

Characterization of the Socio-economic Impact of Goat Rearing (*Capra hircus* L., 1758) in Peri-urban Pastoralists. Empirical Analysis Carried Out in the Natural Conditions of the Ituri Province

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Abstract

Ituri has long been considered the "cradle" of domestic animal husbandry in the Democratic Republic of Congo. It has a mild climate and favourable soil for animal production, which is why a research station at the National Institute for Study and Agricultural Research (INERA) was set up in Nioka by the settlers in Mahagi territory, followed by a planting in Bunia of a large industrial Slaughterhouse, the second in Africa after that of Nigeria. The establishment of the Slaughterhouse was in order to facilitate the commercialization of meat in this region. A characterization of the socioeconomic impact of local goat farming was conducted among 192 breeders subjected to a closed questionnaire survey. The study was carried out between May 2011 and May 2017 in periurban and peripheral rural areas of the Ituri province. The study establishes that the income obtained from this activity appears to be satisfactory for breeders from a herd composed of a minimum of 15 goats.

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Livestock income allows farmers to make long-term investments, including the acquisition of land titles; subsidizing certain basic social needs including food; schooling of children; the payment of the dowry, a symbol of customary marriage; the acquisition of certain goods, etc.). Goat breeding offers great opportunities for development through its meat production, prolificacy, hardiness and good adaptation in all the edapho-ecological conditions of Ituri. This is how it is found in some families in the Ituri province, and intervenes in all areas and stages of the life of households of the breeder. In terms of the number of animals raised, statistics show that the goat comes second after poultry. In the end, based on results obtained in this country of the Democratic Republic of Congo, the goat is a savings in kind to ensure the future of the breeder.

Keywords: characterization; socio-economy; Impact; breeding; goats; native; herders; periurban; analysis.

1. Introduction

Local goat farming (*Capra hircus*) is of increasing economic interest in African households. It is an important and easily accessible source of animal protein and income for many poor families. It offers great development opportunities through its meat production, its hardiness and its good adaptation in all the edapho-ecological conditions of Africa.

In Niger, Zakara [1] reports that in pastoral society, the goat occupies a privileged place. Its endurance to the climate, its sobriety compared to sheep and cattle, its prolificacy, its aptitude for long walks give it the respect of the Tuareg man who makes him an animal of choice.

In the province of Ituri, the goat is found in some families and intervenes in all stages of the life of the man who is interested. In terms of their numbers, it comes second after poultry. In some villager families, it is also housed in the same premises as the shepherd or breeder; this explains not only that agricultural practices are still archaic, but also insecurity and the importance given to this speculation.

The importance of the goats linked to the economy and the social of the person who raises it would no longer be disputed today. No one can underestimate the essential contribution of livestock to job creation and poverty reduction in households in poor countries. Our results obtained in 2013 (a) [2], show that the income from livestock allows pastoralists to make long-term investments and able to ensure the daily feeding of livestock owners. Our projections estimate that the population of the Democratic Republic of Congo will exceed 100,000 from around here to 2050, of which only the province of Ituri is in excess of 10 million in 2017 and is expected to double by 2030, reaching 25,000. 000 in 2050; meat consumption is also expected to increase. In the countries of the Third World in general, the population remains composed of 70% rural mostly poor. Now, the goat under normal conditions of breeding, is able to contribute to the improvement of the living conditions of the populations. We thought in 2013 [3] that local goats are able to cope with the problems of food and poverty in tropical environments. In this province, the goat is very prolific; the litter size ranges from 1 to 3 and sometimes 4 per birth for some indigenous goats. In this purely Iturian region, there are three characteristic elements, two of which are very slowly emerging; in particular, (1) strong uncontrolled population growth followed by (2) acceleration of urbanization, and finally (3) agricultural production, a non-emergent and

worrying element creating an imbalance in life human. The development of goat farming in the province of Ituri has accelerated recently as a result of the many successive wars in the region that orchestrated the plundering disaster of the region's small and large livestock exported to neighbouring countries; the population has also reintegrated into the rearing of small ruminants, particularly goats, with the aim of improving their daily lives by providing for their basic needs. For example, goat rearing in Third World countries is important for achieving poverty reduction goals, it is a most important productive sector for most low-income households, and it is important to Black Africa. The analysis of the contributions and impacts of goats to farmers leads to define the problematic of our study which questions the precarious conditions granted to the breeding of the native goat whereas it offers several opportunities to the human life for its fulfilment. The purpose of the present work was to characterize the economic and social impact of goat rearing on livestock farmers in peripheral cities and rural peripheries of Ituri, selected under goats that they hold and the ability to provide reliable information on their daily life related to goat farming in Ituri Province. The central question of the problematic oscillates on the economic and social contribution of the breeding of native *Capra hircus aegagre* in traditional breeding of Ituri under unimproved habitat, food and health conditions.

2. Material and methods

2.1 Geolocation and study approach

In both rural and peri-urban areas, quarterly surveys and follow-ups [4] on social and economic intervention levels of goats were conducted to provide an overview of the use of income from this speculation in Ituri. To analyse the impact of goat rearing on pastoralists under the analytical method, a study was conducted in the Ituri province, which is located in the north-east of the Democratic Republic of Congo. The theory was supplemented by a field survey carried out in four territories out of five which make up the said province: Irumu, Mambasa, Aru and Mahagi; the territory of Djugu, which is also one of the 5 territories of the province, but was not studied. In this study, research was conducted using surveys and monitoring of livestock over the period 2011-2017. The maps below show the province and its different territories.

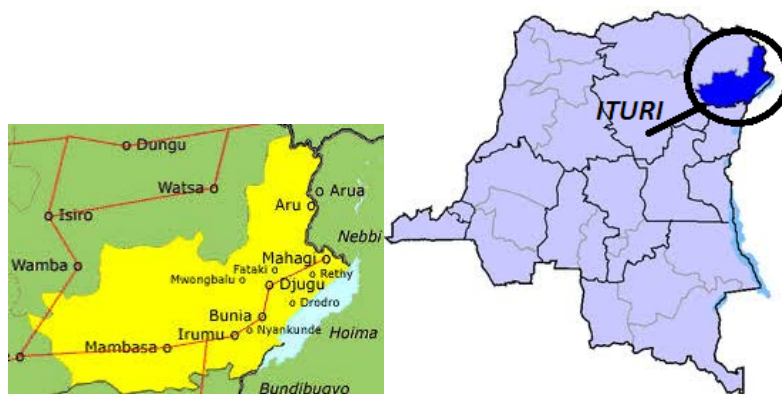


Figure 1: The province of Ituri in yellow colour on the map is our field of research. The general map of the DRC is drawn from the archives of the University of Kwango and the Shalom University of Bunia 2015, treated and completed at the Faculty of Management of Natural Renewable Resources, Kisangani University.

2.2 Sampling

Based on the functional elements of the study, a sample of 192 breeders spread over the four corners of our study area was chosen for the 4 territories in the province. These one hundred and ninety-two breeders had been selected under easy-to-understand criteria and kept at least 15 goats in their herds. The selected breeders were subjected to a closed questionnaire survey administered several times during this research. Each territory included 6 strata and each of them consisted of 8 breeders able to provide useful information related to the characterization of the socio-economic impact of livestock farming on peri-urban livestock farmers. A sub-sample of 24 strata distributed over the 4 study areas was carried out.

2.3 Collection and processing of data

In general, this study was based on the surveys that a closed survey questionnaire was administered, and also the experiment, which consisted in taking the live weight of the animals for sale, which had to be correlated with the prices at the time of sale. The live weights of goat at the sale were taken from the dhedams pocket attached to the scale.

Moreover, in order to characterize the socio-economic contribution of goat rearing in the development of pastoralist households, the authors were interested by retrospective survey, in characterizing the main elements related to the socio-economic impact: as the periods rising and falling prices, the live weight of the goats on sale that have been associated with the market price, and the goals of the goats raised (sale, self-consumption). Mainly, they focused on the main causes of sale of goats and also sought to know the end use of revenue or income from goat sales in order to highlight the impact of livestock on goats, the economic and social life of the breeders.

To make it possible to choose breeders and their herds, interviews were conducted many times in the pre-survey; the objective was to make a historical retrospection on their breeding to allow knowing where to start and their level of knowledge on their farms. During the study period, several other interviews continued as the investigators passed to the breeders in the 24 strata of the study areas. The results of the interviews enabled the researchers to organize two training sessions in each territory, which focused on breeding techniques, and parasitologies and pathology of domestic animals as well as techniques and methods of data collection. The field data concerning the analysis of the socio-economic performances of the households of the breeders, were seized and recorded using the software SPSS (Statistical Package for the Social Sciences) under Windows and analysed with descriptive statistical methods (frequency, mean, standard-deviation, variance) which allowed to insert some figures.

3. Results and discussion

3.1 General characteristics of breeders profile

The majority of breeders were men, 121 out of 192 (63%). Manjeli and his colleagues [5] and Musalizi [2 and 6] reveal that goat rearing has emerged as a predominantly male activity. The average age of both sexes was 55

years old. The households of the interviewed breeders are characterized by an average number of 3 to 5 people. For the sample as a whole, about 67 percent of herders are educated (primary, secondary, and university) and 33 percent are illiterate but have a breeding experience. Generally speaking, in the study areas, livestock and agriculture are a main activity for some households (79%) while the others are in various occupations (21%), such as public servants, traders ... and who associate livestock farming as a complementary activity to improve their incomes. The people surveyed were a very heterogeneous group from an ethnic point of view; the respondents who participated in the study group were represented by all the tribes (native and non-native) encountered in periurban and rural peripheral study areas. These heterogeneous ethnic mixtures consisted of 29 per cent who could neither read nor write; 52% had elementary and secondary school levels and 19% included academics.

3.2 Characterization of the socio-economic impact

The results of this theme should be treated in detail and presented according to each territorial stratum in order to highlight a global reference for the province of Ituri; in this part unfortunately there is a synthetic work of research.

3.2.1 Commercialization and Goals of High Goats (Sales, Self-consumption)

Livestock products are used in many forms. Some are consumed (non-commercial allocation of goats) directly without going through the sales market, others are sold to supply households (commercial allocation of goats).

3.2.2 Number of animals sold standing or slaughtered by farmers per year

The largest number of goats sold (Table 1) are between 16 and 20 although the total frequency of the investigators is moderately low compared to the last two (6 - 10 and 11 - 15) of the table below.

Table I: Annual sales of goats by breeders

Number	Irumu	Mahagi	Aru	Mambasa	Total	Percentage
1 – 5	12	8	11	6	37	19,3
6 – 10	17	11	13	14	55	28,6
11 – 15	15	16	15	12	58	30,2
16 – 20	4	13	9	16	42	21,9
Total	48	48	48	48	192	100,0

The goat, which is present in a few families in Ituri, offers nutritional benefits and income generation to the farmer; according to Gnanda [7], goat farming represents an opportunity for income generation for small producers. It is a breeding ground for families interested in this province. This does not mean that it is the only most popular cash crop in the area. Observations suggest that goat is in second position after poultry.

All of the surveyed breeders agree that goats are sold at home and at the local market, and only 43.2% of breeders in the vicinity of the central and provincial market can access them for a higher margin sale. than on the farm. Local markets are often located between 5 and 10 km from their homes while the central market of the province is located more or less 200 km depending on the strata; this distance does not allow distant breeders to access the central market of Bunia. Thus, breeders from distant strata prefer to sell to the nearest market in the territory.

On the other hand, some other consumers as well as herders who are in the periphery of the Djugu territory and who want to reform or start herds prefer to buy goats from the farm or the intermediate market of animals which is located in Katoto, territory of Djugu where they estimate that prices are relatively low compared to the central market of Bunia. In general, goat farming products are geared towards commercialization [8]. At the provincial market located in Bunia, two animal sub-markets are available, one is at the level of agricultural inspection and is held every day for small ruminants, and the other is at the industrial slaughterhouse of Bunia, is held every Monday, Thursday and Saturday for large and small livestock. These markets are specialized only for the sale and slaughter of animals. The frequent sales of goats are observed during the dry season therefore the prices are slightly low. The sales observed during this period are those in prevention against diseases and drying of fodder, sometimes orchestrating weight loss, weakness, susceptibility to disease attack, and so on. During the rainy seasons, sales are sporadic due to the abundance of fodder, because at this time the growth of the grass is active, therefore, the prices per goat are beneficial to the breeders. Sales prices are high during the rainy seasons compared to the dry season. In terms of the number of animals consumed by farmers, the average results (Table 2) from territories are such that 98.4% of breeders consume between 1 - 5 goats per year, followed by only 1.6% of farmers who consume between 6 - 10. Livestock producers' own consumption of goats is low in the strata, many of them prefer to sell to obtain money that can allow them to buy various products (food, manufactured, etc.) or other family needs, schooling, dowry, acquisition of land, etc. In principle, a breeder hardly cuts his animals that he raises. Instead, he prefers to sell them to solve small family financial problems rather than see them slaughtered. In 2011, a study conducted at Kasenyi in Ituri province by Monde and Musalizi showed that the frequency of slaughter of animals by the breeders themselves is low.

Table 2: Threshold for goat consumption by the breeders themselves

Number	Irumu	Mahagi	Aru	Mambasa	Total	Percentage
1 – 5	46	47	48	48	189	98,4
6 – 10	2	1	0,0	0,0	3	1,6
11 – 15	0,0	0,0	0,0	0,0	0,0	0,0
16 – 20	0,0	0,0	0,0	0,0	0,0	0,0
Total	48	48	48	48	192	100,0

The slaughtered goat offers a large amount of meat that can be stored and consumed for two to three weeks depending on the family. During this time, the consumption of goat meat by the households of the breeders contributes to the fight against animal calorific malnutrition which has taken up residence in the poor families of

the tropical regions of which the Democratic Republic of Congo is one of them.

3.2.3 Weights associated with the selling price (in USD) of goats in Ituri

The sales prices by goats in the strata or in the Ituri province, depend on animal weight, period of sale, type of animal. As can be seen in Figure 1 below, each type on the left corresponds to a standard price on the right.

In fact, the goat of 18 kg sells for 50 USD while the 33 kg of goat can be bought for 55 USD. This situation is explained by the fact that the goat sold at an early age is mainly intended for breeding, therefore, it is a parent, by consequent, it is more than the goat arrived at the end of the reproduction, which must be sold for herd reform. The price mentioned in the figure is a peak observed in the region, the price can still be revised downward or upward depending on the environment, the time or period, type of discussion or agreement between the two parties, etc.

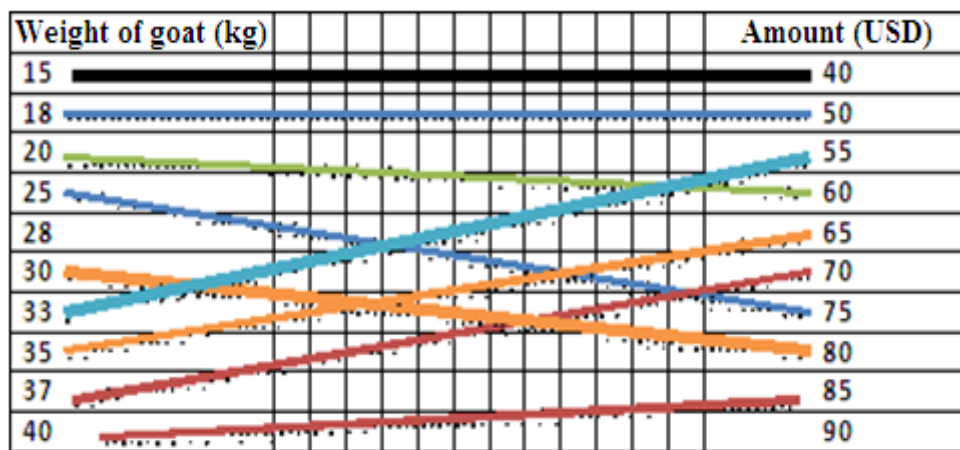


Figure 2: Prices correlated with goat weights in strata

3.3 The main buyers of goats among breeders in the territories

In the study areas, the main buyers of goats or customers from pastoralists include resellers, breeders, consumers and organizations. The investigators are unanimous that resellers and other breeders who want to start breeding or who are reforming their herds, are their main customers who frequently buy goats from them. In addition to this statement, consumers (52.1%) and organizations (non-governmental organizations, associations, mutual societies, projects, etc.) are nevertheless rare in this circuit; However, Moussa's studies, carried out in 2011, show that purchases of Maradi russet goats by projects, non-governmental organizations (NGOs) and other associations are the most profitable to producers or breeders, even if they are also rare. These generally charge higher prices than the markets [19].

In fact, these organizations purchase, most of the time, as part of their programs of action to combat malnutrition, against poverty, reconstitution of livestock herds. The table below shows the results on those who are the customers of the breeders.

Table 3: Goat breeders' customers in the breeding strata

Customers	Irumu	Mahagi	Aru	Mambasa	Total	Percentage
Consumers	31	30	20	19	100	52,1
Retailer	48	48	48	48	192	100,0
Organizations	8	1	0	5	14	7,3
Breeders	48	48	48	48	192	100,0

Resellers (and butchers) prefer to buy at home or on the farm because of the relatively low price in these environments to ensure a certain high profit margin. They buy at a relatively low price and resell them at a high price: the primary goal of marketing.

3.4 Seasonal and territorial variation of the price level

Sales of goats during rainy seasons are made with the motive of obtaining currency to solve small financial problems that prevail in the family. Regular sales are made during the dry seasons to reduce the number of animals against the moments of famine. In Figure 2, the different trends concerning sales periods at low or high prices are presented.

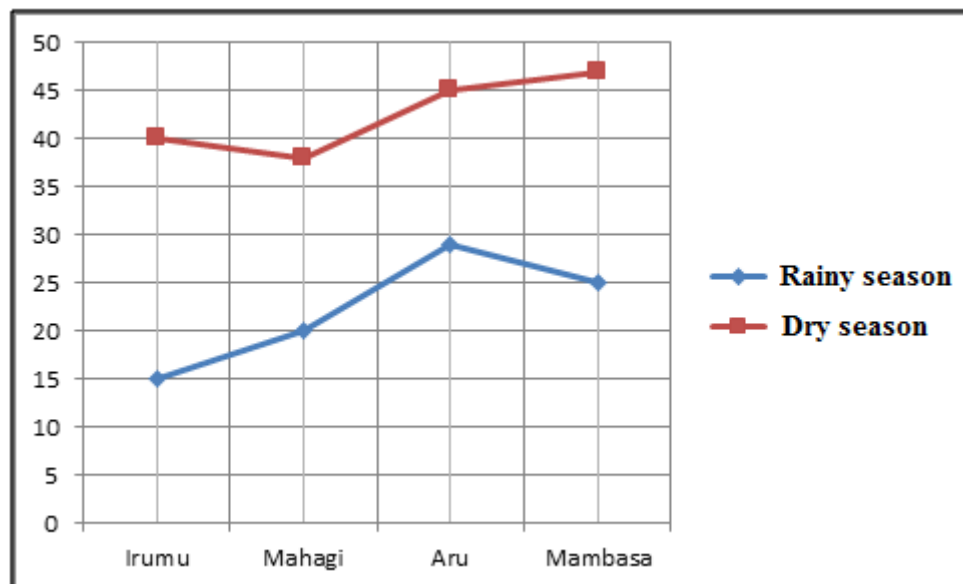


Figure 3: Period of regular sale of the animals: Dry or rainy season

Firstly, as can be seen in figure 2 and as already reported, sales are more during the dry seasons, because of the low capacity of forage biomass production during this period. The dry season curve shows a peak of 47 surveyed in the Mambasa territory, which justifies greater sales during the dry season than during the rainy season when sales are low (29%). The generalized average across the province, advocates a peak of 88.5% of

goat sales at low prices during dry seasons in an alternative market and irregularly supplied to goats. These results relate to those of Acacha and Vissin [9] who stipulated that the climate and its variations affect the prices of agricultural products in the city of Cotonou in Benin. They report that drought, floods, are all manifestations of climate change acting on low or high prices in Benin.

The breeder studies all the possibilities of profit maximization resulting from his breeding. He analyses the favourable and strategic moment during active growth where it is necessary to sell. It is considered in this section that the provincial averages of percentages are greater than 100%, this is due to several assertions of the form that the respondents chose with respect to the types or categories of animal that the breeder prefers to sell to gain more. In the categorization, we could list, the brooding parent, adult spawner, adult for butcher or sale at any age. Sales of kid for butchery are low. Table 4 explains the results from territories in the province of Ituri.

Table4: Categorization of type of animal sold by the breeder

Variables	Irumbu	Mahagi	Aru	Mambasa	Total	Percentage
Parent breeder	48	48	48	48	192	100,0
Butcher's day	19	14	16	13	62	32,3
Adult parent	48	48	48	48	192	100,0
Adult butcher	48	48	48	48	192	100,0
Any age	48	48	48	48	192	100,0

3.4 Main causes of sale of goats listed in the provinces

In many African countries, rapid population growth and serious economic problems have reduced the standard of living of the population, especially that of agricultural producers.

They are therefore looking for new sources of income in order to be able to support themselves [10].

As such, the goat already in operation can play its role of piggy bank in many producers in African countries.

The main causes of sale of animals are: the poor health condition of animals and the condition of financial emergency.

The main causes are followed by other secondary causes such as herd reform (71.9%), accidental deaths (60.9%), making the money available in the family fund (60.9%), sterility of animals (59.4%), savings (56.7%) and supplies of Veterinary Products and Equipment, VPE (43.8%) as shown in the table below, constitute the main causes visible.

Table 4: Determination of the different causes of sale of goats

Causes	Irumu	Mahagi	Aru	Mambasa	Total	Percentage
Herd Reform	48	28	29	33	138	71,9
Sterile animal	35	30	25	24	114	59,4
Poor health	48	48	48	48	192	100,0
Death by accident	33	33	27	24	117	60,9
Condition of financial emergency	48	48	48	48	192	100,0
Financial Availability	25	32	28	32	117	60,9
Saving	28	30	25	26	109	56,7
Supply in VPE	2	1	0	0	3	1,5

Herd reform is one of the highly technical elements of sustainably maintaining herds on the farm; our respondents sell the genitors that have come to end of reproduction. The animals found to be sterile are also sold to be exchanged by fertile ones. In principle, sick animals are quarantined for sanitary observation in the infirmary in intensive or modern breeding; the type of traditional breeding as in this context of the study in the outlying areas of Ituri, breeders prefer to slaughter or to sell at the butchers, the only way to get rid of sick subjects.

Financial availability in the family fund is a key issue in the day-to-day management of households; many needs arise suddenly in family, which must have the means to face it. Zakara [1] reports that in rural areas, animals are at the centre of the peasant's social life. It constitutes a starting capital for the constitution of cattle herds. It is an important treasure that contributes to the reputation of poor families.

The purchase of VPE is a luxury for goat farmers in Ituri. It is not a priority issue. The majority of breeders use material collected from all sides for use in breeding, as it is the case for the drinkers they use the used pans. No listed feeders and rarely the veterinary products purchased to heal the animals. In the case of an unhealthy attack, the breeder prefers to avoid treating the animal by immediate sale or slaughter.

3.5 Goat marketing circuit in Ituri province

Several goat-marketing channels exist in the province of Ituri, including:

- 1) Family farm – Consumer ;
- 2) Family farm – Butchery – Consumers ;
- 3) Family farm – Butchery – Ambulant – Consumer ;

- 4) Family – Buyer – Butchery – Consumer ;
- 5) Family farm – Ruminant market ;
- 6) Family farm – Buyer – Ruminant market – Butchery – Consumer;
- 7) Family farm – Buyer – Ruminant market – Butchery – Consumer;
- 8) Family farm – Buyer - Ruminant market – Butchery – Ambulant – Consumer.

Indeed, the figure below, establishes the circuit of goat marketing in the province of Ituri.

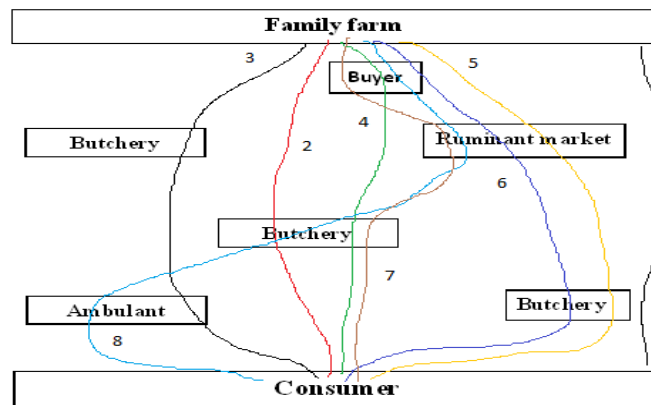


Figure 4: Goat marketing circuit in Ituri province

4. Overview of profitability of goat farming

4.1 Use of livestock income

Goat farming is the main meat production activity in Ituri province after poultry. It is consumed every minute that passes through the system called cabrito, contributing to the well-being of human beings. Table 6 sets out the various types of income allocations from goat farming in Ituri Province.

Table 5: Forms of use of income from livestock

Income allocation	Irumu	Mahagi	Aru	Mambasa	Total	Percentage
Schooling of children	48	48	48	48	192	100,0
Family ration	48	42	44	38	172	89,6
Clothing	8	22	16	26	72	37,5
Savings	44	48	40	46	178	92,7
Social	30	28	38	28	124	64,6
Purchase of machinery (displacement)	36	32	22	38	128	66,7
Purchase of plot	40	30	42	36	148	77,1
Dot	28	22	32	38	120	62,5

In the livestock sector, the goat is the main source of income for poor households and one of the main pillars of food security in the livestock sector, the supply of family rations, also the income from practice contribute to the purchase of mobility devices (motorcycles, bicycles, etc.) as affirmed by the majority of respondents. Zakara [1] estimates that goats, in short, are a source of savings that is used in many circumstances: purchase of food and family needs; religious manifestations; baptism and wedding ceremonies; and receiving distinguished guests. In 2008, Gnanda [7] previous work, introduced notions of the monetary and non-monetary contribution of the goat to highlight its double impact in households; for example, goats provide a significant and non-marketed quantity of fluid milk to members of rural households. In addition, it represents the species most concerned by non-commercial samples described as social (slaughter, celebrations of baptisms and weddings, barter, donations, dowries). Thus, combining the monetary and non-monetary aspects inevitably increases the goat's contribution to the fight against monetary and / or non-monetary poverty. To this must be added the function of live cash played by animals such as goats for the benefit of the breeders because of the possibilities and the regularity of the income generated throughout the year and at any season. In pastoral communities, the slaughter of animals that customarily punctuate, the visits of foreigners to families includes goats [11]. In many Burkinabe societies, the goat remains the most used animal in traditional sacrificial ceremonies (funerals, sacrifices to ancestors and "gods") [7].

Its particular contribution to GDP remains unrated in the Democratic Republic of Congo, however we estimate that it can reach about 19% in the country's agricultural products.

4.2 Some elements of analysis (average) of the breeders accounts: example-type of a breeder of Mahagi

Table 6: Taken-a-part from a breeder's account

Variables / expenses	2011	2012	2013	Observation
Number of goats	63	105	136	After many sales
Shed Construction Cost (\$)	20	0	0	20
Salary of goatherd	1 goat	1 goat	0	2 goats
Veterinary Products and Equipment (VPE)	0	0	0	0
Pasture development	0	0	0	Natural pasture
Mineral complement (lick block)	0	0	0	0
Supplementary Feed	0	0	0	0
Average Purchase Price / Goat (Figure 1)	0	0	0	0
Average Sale Price / Goat (Figure 1)	0	0	0	62,5\$
Acquisition of land for pasture	0	0	0	62,5\$

APP: Average Purchase Price; ASP: Average Sale Price.

The account of the breeder above is made up of the items related to the expenses that most breeders have made during their breeding practice. In the calculation of profitability, the following parameters are selected according to Table 7: number of goats per herd, cost of construction of building or housing shed, pay of goatherd by type of contract (cash or in kind), VPE, pasture management, mineral supplement supply, supplementary feed, PP / SP per goat, land acquisition for pastures, etc. The number of goats held by breeders is considered the basis of the entire profitability calculation in this section. The number of goats has been estimated at 63 in the contract between the project and the breeders in 2011, exceeding 105 in the second year for 136 goats at the end of the

project. Two valid reasons explain the standard of 136 at the end of our observations, in particular, the quota of the fixed number to keep and several sales made by the farmer during the year in search of profit. Annual sales by our investigators are estimated at the average of 12 goats, sold from the following year after start-up. The cost of construction replenishes the expenses incurred during the construction of the accommodation shed. In peri-urban areas, the availability of zootechnical building materials makes purchase prices of one square meter as cheap as possible, estimated at less than 1 US dollars (\$), and not all materials are purchased, some are pick up on the ground. Thus, the total cost of constructing the hangar made by the farmer is estimated at 20 US dollars (\$). We advocate the principles that, in a purely zootechnical agricultural enterprise, the price of material per square meter must be as cheap as possible to enable the farmer to maximize the profit of his farm. As for the remuneration of goatherds in periurban village settings, the mode of payment of the goatherd's salary is either direct or indirect, that is to say that it is done either in cash or in kind. In nature, the goatherd freely chooses a female of its choice, of which exclusively all the offspring of it will belong to it at each litter. In cash, the goatherd is paid in money. The selection of the goatherd by the herd owner is based on the availability or permanence of the goatherd and the lowest bidder. Most often our respondents use the students who care for goats from 15 or 16 pm. Veterinary Products and Equipment (VPE) is an area not frequently used by goat farmers in Ituri province. Pastoralists in the region do not buy VPE for animal production. However, VPE provide promising safety with regard to hygienic use and preventive control when dealing with pathological attacks of animals. The grazing spaces are nature trails not far from their homes. The system of breeding recorded in the environments remains purely traditional, the breeders are satisfied only with the existing natural courses; our surveys show that no land has been purchased for the management of agricultural pastures, so rearing in peripheral areas is based on natural regrowth or pasture available. However, pasture management is the basis for livestock development for any country that wants to develop this area. Regarding the mineral and food supplement, this was not recorded during our surveys, and is therefore not a major concern for farmers. The latter let "nature do the other" in their place "we can believe that we practice an abandoned breeding". For the mineral diet of goats according to Kessler [12], the major minerals (P, Ca, Na, Mg ...) and minor or trace elements (Cu, Zn, Se, Co ...) are essential, whose deficiencies cause metabolic disorders that can only be corrected by complementation with the deficit element; all these elements are provided by the ration including fodder, except for certain vitamins, such as vitamins of group B, which are synthesized by the microorganisms of the rumen while vitamin D is formed during the irradiation of the body of the animal by the solar rays. In this study, as in several others [13, 14, 7], it is shown that goats are still the most "injured" species in terms of supplement intake by breeders. Other studies conducted in the Central Plateau of Burkina [15 in 7], reveal the same trends in priority allocation of food supplements. They are generally less concerned by vaccination campaigns and receive little special care, such as the use of antiparasitics and antibiotic treatments [16, 17]. An average purchase price (APP) and sale (ASP) of US \$ 62.5 were considered per goat; this in order to estimate if the activity of the breeding of the goats appears profitable or not.

5. Cost-effective nature of goat farming in Ituri

As a bonus on board, by bending to the simple basic calculation, it is apparent from the analysis of the elements committed in terms of the expenditures made, in particular, the purchase price of 30 goats at the start up in 2010; construction of a traditional goat farm at a total price of US \$ 20. If the farmer wishes to end his breeding

activity in the third year, the profitability calculation would have led to:

1. Start-up cost calculation: $\$ 62.5 \times 30 \text{ goats} = \$ 1,875 + \$ 20 = \$ 1,895$
2. If breeding is completed, Average Sale Price / goat can be calculated: $\$ 62.5 \times 136 = \$ 8,500$
3. Considering the number of goats sold standing or slaughtered during the 3 years of breeding (2011, 2012 and 2013); here we consider the average of the threshold of between 11 and 15 (Table 1) of which 13 goats sold annually multiply during 3 years, we have $13 \times 3 = 39 \text{ goats} \times 62.5 \$ = 2,437.5 \$$.

Final calculation: $\$ 8,500 + \$ 2,437.5 = \$ 10,937 - \$ 1,895 = \$ 9,042$. In the practice of raising goats, breeders generate more profit without spending too much money. One of the major objectives of peri-urban producers according to Nguegang [18], is to maximize their profits, the purpose of production being the marketing of the surplus of their products and the obtaining of monetary incomes. Thus, the producer would stay and seek to improve production as the profit would be interesting, otherwise they would leave production.

6. Conclusion and recommendation

Considering that the breeders do not provide too much financial effort (Table 7) for their zootechnical activities, the gains are higher than the costs incurred during the investments. In peripheral (peri-urban and rural periphery) areas of Ituri province, goat rearing is a daily and major activity for some families, which means that income from livestock is a major contributor to the survival of households of breeders. The observations from the field send to the essential recommendations to the poor demographic layers of Ituri as well as to all the Democratic Republic of Congo and by implication of all the underdeveloped countries, to integrate the goat breeding, considering its simple and its high prolificacy, whose range reaches up to 4 for some natives by farrowing, while strengthening their links of collaboration with organizations specialized in the breeding of Ituri, such as the Cooperative Association of the breeders of the Ituri (ACOOPELI) and the Centre of Ruminant Biodiversity Monitoring in Africa (CSBR-Africa) with a view to revitalizing livestock development, benefiting from capacity building training and also from their veterinary products and equipment. These organizations should focus their research on the conservation and rapid multiplication of local goats up to 4 births in size to combat animal poverty and caloric deficiency in rural Iturian settings. With this in mind, the local goat is a genetically valuable base that can be exploited in breeding programs to adapt to tropical environments. In the end, the authors acknowledge that they have not addressed all aspects of this research. For other useful aspects, you can send us your scientific contributions via musalizi@yahoo.ca or lafleur.musalizi@unikis.ac.cd

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