



Critical Analysis of Rabbit Production in Abidjan District, Ivory Coast

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Abstract: Rabbit production has been identified as a major source of meat and an alternative of a good sustainable economic resource for the population. But, in Ivory Coast, it's considered as a non-conventional breeding and don't receive sufficient attention despite it was recognized as a very prolific mammal. The study aims to depict the current situation of the rabbit production and shed light on this situation in order to help the authorities for good decision-taking for rabbit production increasing. The method of survey adopted in this work was random sampling. Three cluster of breeders are identified by the survey: the small, medium and large producer. Results show that the number of rabbits per breeder varies widely from 10 to 600. Rabbit's activity is generally practice in camps by 35% of breeders and backyards of houses by 65% of breeders in urban areas. This activity are less than ten years old and only 35% of breeders are receive a training. The number of rabbits sold per month vary from 10 to 50 rabbits for 50% of the breeders and between 60 to 150 rabbits. The most of rabbit farmers (82.35%) use commercial pellets as staple food for their rabbits and only 17.65% use fodder. Rabbit farming is therefore highly dependent on commercial pellets. Rabbit production in Côte d'Ivoire is still young and traditional. Efficient and sustainable policies must be applied like a financial support by the authorities to help the breeders to increase their activities.

Keywords: Rabbit Breeding, Authorities Support, Breeders Training, Increase Rabbit Production

1. Introduction

The third World Rabbit Congress, held in 1984, recommended that governments give high priority to the development of logistic rabbit projects in their national development and budget plans [19]. The global food market is undergoing many transformations, particularly in developing countries. These transformations are visible in the consumption habits of animal feed products. The change in consumption patterns is influenced by increased nutritional awareness. It also, improve the standard living of a large number of citizens [21]. Breeding small animal species can be a good alternative. Indeed, it can occur significant benefits for households, both for short- and medium-term needs and

in the long-term for savings. According to FAO and Wilson, R. T. [4, 33], by the year 2000 the meat requirements of one-third of the human population will be satisfied by the supply of pork, poultry and rabbit meat. Also, rabbit production has been identified as a major source of meat that can contribute to this objective. This is largely attributable to the rabbit's high rate of reproduction, early maturity, rapid growth rate, high genetic selection potential, efficient feed and land space utilization, no competition with humans for similar foods and high-quality nutritious of meat [32]. In addition, with good care, a doe can produce up to 40 young ones per year compared with 0.8 for cows and 1.4 for ewes per year [20, 24]. However, the production of rabbits has not benefited sufficient attention for authorities. It's less considered in national agricultural policies. Then, annual

rabbit production in Côte d'Ivoire is only 35 000 animals/year [22]. The breeders face several constraints that they don't manage most of the time such as, financial resource to develop their activity, rabbit diets, absence of experience (training) and sell channel of their products, lack support of governmental and institutional. In addition, economic and socio-cultural factors remain a hindrance to widespread adoption of rabbit keeping. Face these difficulties and considerations, an evaluation of rabbit production, through a survey-valuation approach, needs to be conducted instead to collect more information which analyses can provide line of thought of authorities and help them increase the level of rabbit production in Ivory Coast.

2. Materials and Methods

2.1. Study Area

The survey was carried out from February to October 2018 in the district of Abidjan in Côte d'Ivoire, located between Latitude 5°00 and 5°30 North and Longitude 3°50 and 4°10 West. It covers 2120 km² with 5.9million inhabitants (Abraham, 2010).

2.2. Conduct of Survey

The method adopted in this work was random sampling. The data collection was done by self-counting (respondents completed the questionnaire themselves) and interview-assisted methods for each respondent. Sixty (60) urban and peri-urban rabbit producers were interviewed. The questionnaire was divided into five (5) sections: the first for the respondent profile, the second for their experience, the third for their motivation, the fourth for investment costs and the last section for their financial gains.

2.3. Statistical Analysis

All the information obtained were treated on Statistical Package for the Social Sciences (SPSS) Software Version 17.0. The responses were converted into quantitative data, on which statistical analyses were performed. These quantitative data consisted in the number or/and the percentages of respondent.

3. Results

3.1. Level of Rabbit Production and Characteristics of Selling

Rabbit production characteristics by producers are presented in table 1. The survey shows that the number of rabbits per breeder varies widely from 10 to 600. The smaller producers account for 30% (10 to 45 animals), medium and large producers account for 35% each (50 to 100 and 150 to 600 animals, respectively).

The study shows also in table 1 that only 35% of breeders have from 150 to 600 numbers of rabbits in their farm.

The number of rabbits sold per month by breeders

according table 1 vary on the one hand from 10 to 50 rabbits and 60 to 150 rabbits on the second. Each part concern 50% of the breeders. The rabbits sold vary in weight from 1.5 to 1.8 kg for 60% of breeders, and 2 to 3kg for 40% of breeders. The rabbits sold by most of breeders (60%) are between two and three months age and 40% of them sell rabbits between 4th and 5th months age.

Our study showed that the live rabbits of under 2kg of weight is generally sold between 3000 and 6000 FCFA for 75% of the breeders, and between 10000 to 14000 FCFA for 25% of breeders for rabbits of up to 2 kg of weight.

Table 1. Rabbit breeding characteristics according producers.

Breeding characteristics values		% Producers
Number of rabbits per breeding	10 to 45	30%
	50 to 100	35%
	150 to 600	35%
Number of rabbits sold per month	10 to 50	50%
	60 to 150	50%
Weight (kg) of rabbits on sale	1.5 to 1.8	40%
	2 to 3	60%
Rabbits' selling age (month)	2 to 3	60%
	4 to 5	40%
Rabbit selling price (FCFA)	3000 to 6000	75%
	10000 to 14000	25%

3.2. Rabbit Diets and His Cost

The figure 1 shows the different feed of rabbits in the farms. The most of rabbit farmers (82.35%) use commercial pellets as staple food for their rabbits and only 17.65% use fodder. We notice that the majority of breeders use mainly pellets and a few of them (17.65%) use only green forage.

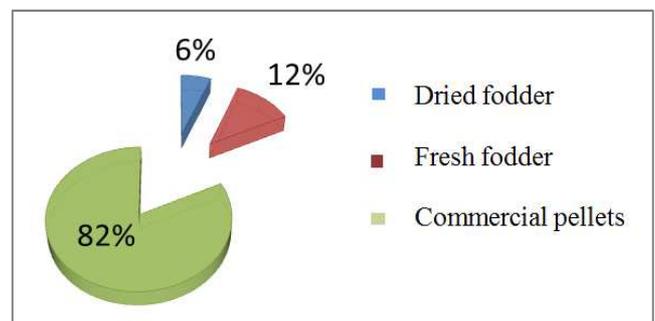


Figure 1. Different feeds for rabbits.

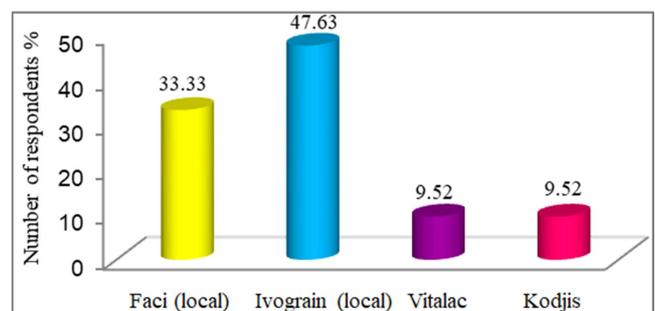


Figure 2. Different pellets providers and their average of using by producers.

The main suppliers of rabbit food in Côte d'Ivoire are

Ivograins and Faci (Figure 2). 47.63% of breeders feed preferably their rabbits with Ivograins pellets; those are used preferably Faci pellets represented 33.33%. Imported pellets such as Vitalac and Kodjiss are used at 9.52% each. These are a few professional breeders who use these foods. Table 2 shows that the costs of the local pellets provided by local producers are from 250 to 300 FCFA/kg. That concerns 80.96% of breeders. But for 19.04% of breeders, the pellets cost 450 and 500 FCFA/kg for Vitalac and Kodjiss which are imported from France and Holland, respectively.

Table 2. Rabbit breeding characteristics according to producers.

Pallets	Cost FCFA/ kg
Ivograins	250 to 300
Faci	250 to 300
Vitalac	450 to 500
Kodjiss	450 to 500

3.3. Experience in Rabbit Breeding and Economic Return

The survey results show in table 3 that 65% of rabbit farmers practice this activity for economic reasons while, 35% do it for their personal consumption. Relatively to the training in rabbit breeding, the same table shows that 75% of breeders are not training in breeding rabbit against 25% of them who receive a training.

In table 3, results reveal that rabbit breeding is mainly carried out in the house yards (65%) and in the camps (35%). These results are in line with the weak quantity of animals produced and reported in table 1.

In terms of years of experience, those with less than 5 years and 5 to 7 years of experience account for 35% each and 30% have more than 10 years of experience (Table 3).

Always in table 3, survey shows that the monthly income ranges from 50 000 to 100 000 FCFA for 57.5% of rabbit farmers and for 42.5% others, it ranges from 200 000 to 780 000 FCFA. These amounts are essentially due to the sale of the animals; expenses were not accounted for. The first category includes breeders who sell the rabbit between 3000 and 6000 FCFA and/or small quantity, and the second for those who sell the unit between 10 000 and 14 000 FCFA and/or large quantity.

Table 3. Rabbit breeding characteristics according to producers.

Information	Responses	%
Reason of rabbit breeding	Personal consumption	35
	Economic activity	65
Training in rabbit breeding	Training in rabbit breeding	25
	No training in breeding rabbit	75
Breeder place	At the camp	35
	Court yard of a house	65
Year of experience in rabbit breeding	1 to 3 years	35
	5 to 7 years	35
	More than 10 years	30
Monthly income of rabbit breeders	50 000 à 100 000 FCFA	57.5
	200 000 à 780 000 FCFA	42.5

4. Discussions

In table 1 the survey shows that rabbit breeders can be regrouped in three clusters: (i) the small producers, (ii) the

medium, (iii) the large producers. These three groups of breeders accurately reflect the three types of livestock identified by [15]: the family system that matches our result of 42.96% of breeders with a low production (10 to 45 rabbits), the artisanal system that matches the results for 38.86% of breeders with an average production of 50 to 100 rabbits and the modern system that matches the results for 18.18% with a large production of 150 to 600 rabbits. The both first systems represent 81.82% of rabbit production. That explains the weak production of rabbit meat in Côte d'Ivoire specifically and generally, in developing countries. In addition, it's a secondary activity at 95% according to Kimse and Tano, K. J. [15, 32]. It means that many breeders are still exposed to the traditional ways of raising rabbits resulting in low performance and profitability. Indeed, results of four study parameters in table 3: 35% breeder practice activity as personal consumption, 45% are not training in rabbit breeding, 65% practice their activity in a court yard of a house, 70% of breeders are less than 10 years of experience in rabbit breeding, show that such conditions are not favorable to the development of rabbit breeding.

Concerning the numbers of rabbits in farms (Table 1) and their location (Table 3), they can be compared to rabbit production in Nigeria where it is largely traditional, non-commercially oriented, family consumption targeted, and small holder type operation comprising 2-7 does and 3 bucks according to Abu [1]. Some scattered free-range backyard rearing was recorded. A study of [15] found that rabbit keeping in suburban areas are mostly in buildings (61%) compared to farms in urban areas that are conducted outdoors at 80%. Rabbit rearing is an activity which can be considered as a really source of complementary income by the populations according to Lhoste [17], but 65% of breeders produce less than 100 rabbits in their farm. It means that they are more small-producers than big-producers. This situation doesn't contribute to develop rabbit production and is far from satisfying the demand. Conversely, this also means that farmers cannot obtain more resources from this activity unless they change their rabbit production system. To achieve sustainable production in quantity and quality, the trend must necessarily be reversed. Production must evolve towards modern character systems that develop in buildings rather than backyards.

The survey shows that the number of rabbits sold per month by the most of the breeders are not sufficient and vary on 10 to 50 rabbits. These results mean that some farmers sell almost all of their animals to restart their activities later. They then carry out this activity intermittently which only brings them a few occasional gains. Such production is not efficient and does not reflect the sustainability of production. The results show again that the market of rabbit meat is weakly provisioned in Côte d'Ivoire. It is certain that demand is stronger than supply. Compared to the needs of the country, amount to more than 262 thousand tons/year with a consumption of beef estimated at 75 210 t/year, the rabbit meat production is far below the needs of the growing population each year. Indeed, the annual production is 50 tons carcass for an estimated Ivorian population of more than 25

million. In fact, according to [16], some 82 percent of the world's production of rabbit meat takes place in the developed nations, meaning that approximately only 18 percent of total rabbit meat production in the world occurs in developing countries. This shows that there are more to do in these countries concerning rabbit production.

As concern the weight of rabbits sold (Table 1), the results are consistent with [22] data which is indicating that rabbit carcasses produced are approximately 1.5kg. The rabbits sold by 60% of breeders are between two and three months of age with 1.5 to 2kg and 40% of them sell rabbits between 4th and 5th months of age with 2 to 3 of weight. According to Khan [14], in Pakistan the live weight for different indigenous rabbit types ranged from 1.40 to 1.66 kg. At 90 days, the dressed weight will be between 1-1.2kg in Kenya, according to KARI [12]. The weight and age of the sale of rabbits are usually a function of the species.

In table 1 the live rabbit of 2 kg of weight is generally sold by Ivorian's breeders between 3000 and 6000 FCFA. This price is in the same price range applied in Senegal in the work of [7, 31] where Senegalese breeders sold a live rabbit between 3400 and 4000 FCFA. This show that, the price of rabbit kg is more expensive in Côte d'Ivoire than in Senegal [2]. Thus, the rabbit can bring a considerable benefit to the actors of the sector [24] if they can sell more than 100 rabbits/ month. Otherwise, they cannot grow financially and their activities themselves. Our study showed that rabbits are sold between 3000 and 6000 FCFA for 75% of the breeders, and between 10000 to 14000 FCFA for 25% of breeders. This means also that rabbit meat is not within the reach of all citizens and would be intended for a relatively affluent social class. Rabbit meat becomes then a luxury.

The results re-emphasize rabbit production as a profit and efficient productive venture. The average consumer price of whole rabbits in metropolitan France according to Gomant [8] was €9.95 / kg (6500 FCFA/kg). However, in Kenya, the rabbit meat can be sold at between Kshs.500 and 1000 (3000 and 6000 FCFA) per kilogram dressed weight [22]. In Nigeria, an investigation of [25] show that the rate of return to rabbit production investment was found to be 152% (that is, ₦ 1.52 (2.45 FCFA)) return to every ₦ 1.00 (1.61 FCFA) invested. That for fixed cost was 1299% (that is ₦ 12.99 (20 FCFA) return to every ₦ 1.00 (1.61 FCFA) incurred on fixed asset) while the rate of return on variable cost was 274.5% (that is ₦ 2.75 (4.45 FCFA)) return to every ₦1.00 (1.61 FCFA) invested on variable inputs. Unfortunately, in developing countries, most rabbit production are predominantly subsistence low input/low output system according to Borter [3]. In Algeria, the price of one kg of rabbit meat in butchers increases over the years, thus making rabbit a luxurious meat, with selective consumers [13, 30]. According to the same authors, in 2016, the average price of 1 kg of rabbit was 750 DA (5.15 € ≈ 3400 FCFA).

Rabbits are feed in 82.5% of case with pellets and fodder are use in 17.5% of case (Figure 1). Likewise, the figure 2 and table 2 show that rabbit production is mainly dependent on pellet production companies. Thus, the activity of the breeders is closely linked to these supplying companies. In other words,

in the event of insufficient production in quantity and quality of the pellets, rabbit production will necessarily more affected and get a significant decrease. This will negatively impact farmers' income. Their survival depends on it. Several farmers use both Faci and Ivograin pellets because, according to them, their production is inconsistent. This guarantees their production activity. But unfortunately, in case of animals disease or death related to food, they cannot clearly identify the source. Vitalac and Kodjis pellets are ordered exceptionally for exotic rabbit breeds. These are sold very expensive by their producer.

The cost of selling the feed (Table 2) is related to a high selling price of rabbits (10 000 to 14 000 FCFA) (Table 1). In any case, this cost of the pellets does not help small and medium farmers. This is why 17.65% of breeders feed their rabbits with dried or fresh fodder. With the small number of animals at their disposal, they are not able to cope with the cost price of food. Indeed, if a rabbit has to consume between 5 and 10 kg of pellets during its breeding, the farmer will spend between 1250 and 3000 FCFA for a single rabbit. The sale price of the rabbit as practiced today does not then make the business profitable enough for the 80.96% of breeders. This means that overall rabbit meat cannot be available and accessible by the majority of the Ivorian population in these conditions.

Feeding rabbits using pellets or green fodder are also revealed by [15] in the district of Abidjan. Indeed, he had showed that the pellets are local foods or imported and sold by Ivograin, Faci, Vitalac and Kodjas. In Kenya, the feed/pellets cost Ksh.51 / kg (300 FCFA/kg) according to [12] and most farmers used various types of feeds, pellets (11%), vegetables (19%) and pellets and vegetable mixtures (60%) [31]. This is consistent with our results in figure 1. According to literature of [10, 29], this balanced diet containing adequate fibers (20-25%), minimal starch and optimum protein concentration which is important to prevent gastro intestinal distress and improve rabbit production. It was observed that some farmers did not trust feed companies because they did not indicate the feed composition on the packages, other farmers complained of high feed cost that caused them to seek alternatives to feeding and consequently substituting rabbit pellets with chicken mash [9]. Diets of rabbits in Nigeria are primarily forages, grasses and legumes supplemented with kitchen wastes and agricultural wastes such as dried cassava peels, wet milled cereal [1]. In fact, studies that take into account industrial and agricultural wastes must be carried out to produce food sufficiently cheaper able to boost rabbit production activity and thus improve the income of breeders. Like [6], we believe that rabbit meat production can be increased by improving the quality of food and the environmental conditions of animals. It is a question of political will.

In terms of the respondents' experience (Table 3), the survey reveals that the majority of rabbit's breeders are not professional breeders. If more than a third of them carry out a production activity for their own satisfaction, the 2/3 in which only a few of breeders are modern or industrial practices, it

cannot satisfy the Ivorian market with such a production system very little or not developed. It also means that many farmers do not know or believe in a profitability of rabbit production activity. Breeders or other people interested in breeding rabbits need awareness and training to carry out this activity well and to benefit Ivorians.

The study of [15] are revealed that rabbit rearing is practiced as a secondary activity in most farms at 90.55% whereas thirteen per cent of the farmers in Kenya, kept rabbits mainly as a source of meat and 31% as a source of food and income. In table 3, 25% of rabbit breeders received training in rabbit breeding before start the activity, but 75% did not receive training. This means that the majority of the pupils practice their activity in the informal without any knowledge in the field. They cannot therefore improve their production and claim to develop it. In Bangladesh, according to Lukefar [18], small-scale rabbit enterprises were managed by women and children, but they don't receive a sufficient training to conduct their activity. In Cameroon, where certain rural family farm, women and children assumed most of the rabbit feeding and management responsibilities, they do not also have any experience. All these activities remain familiar and informal and are not efficient. It is notice that every farmer not possesses the human talents required for successful rabbit production. So, training of farmers on basic husbandry technique would contribute to the sustainability of the production systems and formal farmers training may be more appropriate when held on demonstration farms [18]. Before start this activity, training was mainly necessary for the breeders to carry out their breeding and success their activities [23].

As for the local of rabbit breeding, it is mainly carried out in the house yards and in the camps (Table 3). These results are in line with the weak quantity of animals produced revealed in table 1. Rabbit production is mainly a small-holder system that has not advantages over the other livestock systems. The practice of rearing rabbits in a house yards or backyard can make it possible to develop this activity and make it profitable if producers are supervised. It is very important to promote otherwise rabbit rearing. Indeed, the rabbit when raised with appropriate technologies can contribute virtually to improve the diet of large numbers of both rural and urban families, particularly landless and low-income ones, eventually providing such families with employment and a source of regular income [11, 26]. According to Lukefar [19] in areas where rabbit meat is not widely consumed or marketed, small-scale rabbit projects should be initiated on a backyard family basis, since the ultimate goal of rabbit raising is to provide more meat at the family level. Unfortunately, in many countries confinement rearing has been identified as one common traditional hindrance to rabbit farming due to lack of experience and training.

According to the years of experience in table 3, the survey shows that majority (more than 70%) of breeders are less than ten years of experience. This means that rabbit production is an activity that is very young in Ivory Coast as most of African countries, while its domestication dates from the Middle Ages (15th century) by the French monks [11, 34]. In Benin, for

example, the rise of cuniculture has been observed since 1988 [5]. The mean experience in rabbit farming is 3 years according to [9] in Kenya. In that context, it is established that technical knowledge on rabbit production lack in many countries [28]. This means that there is much to be done and states must adopt efficient policies to address the many challenges in the field. According to Oseni [27], a lack of access to information on rabbit management under smallholder units is one of the major challenges in rabbit production. The availability and access to information on rabbits in terms of productivity, profitability and food quality would make it possible to further develop this sector on the continent. Many people indeed ignore, all the qualities of the rabbit.

The monthly income amounts are essentially the sale of the animals (Table 3). The results show that the category who get 50 to 100 000 FCFA are matches that who sell the rabbit between 3000 and 6000 FCFA and/or small quantity, and the second who get 200 to 780 000 FCFA are matches for those who sell the unit between 10 000 and 14 000 FCFA and/or large quantity. This income must be reduced by at least half if production costs are taken into account. According to KARI [12], in Kenya, a weaned rabbit, one month is fetching between Kshs.500.00 to 1000.00 (3000 to 6000 FCFA). Every extra month increases the value with Kshs.1000.00 (6000 FCFA) and with a mature four months rabbit going for between Kshs.3500.00 to 5000.00 (20 000 to 30 000 FCFA) [31]. This information shows that rabbit production can really be a profitable activity. Such gains can improve the lives of breeders and reduce poverty. And that is why we recommend a real support policy that takes into account all farmers to help them to increase their activities. That's can help to struggle against food insecurity in meat.

5. Conclusion

The present study has been started to provide information and build objective analyses on the rabbit production situation in Côte d'Ivoire base on rabbit producer's opinion in order to help increase their activities. The results had showed that the practice of rabbit activity of production is very recent (less of 10 years) so that the rabbit meat is weak produce in Côte d'Ivoire. Three groups of breeders are identified: small, medium and large producers. The small and medium groups represent the majority of breeders. Most of them are not training and practice their activities of rabbit production in the house yard so that they don't get important incomes through this activity. The rabbit food market is dominated by use of pellets provide by two local companies which dominate this sector so that rabbit production is strongly link to these company pellets production. Of all the foregoing, the state must become more involved in the sector. Efficient and sustainable policies must be applied in order to help the breeders to develop their activities. For example, search for cheaper foods for the rabbit diet is necessary. A minimum financial support by the authorities will help convert most of the small breeders to medium, and medium breeders to large breeders. Producers must be trained on self-sufficiency rather

than depend on commercial feed or imported feeding. Such initiatives can allow to increase rabbit production and reduce the cost of rabbit meat. This will further promote its consummation and be able to join its production.

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