena (Chad)

Margin	Wholesaler (N = 29)	Retailer (N = 61)	Peddler (N = 14)	Total Salesmen (N = 104)
Absolute	856.9±532.6 ^a	827.5±354.1 ^b	453.6±216.1 ^c	789.9±416.5
Percentage	47.0±36.0 ^a	46.1±19.9 ^b	26.6±13.5 ^c	43.7±25.6

The averages of the lines followed by different letters, differ significantly at 5% threshold

baskets (10%), or baskets only (4%). The remainder (13%) consisted of peddlers who would carry the fowls at arm's length. Out of a total of 542 fowls lost during transport, 91% were chickens, 8% of pigeons and 1% of guinea fowls. The losses of 492 chickens were recorded among 29 wholesalers retailers and 52 retailers, representing an average of six (6) heads for these two categories.

The tradesmen sold on the whole 3701 poultries per day including 92% made up of chickens. About thirty of the tradesmen under monitoring sold an average of 3621 heads. The distribution of the sales by species showed the importance of chickens among the marketed poultry products at the markets (Table 3). The average purchase and sale prices of all compound categories of tradesmen indicated some appreciable average gross margins. The average gross margin gained on the sale of ducks was significantly higher ($p < 0.001$) than that on the other poultry species.

The expenses on chicken feed, transport and daily municipal tax were estimated at an average cost of 195 FCFA/chicken. Thus, the net margin per sold chicken is therefore 595 FCFA.

The sales revenues for the surveyed tradesmen were estimated at approximately 9.5 million F CFA a day. Depending on the types of tradesmen, the average gross margins varied significantly both in absolute value and in percentage (Table 4).

Out of 693 chickens weighed in various markets and sales outlets, the average live weight was 1047.1±218.9 g, all genders being considered. Depending on the gender of the birds, the males have an average weight of 1092.8±223.6 g, which is higher ($p < 0.001$) than that of the females (1017.9±211.1 g).

Stocks were sold out in less than three days for 44% of the tradesmen made up of the majority of retailers and almost the total number of the peddlers and, in less than one week for 56% of others made up of all the wholesalers retailers. The wholesalers retailers had each an average of three suppliers. They were assisted in the redistribution or the sale of poultries by an average of three permanent and traveling retailers respectively.

Table 5: Average carcass weight (g) and produce (%) of chickens sold at the markets in N'Djamena (Chad)

Gender	Average carcass weight (g)	Average carcass produce (%)
Male (n = 270)	712.6±166.8 ^a	65.0±5.8 ^a
Female (n = 423)	660.7±139.7 ^b	65.0±6.2 ^a
Total (n = 693)	680.9±152.8	65.0±6.0

The averages of the columns followed by different letters, differ significantly at 5% threshold

As for the retailers, 28 have an average of 2 suppliers, 14 also have 2 retailers and only 4 worked with 3 peddlers each.

Among 34% of the tradesmen, the major customers were housewives, whereas among 38% of the whole, they are both housewives, street meat grill operators or meat braisers in bars and the remainder (28%) of the customers is mixed (made up of housewives and restaurant operators).

Slaughtering and plucking at the market place: Out of 3701 fowls sold daily at the markets, 2713 heads representing 73% of birds were slaughtered and plucked on the spot. This percentage related exclusively to the poultries acquired by the wholesalers retailers and permanent retailers.

Slaughtering, plucking and cleaning of the poultries are carried out by a young person, often a relative of the seller, to whom are paid the slaughtering and plucking fees. The young associates of the wholesalers retailers slaughtered an average of 53.6±24.8 poultries per day and made an average gain of 6180 F CFA. On the other hand, those working with the retailers only slaughtered an average 19.9±10.0 heads and gained only 2225 F CFA. The gaps of the average slaughter and income figures between these young people were significant ($p < 0.001$). At the average cost of approximately 115 F CFA by processed poultry and for some 2713 heads, slaughtering and plucking made it possible to earn approximately 312000 F CFA per day. For 90 young people who got involved in this activity, the average daily gain was approximately 3470 F. For 693 weighed

Table 6: Estimate of the cost (F CFA) of poultry losses per category of tradesmen in N'Djamena, Chad

Types of sellers	Total losses	Average losses	Total cost	Average cost	Number
Wholesalers retailers	241	8.31	486100	16762	29
Retailers	301	4.93	518050	9962	61
Total	542	5.21	1004150	12396	90

Table 7: Difficulties encountered by the actors in supplying poultry to the city N'Djamena, Chad

Terms and conditions	Numbers	Percentage (%)
Distance	2	2
Losses during transportation	40	46
Losses during storage	3	3
Losses transportation and storage	18	20
Both distance and losses	25	29
Total	88	100

Table 8: Proposals made by the tradesmen to improve the supply of the city of N'Djamena in Chad with poultry products

Terms and conditions	Numbers	%
Transport conditions and charges	43	84
Lowering prices at the collection market	6	12
Improvement of breeding	2	4
Total	51	100

slaughtered chickens, the average carcass weight means was 680.9 g and the carcass produce was 65%. The majority females (61%) had an average carcass weight lower than that of the males ($p < 0.001$). As for the average carcass produce, the observations did not indicate any significant differences according to the gender (Table 5).

Compared to the volume of chickens sold (3 405 heads) per day, the estimates of carcass meat were 2, 318, 805 g representing approximately 2.32 tons per day or 846.8 tons per annum. Compiled on the whole from 220 tradesmen listed at the markets, the quantity of carcass meat was approximately 1.791 tons/year. For an approximate total of one million inhabitants in N'Djaména, the annual average consumption was estimated at 1.80 kg of traditional chicken carcass meat.

Losses incurred during transportation and difficulties encountered: Concerning the losses due to transport, 90 tradesmen recorded poultry losses of an average cost estimated at 12.396 F CFA. Among the wholesalers retailers, the average loss costs were higher than for the retailers (Table 6).

As regards the difficulties encountered in supplying, poultry losses during transportation and the long distance from collection centers or markets were the tradesmen's major concerns (Table 7).

Out of 104 surveyed tradesmen, 88 representing 85% declared they have had difficulties during transportation of poultry. The recorded losses are due to the packaging and transport conditions, the distance from the purchase zones and the painful access to the supply areas.

The improvement in the transport conditions and the reduction of the transportation costs were the major concern of the majority of the tradesmen (Table 8).

The concern of the tradesmen also bears on the construction of the roads to the supply zones. In rainy season these roads are barely practicable.

DISCUSSION

The study characterized the supply and marketing of traditional poultry at the markets of the city of N'Djamena. A rise in the poultry trade is taking shape in comparison of the number of tradesmen involved in poultry sale and the volume of daily sales. In 2001, observations were made about 151 tradesmen listed as being involved in poultry sale in the markets of N'Djamena (Mopate, 2010b) as against 220 listed during our study. The same approach was used in determining the daily poultry sale volume at the markets in the city. They went from 2542 poultry sold per day in 2001 (Mopate, 2010b) to 3701 heads at the end of our work. Specifically, the number of fowls has been more than doubled within a period of 9 years. They were 1,556 heads in 2001 as against 3,405 heads currently. This also gives an indication of the importance of poultry in general and especially of traditionally bred chickens in meeting the need of the city for poultry meat in Chad (Mopate and Awa, 2010).

Concerning the supply basins or zones for the markets in N'Djamena, an increase and some further remoteness were also noted. In 2001, 60% of the poultry tradesmen in N'Djamena attended the markets of the localities within the former Chari Baguirmi Prefecture only (Mopate, 2010b). Our results only showed 42% of them, except the peddlers in N'Djamena, who have been attending markets within the newly established Hadjer Lamis and Chari Baguirmi Regions, resulting from reshaping the former Chari Baguirmi Prefecture. Apart from these regions, those in Western Tandjilé and Eastern Mayo-Kebbi come 2nd and 3rd in the supplying N'Djamena with poultry. It arose from the investigations made at the market of Bongor, that approximately 5,800 chickens are dispatched each week to Djaména (Mopate and Djime, 2012).

The majority of tradesmen have had an experience of 10 to 20 years in the poultry sale activity. That indicates that this activity is relatively old in the city of N'Djamena. The concentration of poultry sellers and cages in 7th, 5th and 4th municipal districts is in connection with the importance of the markets such as Dembé, Champ-des-fils and Al Afia markets in these respective districts.

City traditional poultry tradesmen are men, which is against the observations made at the weekly village markets. In rural areas, one deals with people who are both poultry producers and sellers. For this reason, women are more in charge of production and sale activities than men (Alabi *et al.*, 2006; Ogunlade and Adebayo, 2009; Dinka *et al.*, 2010). At the weekly markets, sale is often occasional. In town, the actors present in the sale of traditional poultry carry on this activity in a permanent way and as a trade. In N'Djamena, poultry sales are regular during the whole year at the markets (Dembé, Al Afia, Champ-des-fils, Diguel, Cereal market, Farcha). The same observation pointed out at other markets in African cities (Gueye, 1998). Our observations highlighted the presence of some middlemen such as the suppliers and collectors in the supply zones and the peddlers in town. The same observations are reported by Emuron *et al.* (2010) in Uganda, Dessie and Ogle (2001) in Ethiopia, Mlozi *et al.* (2003) in Tanzania, Gondwe *et al.* (2005) in Malawi, as well as Ouedraogo and Zoundi (2001) in Burkina Faso. The average number of poulties sold by the tradesmen monitored in ten days was close to our results obtained through occasional investigation. It also states that the tradesmen have some good experience of the number of daily poultry sales.

The average price of local chicken bought in the supply zones at the time of the study was higher than the national average price (1840 F CFA) in 2008 (Mopate, 2010a). That would be explained by the high demand of poultry meat. This average price is also higher than those reported in Bamako, Mali (Horman, 2004), in Niamey, Niger (Assoumane and Ousseini, 2010), in Dakar, Senegal (Gueye *et al.*, 2000), but is lower than that in Yaounde (Awono *et al.*, 2008). However, the weight and the size are the only criteria considered at the time of purchase at the markets (Teno, 2010). It is observed that more female fowls are sold than the males. This gender-based selection criterion is not in conformity with that which was observed at rural markets in Senegal Gueye (1998) and Malawi (Gondwe *et al.*, 2005). This situation would be explained by gustatory preferences for the quality of flesh and the facility of cooking the female birds. The carcass produce obtained in our study is lower than that of 80% obtained in Burkina Faso (Kondombo, 2007). Our results would lead us to believe that the chickens put on sale at the various markets in the city of N'Djamena would overall be much younger, therefore less heavy because of the pressure due to high demand. On the other hand, observations made in Bongor showed some 90% carcass output (Mopate and Djime, 2012).

Slaughtering is carried out in almost all of the markets in the city. Al Afia Market has a summarily set up slaughter slab where each tradesman has his own representative

who welcomes the customers who wish to have their bought chickens killed on the spot. At the other markets, however, each tradesman has the sold chickens slaughtered at the place where they are sold. Thus, the fireplace for heating water and the hole dug in the ground for blood are just next to the salesman. Plucking is done on a bag spread out on the ground and the feathers piled up in a bag. The coagulated blood in the hole is scraped and packed in a sachet. The sachets and the feathers are thrown on the rubbish dump at the end of the day.

In spite of the chicken losses recorded during transportation, the tradesmen made some benefits because the poultry trade constitutes a profitable activity for these actors.

Information shared by some tradesmen give an indication of the fact that poultry slaughtering and the plucking have been carried out for 31 years at Al Afia market, for 24 years at the Champ-de-fils market and for 11 years at the Cereal market. On the other markets, the tradesmen could not remember but would recognize that this is a quite recent practice, after the year 2000, in their respective sales market. It rises from a need to meet the increasing demand by the consumers. Nevertheless, this practice which is far from being carried out in a suitable way is potentially a risky one in terms of food hygiene and disease transmission.

The high number of illiterates in the poultry trade is likely to be a roadblock to sensitizing on biosafety actions at market places. This aspect must be taken into account for possible interventions in this sense. The concentration of number of various species of farmyard birds at the markets creates favorable conditions for disease propagation.

Conclusion: This study characterized the supply of the markets and the marketing of traditional poultry in the city of N'Djamena. The results showed that the activity of selling poultry is a regular activity carried out during the whole year. The supply zones for the city of N'Djamena in traditional poultry are many and more or less distant from each other. The increasing number of the tradesmen and sold chickens shows a high urban demand and a real dynamics of the traditional poultry chain. The recorded economic losses pose the problem of poultry supply difficulties which require a special attention in order to better organize and improve the supply. In light of these results, a reorganization of the poultry distribution chains is necessary. This needs to take into consideration the strengthening of the organizational and functional framework of the various players in the marketing chain. In order to meet the high demand, there is need to carry out an implementation of a vast village poultry farming development programme in high production areas.

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