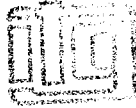


**ASSOCIATION OF INSTITUTIONS OF TROPICAL
VETERINARY MEDICINE**

LIVESTOCK COMMUNITY AND ENVIRONMENT
Kyvsgaard, N.C. and Monrad, J. (Eds.)

Proceedings of the 10th International Conference of The Association of
Institutions of Tropical Veterinary Medicine



SMALL RUMINANT AS A SURVIVAL STRATEGY FOR URBAN HOUSEHOLDS IN THE CITY OF BRAZZAVILLE, CONGO: A REALITY?

Mfoukou N.A.¹, Thys E.², Doulou V.¹, Van Huylenbroeck G.³ and Speybroeck N.²

¹*Unité de Recherche sur les Systèmes de Production Agricole (URSPA), B.P. 13627 Brazzaville Congo*

²*Prince Leopold Institute of Tropical Medicine, Department of Tropical Animal Health, Nationalestraat 155, B-2000 Antwerp.
E-mail: ethys@itg.be*

³*Faculty of Agricultural and Applied Biological Sciences, Department of Agricultural Economics, Coupure Links, 653, B-9000 Gent, Belgium.*

Abstract

A single visit multiple subject survey on urban small ruminant production had been carried out in Brazzaville in Congo from August to October 1993. 249 urban smallholders holding 2.190 small ruminants were involved. By extrapolation of these data, the sheep and goats population in Brazzaville at that moment may be estimated between 12,000 and 15,000. The flock is however unequally distributed in the city. Thereby, it is observed that there are more sheep and goats in the densely populated urban zone than in the periurban one. The observed difference are statistically evaluated. The study reveals the existence of 3 types of flocks: sheep flocks, goat flocks and mixed flocks. The flock size of these types are critically compared and the flock management system is discussed. Before the major armed conflicts which occurred in Congo Brazzaville, animals played an important role for urban low income populations. The survey shows that the small ruminant urban farms in the city are mainly the property of old (56.8% was more than 50 years old) male and retired (28.9%) owners. On the basis of the collected data, a typology based on the socio-professional categories has been constructed by the Regression Tree Technique. The surveyed urban livestock system is sheep oriented and confronted with a lot

of difficulties. The development potential of the animal husbandry depends upon the role played by various actors in the system, both upstream and downstream. The paper also emphasises and illustrates the generally observed increasing trend of urban agriculture throughout the world. The urban small ruminant production seems to be a survival strategy for the segment poor of urban dwellers in the city of Brazzaville. Rearing animals in general makes it possible to better resist to crisis situations. To verify if this strategy is still a reality in the current post-war Brazzaville, a new research will be conducted and oriented mainly to show how this component of urban agriculture is related to other development parameters.

Introduction

Brazzaville, a city of 12,000 ha and c. a million of inhabitants, experiences like most capitals of sub – Saharan Africa, a strong growth of its population now representing close to one third of the population of the country. This is partly explained by immigration of rural population masses that are often resource less and looking for better conditions of life. The resulting pressure on the environment was followed by the pauperisation of an important part of city-dwellers, the deterioration of the food security and less job opportunities.

Survival strategies often used by city-dwellers, permit to develop income-generating activities, of which some ends up in ruralising the urban life. As noted by Smith and al. (1996), cited in Mougeot (2000), the emergence of urban agriculture (UA) mobilises more and more people throughout the world. Livestock production is actually an important component of those urban agricultural practices (Waters-Bayers, 1995).

The present communication describes the result of a survey. It aims to describe the livestock component of UA in the city of Brazzaville, especially small ruminants. The zoo technical aspects and the technical constraints are analysed. Furthermore, the urban breeder profile of small ruminant owners in the city of Brazzaville in Congo is analysed. Regression trees were used to obtain information on the socio-economic parameters, which are related to the professional activity (PA) of those owners. From these parameters, the geographical distribution and the children pattern were studied in detail.

Materials and methods

Localisation and collection of data

A single visit multiple object survey was implemented in the 7 urban districts of Brazzaville (Republic of Congo). During the period from August to October

1993, 249 small ruminant owners with a flock of 2,188 sheep and goats were interviewed.

Treatment and analysis of data

Chi-square tests permitted to make comparisons of distributions of small ruminant between districts and between type of flocks. The 249 persons were categorised in 5 professional activity groups and this categorical variable was then used as the dependent variable of a classification decision tree, using CART (Steinberg and Colla, 1995). The categories are: unemployed - including housewives - (0), public servant (1), hand-workers (2), traders and self-employed (3), retired (4).

A decision tree is a flow chart or diagram representing a classification system or predictive model. The tree is structured as a sequence of simple questions, and the answers to these questions trace a path down the tree. The end point reached determines the classification or prediction made by the model. Discovered relationships and patterns in the data are presented as a flow chart. Overgrowing trees are pruned back. The default 'Gini method' was used as a splitting criterion, because it typically performs best.

Results

Small ruminants in the city of Brazzaville and their destination

Table 1 shows the number and percentage of flocks, the total number of animals and the average size by type. Most of the owners are pure sheep breeders (47.4 %). In contrast, 17.3 % keep mixed flocks, but the average size of their flock is the largest (16.6).

Table 1: type of the surveyed urban small ruminants flock in Brazzaville (1993)

Type	Number (n)	Total number animals	Percentage (%)	Average size (Head)
Sheep	118	957	47.4	8.11
Goat	88	517	35.3	5.87
Mixed Sheep and Goat	43	714	17.3	16.60
Total	249	2,188	100	8.78

Table 2 presents the average numbers of sheep and goats per type of flock in the 7 districts. On first view, there doesn't seem to be a difference in the average size of the flocks between the individual districts.

Table 2: Size of the flocks by district and by type of flock in Brazzaville (1993)

Districts	Sheep	Goat	Mixed Sheep and Goat	Average size
Makélékélé	5.81	4.80	17.66	7.80
Bacongo	9.91	8.00	20.50	9.91
Poto-Poto	9.46	4.16	24.62	12.55
Moungali	7.35	8.77	13.20	8.58
Ouenzé	12.00	5.65	18.16	10.04
Talangai	6.63	4.65	9.14	6.15
Mfilou	6.20	6.70	13.00	8.00
Total city	8.12	5.88	16.65	8.78

Table 3 shows the number and percentage of flocks, the total number of animals and the average size by type using a classification of the districts based on the distance from the centre of the town. An interesting observation is that the average flock size is higher in the central districts than in the fringes. This was shown by means of a negative binomial regression ($p < 0.0001$).

Table 3: Distribution of the 249 small ruminant flocks in Brazzaville (1993)

Zone	type of flock	Animal number	Flocks Number (n)	Percentage	Average Size
Central districts (Bacongo, Poto-Poto, Moungali, Ouenzé)	Sheep	628	65	28.67	9.66
	Goat	305	46	13.93	6.63
	Mixed Sheep and Goat	413	21	18.86	19.67
Total Flock centre zone		1,346	132	61.46	10.20
Fringes (Makélékélé, Talangai, Mfilou)	Sheep	329	53	15.02	6.21
	Goat	212	42	9.68	5.05
	Mixed Sheep and Goat	303	22	13.83	13.17
Total Flock fringe zone		844	117	38.53	7.21
Total urban flock		2,188	249	100	8.78

A total of 90.2% of those flocks are kept indoor. The other 9.8% are free roaming and scavenging animals. Based on the sample, the total flock of Brazzaville can be estimated between 12,000 and 15,000.

Small ruminant production in the city is essentially meat oriented. However, it is observed that manure demand is in a constant increase in relation to the development of market gardens. Self-consumption (38.5%) and sales (33.6%) remain the main purposes of animals raised in the city. Most sales are done in the neighbourhood of the owners and mainly concern live animals. Importation of animals also exists.

Other than small ruminants, poultry (33% of cases), notably chickens of local breed, pigeons, ducks and to a smaller extent pigs, provided some room for an alternative choice.

Problems faced by small ruminants production in Brazzaville

From the 221 owners who gave an answer, 86.4 % considered that animal agriculture in town is facing constraints. These constraints are summarised in Table 4.

Table 4: Main constraints faced by the small ruminants owners in Brazzaville (1993)

Main Constraints	Relative Frequencies (%)
Feed related constraints (delivery, costs, etc.)	47.5
Problems with the neighbours	4.1
Technical knowledge	2.3
Workforce	12.2
Lack of technical assistance and credit	6.8
Theft	13.6
No difficulties	13.6

Feed related constraints, especially provision of fodder, are the most common bottlenecks in the sector. It was also recorded that 44.5 % of the disease cases were due to diseases of the digestive tract and 38.3 % due to respiratory infections.

Household characteristics and profiles of animal owners

Small ruminant production is always exercised at the place of dwelling of the animal owner, so that the unit of exploitation corresponds at the same time to his concession. A total of 63.8% of the owners possess a standard type of concession of 400 m². Concessions of reduced sizes or bigger sizes up to 1000 m² appear less frequently. An average size of 8.36 persons by household and an average number of children between 5 and 15 years of 2.92 was noticed.

Most of the owners are retired (30.1 %), followed by the public servants (23.7 %), traders (18.5 %), unemployed people (17.3 %) and hand-workers (10.4 %). 83 % were men. The average age of the animal owners was 50.4 years.

In addition, the regression tree technique permitted to explore the main parameters behind the professional activity (PA) (see above). The overall analysis revealed that age and sex were most strongly related to the PA. The subjects were split into two groups: people older than and younger than 53 years old. This is probably related to retired and non-retired people. In each of the two age groups the next node splits the groups in males and females. Public servants and hand-workers concerned with small ruminant production mainly live in the suburb districts of the city. Most owners living in the centre are not employed or retired. Finally commercial people are mainly living in Poto-Poto district. The Family Structure reveals that unemployed owners have a small number of children (<0.5). This lower age of unemployed could explain this result. Traders and self-employed mainly have a small number of children (<1.5 but >0.5), public servants and hand-workers a higher number (>1.5 but <6.5), and retired people have the highest number of children (>6.5). The analysis of the total number of members of the household resulted in similar conclusions.

No relation could be detected between flock size and PA. A multinomial regression with PA as dependent variable and flock size as explanatory variable, confirmed the CART observation and showed that PA was not related to the flock size ($p > 0.05$).

The classification tree showed that all PA are equally concerned by feed constraints. Unemployed people have more constraints related to workforce and troubles with neighbours. Public servants are also concerned about problems with the neighbourhood. The constraint of poor technical knowledge for hand-workers is an interesting observation. Business and retreated people are mainly concerned about workforce. Furthermore, business people are more concerned about a lack of technical assistance and credits whereas retreated people are mainly concerned about theft.

Discussion

Small ruminants in the city of Brazzaville and their destination

The importance of the urban small ruminants in West and Central Africa has been emphasised by several authors (Gadji *et al.*, 1987; Centres, 1991; Mahamane, 1992; Thys and Ekembe, 1992 and Fayes, 1999). This concerns many sub-Saharan countries and can be linked to the importance of UA as an all.

All parts of the city are concerned by small ruminant's production but in various degrees (Table 2 and 3). The average size of the owner's flock (sheep and goats) was 8.78 heads. It is superior to the one observed in the country in rural areas (Mfoukou-Ntsakala, 1990). This size varies according to the specific nature of the herd and the localisation.

The average flock of the central districts was larger than the one of the fringes of the city. The survey revealed that the average size of the mixed flocks represented the duplicate of that of pure sheep flocks and nearly threefold of the monospecific goat flocks (Table 1). This tendency to have more animals in the mixed herds has also been highlighted in Cameroon by Ndamoukong *et al.* (1989) and Thys and Ekembe (1992).

There are more sheep than goats in Brazzaville (ratio 1.9). A possible explanation for this could be that the consumers are more mutton or sheep minded. Furthermore, sheep are easier to manage than goats. Gadjji *et al.*, 1987 had shown that, in spite of a more developed context, the system of small ruminant management in urban environment remains often traditional. This seems also to be the case in Brazzaville.

Problems faced by small ruminants production in Brazzaville

Table 4 shows that the problems faced by sheep and goat producers in town vary and are both of a technical and non-technical nature.

Provisioning of feed is the more important constraint. It is time consuming for animal owners since it takes an important place in their calendar of activities. The painfulness of this burden is emphasised by the distance of the feed sources and the fact that the average age of animal owners in Brazzaville is relatively high. The lack of space in relation to the densely populated districts makes the urban environment harsh and is a major constraint for small ruminant livestock. The damage caused by roaming animals is an additional difficulty and source of many troubles with neighbours. Animal health can also be pointed out as an important constraint. Indeed, severe losses due to mortality were observed.

Household characteristics and profiles of animal owners

Most of the owners were retired. The average age of the global sample animal owners was 50.4 years. This can be explained as in Brazzaville small ruminants seem to play the role of saving for older people. The classification by the regression tree technique shows also a clear-cut split of professional activities based on the age. On the other side, the fact that unemployed or retired owners

were living in the central district can be an explanation for the larger size of the average flock if it is linked to a coping or survival strategy.

The public servants are the second group owners in importance. This can be explained by the fact that the survey was realised in a period of insecurity for that professional group.

The regression tree confirms that commercial people are mainly living in Poto-Poto, central district, where the traders and butchers, often West African, are located.

The number of children seems to be linked to the professional profile of the owners, but further analysis is required to explain this repartition.

The constraint of poor technical knowledge for hand-workers could perhaps been explained by their lower level of instruction. The fact that retreated people are mainly concerned about theft is probably linked to a greater feeling of insecurity related to their age.

Since the sample only includes sheep and goat owners, it is clear that some PA groups with interesting characteristics are missing. This is the consequence of the fact that the survey of 1993 focused voluntarily only on small ruminants owners.

Small ruminant production as component of urban agriculture and as survival strategy for urban households

The necessity to take account of socio-economic factors in the analysis of livestock systems, particularly at the level of smallholders, has been sufficiently underlined by Nielsen *et al.* (1991); Lhoste *et al.* (1993) and Van Vlaenderen, (1995).

On the other side, Urban Agriculture (UA) is a noteworthy phenomenon of the 80's in Africa and appears to be one of the most important sectors of the informal economy (Streiffeler, 1994). Urban Livestock Production (ULP), in general, and small ruminant production, in particular, are part of this trend. As noted by Faye (1999) for urban sheep producers, ULP is an important component in securing households. In the last decade of the 20th century ULP has become an open field of investigation for research and development and there is an increase in case-throughout the world (Anonymous, 1999).

In Congo, market gardens were for a long time the major UA activity in the city of Brazzaville and the privilege of women. However, it is observed that more

and more men were investing in this activity. This trend may be related to the continuing crisis.

Like most of the countries of sub-Saharan Africa, Congo was, and still, is confronted with a strong growth of its urban population. The wage – earning employment sector was in crisis with continuous delays in the payment of civil servants salaries, allowances of retired people and scholarships. The attempt has failed to straighten the economic situation by the mean of structural adjustment program (SAP) or reinforced structural adjustment program (RSAP). Poverty gradually increased in the city, particularly in Brazzaville where 4 out of 10 people are poor (Doulou *et al.*, 2000). This study has shown that the most important poverty factors could be age, the total number of members of the family and the socio-professional condition.

As mentioned above, our survey reveals that, in 1993, small ruminants production was the privilege of old males and retired, unemployed people, mainly housewives and other producers who generally are unemployed or inactive people and therefore to be considered as members of risk groups. The heads of households might have started small ruminant production as a strategy to vary their sources of income. Indeed, in the later follow-up of the producers of the sample (Mfoukou Ntsakala, 2000), it was observed that they had a clear-cut commercial strategy related to their needs. This is accordance with the observations of Novo and Murphy (2000), Nugent (2000), Drescher *et al.* (2000) and Purnomohadi (2000), who stated that UA was really a response to the crisis.

Likewise, home consumption, a component of food security and subsistence of population is as the surveyed animal owners stated their production purpose. The use of production for home – consumption may also be considered as a survival strategy since it contributes to the improvement of households feeding. By the way, Mougeot (2000) noted that most urban farmers are low – income men and women who grow food largely for self – consumption. Moreover, he underlined that low – income UA contributes to reduce food insecurity by improving food intake of households. Nugent (2000) considers that the production of urban farms can be considered as consumption smoothing.

It can thus been concluded that small ruminants production as a survival strategy for urban households may be seen as a reality for the surveyed animal owners in Brazzaville before war. However, in the meantime the situation has certainly changed because of socio-economic upheavals registered in relation to the armed conflicts, which occurred in the country this last decade.

To verify if this strategy is still a reality for poor urban inhabitants in the current post-war Brazzaville, an investigation has been launched in April 2001, mainly oriented to show how this component of urban agriculture is related to other development concepts. A preliminary large-scale single visit survey including 2800 households has already taken place. A comparison between animal owners and no animal owners is than possible and all PA will be included. This first survey will be followed by a multiple visit survey.

References

- Anonymous**, 1999. Agriculture urbaine et sécurité alimentaire. Installez vos champs à la ville. In Spore CTA, no. 81 june 1999, 1-2.
- Centres J.M.**, 1991. Elevage urbain et péri – urbain à Bamako. Rapport, Paris, GRET, 1991, 93p.
- Doulou V. et al.**, 2000. Stratégies alternatives de lutte contre la pauvreté au Congo. Etudes et Travaux RPS/AOC n°7, CRDI, 33-35
- Drescher A.W.**, Jacobi P. and Amend J., 2000. Urban Food Security : Urban Agriculture, a response to crisis. In urban Agriculture Magazine, vol n°1, 2000, http://www.ruaf.org/news/gen_fr.html .
- Faye B.**, 1999. Socio-économie de l'élevage périurbain Sécoville. Montpellier, CIRAD
- Lhoste P.**, Dolle V., Rousseau J. and Soltner D., 1993. Zootechnie des régions chaudes : Les systèmes d'élevage. Paris (France), Ministère de la Coopération, 39-80
- Mahamane T.M.**, 1992. The social and economical importance of small ruminants raising in an urban area : case study of Bamako, capital of Mali. In Gootjes (ed.). International Agricultural Centre, International Workshop on livestock policies, Wageningen, 20 – 31 janvier 1992.
- Mfoukou Ntsakala A.**, 1990. L'élevage des petits ruminants en République populaire du Congo. In Bulletin de Liaison du Réseau Africain de Recherche sur les Petits Ruminants, Addis Ababa, Ethyopia, n°19, novembre 1990, 4 –12.
- Mfoukou Ntsakala A.**, 2000. Contribution à l'étude de l'élevage des petits ruminants en milieux urbain et périurbain de Brazzaville, Congo. Thèse de MSc., n°89, 2000, IMTA, Anvers, 89p.
- Mougeot L.J.A.**, 2000. Urban Agriculture : Definition, Presence, Potential and Risks. Paper presented at DES/GTZ/SIDA/ACPA International Workshop Growing cities Growing Food Havana, 1999, 1 – 42.
- Ndamoukong K.J.N.**, Sewell M.M. and Asandji M.F., 1989. Management and productivity of small ruminants in the north west province of Cameroon. In Trop. **Anim. Health Prod.** , n°21, 109 – 119.
- Nielsen M.**, Hardouin J., 1991. Sociologie et élevage. In Editorial, Bulletin de liaison du Réseau Euro – Africain sur les Petits Ruminants (REAPER), n°2, 2 – 4.
- Novo M.G** and Catherine Murphy, 2000. Urban agriculture in the city of Havana : a popular response to a crisis. In DES/GTZ/SIDA/CTA (eds.), International Workshop Growing cities Growing Food Havana, 1999, 329 – 346.
- Nugent R.**, 2000. The impact of urban agriculture on the household and local economics. In DES/GTZ/SIDA/CTA (eds.), International Workshop Growing cities Growing Food Havana, 1999, 67 – 95.

Purnomohadi N., 2000. Jakarta : Urban agriculture as an alternative strategy to face the economic crisis. In DES/GTZ/SIDA/CTA (eds.), International Workshop Growing cities Growing Food Havana, 1999, 453 – 465.

Steinberg, D. and Colla, P. L., 1995. CART: Tree-Structured Non parametric Data Analysis, San Diego, CA: Salford Systems.

Streiffeler F., 1994. L'agriculture urbaine en Afrique : La situation actuelle dans ses aspects principaux. In Compte – Rendu du Séminaire Régional sur les Systèmes Agraires et Agriculture Durable en Afrique Subsaharienne. International Foundation For Science (IFS), Cotonou, Bénin, 7 – 11 février 1994, 437 – 454.

Thys E. and Ekembe T., 1992. Elevage citadin de petits ruminants à Maroua (Province de l'extrême nord du Cameroun). In cahiers agriculture (1) :249 – 255.

Van Vlaenderen G., 1995. La vulgarisation en matière d'élevage : un exemple au projet de développement du petit élevage dans le nord – Kivu (Zaire). In Tropicultura, 13, 3, 117 – 122.

Waters-Bayers, A. (1995). Living with livestock in town : urban animal husbandry and human welfare. In Zessin, K.H. " Livestock Production and Diseases in the Tropics : Livestock Production and Human Welfare" Proceedings of the VIII International Conference of Institutions of Tropical Veterinary Medicine, Berlin, Germany, 25-29 September 1995.121-132.