

## POULTRY FARMING IN AGROFORESTRY IN THE AGBOVILLE (IVORY COAST) AREA

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### ABSTRACT

To diversify their income, farmers in the Agboville area (Ivory Coast) raise poultry in addition to their usual crops such as cocoa. They sometimes carry out both activities on the same plot of land, thus practising agroforestry when they add trees for reforestation. To evaluate the practice of poultry farming in agroforestry in the Agboville area. A prospective, descriptive and analytical survey was conducted among a population of farmers and/or livestock breeders, all from 43 villages in the municipality of Agboville. At the end of this survey, only the data collected from 199 poultry farmers were retained for analysis. In addition, the survey questionnaires focused on socio-demographic characteristics, farming systems, types of poultry raised, poultry feed, poultry health monitoring, and the interaction between poultry and plants. This data was analysed using SPSS and Excel. The results showed that the poultry farmers surveyed were mainly farmers, comprising 5% women and 95% men, with 96,5% being Ivorian and an average age of  $52,49 \pm 0,17$  years. In addition, the majority of the study population practised semi-modern or traditional livestock farming, with a minority practising modern livestock farming. Poultry farmers raised laying hens, broilers, hybrids or African chickens and all recorded good poultry production. This survey also showed that 44,7% of poultry farmers used trees and/or crops as shelter for poultry, compared to 55,3% who did not practise agroforestry. At the end of this survey, it appears that the majority of respondents obtained good poultry and crop production.

**Keywords:** African chicken, Farmer, Livestock, Ivorian, Tree, SPSS.

### INTRODUCTION

In West African countries, family poultry farming products are a permanent source of income and serve as a means of accumulating capital (Gueye, 2003). Combined with agriculture, it contributes significantly to the fight against poverty in developing countries (Moustier and David, 2001). Thus, agroforestry, defined as a farming method that combines tree planting with agricultural crops and/or livestock farming on the same plot of land (FAO, 2005), is considered one of the strategies for achieving food self-sufficiency by improving food security (Faye, 2022). For several years now, planting trees in poultry farming areas has been recognized as improving the welfare of poultry, particularly laying hens, while offering

undeniable economic and environmental benefits (The Gouessant, 2023). In Côte d'Ivoire, poultry farming plays an important role in meat production, with an estimated output of more than 51,631 tonnes per year in 2018 according to (Loukou *et al.*, 2021). It is particularly widespread in the vicinity of Abidjan, especially in the Agboville region, where the population are cocoa farmers who also raise poultry. However, production remains insufficient. Its recovery plan for the development of livestock farming has adopted a strategy of improving the production of short-cycle animals, with poultry playing a key role (MIRAH, 2014). For efficient performance improvement and better management of local animal resources, the Food and Agriculture Organisation of the

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United Nations recommends the identification and characterisation of livestock systems and domestic animals (FAO, 1984). This is the context in which the present study is situated. Its objective is to evaluate the practice of poultry farming in agroforestry in the Agboville area (Ivory Coast). through a survey. Specifically, it aims to : - determine the socio-demographic characteristics of livestock farmers; - evaluate poultry production.

## MATERIALS AND METHODS

### Study site

The study was conducted in 43 villages in the municipality of Agboville (Ivory Coast).

### Study population

This population consisted of people engaged in agriculture and/or livestock farming, civil servants and people engaged in small trades. The inclusion criteria were that anyone engaged in poultry farming was included, while those not engaged in poultry farming were excluded.

### Technical equipment

The equipment used in this work consisted of survey forms (questionnaires), a pen and an Apsonic AP125 motorbike.

## Study method

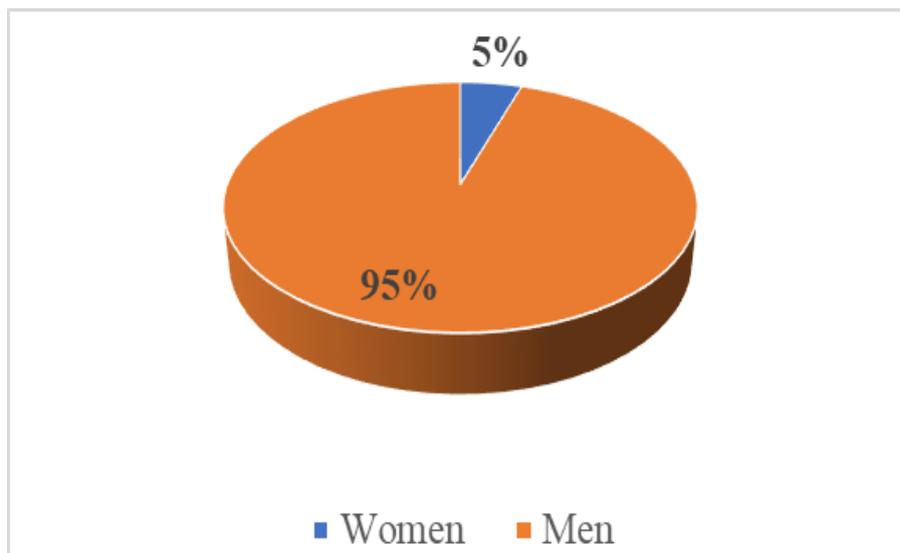
This survey was a prospective, descriptive and analytical study involving data collection from 199 poultry farmers. The information was recorded and analysed over a period of approximately three (3) months, from November to February. This information was collected from survey forms that included: -The identity of poultry farmers; - Socio-demographic characteristics; - Farming systems; - Types of poultry raised; - Poultry feed; - Poultry health monitoring; - Interaction between poultry and plants.

## Statistical analyses

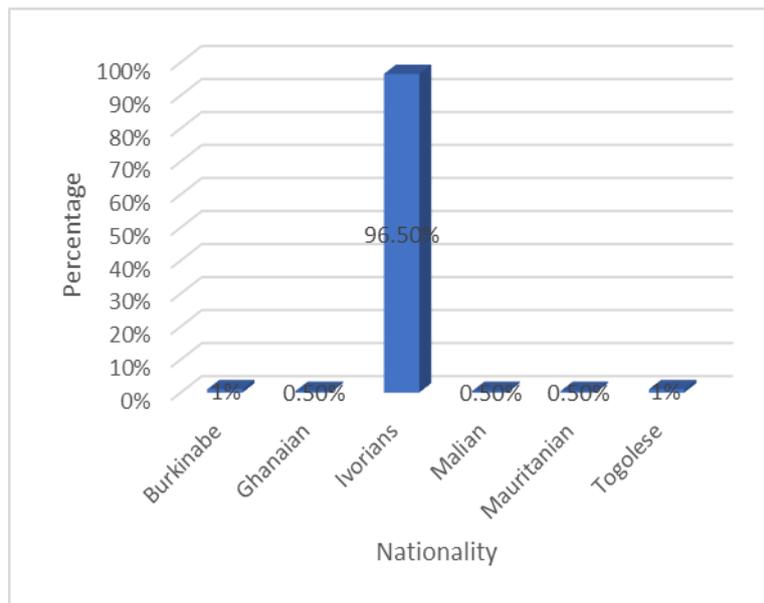
The collected data were entered and processed using IBM SPSS V25 software. This software was used to produce descriptive statistics to determine the numbers, mean, errors on the mean, maximum and minimum. Graphs and diagrams were constructed using Excel 2016 software.

## RESULTS AND DISCUSSION

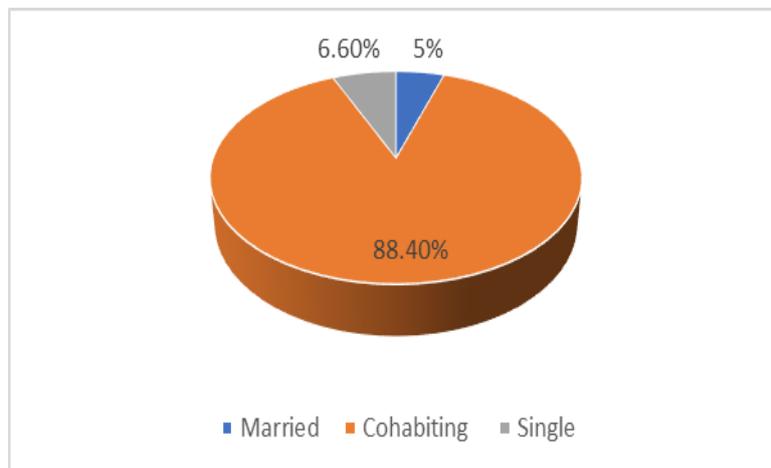
Analysis of the data collected showed that the study population consisted of 10 women, representing 5% of the population, and 189 men, representing 95% of the population (Figure 1). The average age of the population studied is  $52,49 \pm 0,17$  years, with a minimum age of 35 and a maximum age of 64. The survey results showed that the majority of the population studied were Ivorians, numbering 192 or 96,5%. In addition, two (2) Burkinabe, or 1%, one (1) Ghanaian, or 0,5%, one (1) Malian, or 0,5%, one (1) Mauritanian, or 0,5%, and two Togolese, or 1%, were also recorded (Figure 2).



**Figure 1.** Percentage of genders in the study population.



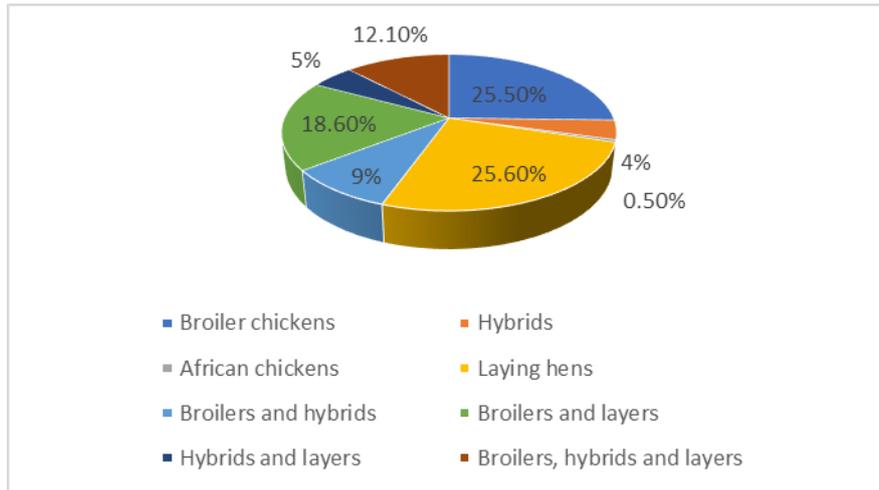
**Figure 2.** Distribution of the study population by nationality.



**Figure 3.** Distribution of the population according to marital status.

Figure 3 shows the distribution of marital status among the study population. The survey results revealed that 10 respondents were married (5%), 176 were cohabiting (88,4%) and 13 were single (6,6%). The average number of children in the study population was  $5,72 \pm 0,17$ , with a minimum of 2 children and a maximum of 12 children. The study population consisted mainly of farmers (128, or 64,32%) and 71 peoples engaged in other occupations (35,68%). Analysis of the survey results showed that the farming systems used by poultry farmers are distributed as follows: 68 farmers use traditional farming methods

(34,2%), 110 use semi-modern farming methods (55,3%) and 21 use modern farming methods (10,6%). The results showed that 50 people raised only broiler chickens (25,1%), 8 peoples raised only hybrids (4%), one person raised only African chickens (0,5%), and 51 peoples raised only laying hens (25,6%). In addition to those who raised a single species, others raised several species. This included 18 people who raised broilers and hybrids (9%), 37 peoples who raised broilers and layers (18,6%), 10 peoples who raised hybrids and layers (5%), and 24 peoples who raised broilers, hybrids, and layers (12,1%) (Figure 4).



**Figure 4.** Distribution of poultry types raised by the study population.

The survey conducted in the Agboville area yielded a total of 293459 chickens, broken down as follows: 136902 broilers, or 46,65%; 131196 layers, or 44,7% ; 25,361 hybrid chickens, or 8,64% ; and 100 African chickens, or 0,003%. All 189 farmers (100%) surveyed fed their animals once a day, specifically in the morning. Among the farmers surveyed, 109 used IVOGRAIN industrial feed (54,8%) and 90 used crushed corn (45,2%). The latter allowed the animals to peck at the plots to supplement their protein intake. The survey results showed that 181 poultry farmers did not use a specialist to monitor their poultry, representing 91% of the total, compared with 18 farmers who did use a specialist, representing 9%. However, none of the poultry farmers had a prophylaxis plan. With regard to vaccination and deworming of poultry, all 199 farmers surveyed, or 100%, practised these procedures. Analysis of the results showed that all 189 poultry farmers had good poultry production, or 100% of farmers.

The survey showed that 89 poultry farmers used trees and/or crops as shelter for poultry, or 44,7% compared to 110 farmers who did not practise agroforestry, or 55,3%. These 89 poultry farmers used trees and/or crops as resting areas for their animals, but the animals did not spend the night there. They returned to the henhouse in the evenings. The survey results showed that agroforestry poultry farmers grew either cocoa : 10 peoples (11,23%), coffee : 4 peoples (4,49%), palm trees : 10 peoples (11,23%), coffee and cocoa : 21 peoples (23,59%), cocoa and rubber trees : 34 peoples (38,2%), cocoa and palm trees : 7 peoples (7,86%), or rubber trees and palm trees : 3 peoples (3,37%). The survey showed that, out of 89 poultry farmers practising agroforestry, 50 reported that their crops (plants) were in very good condition overall, or 56,2%, compared with 39 who reported that their crops were in good condition overall, or 43,8%. In terms of leaf appearance, 27 respondents had leaves that were rated as ‘very good’ (30,7%), and 62 respondents observed leaves that were rated as ‘good’ (69,3%). Analysis of the results showed that 43 poultry farmers had very good production, or 48,9%, 46 farmers had good production, or 50%, and only one farmer had poor production, or 1,1%. In this study, the results

showed a low percentage (5%) of women, which can be explained by the fact that, in rural areas in Agboville, apart from household chores, women are responsible for food crops such as cassava, bananas and maize. Therefore, few women are involved in livestock farming in general. The age of poultry farmers, which varies between 35 and 64, is well explained by the Ministry of Agriculture's report, in its 2015/2016 census of agricultural operators, which places the age of farmers between 25 and 65 (MINADER, 2016). The survey results show that Ivorians account for 96,5% of poultry farmers and foreigners account for the remaining 3,5%. This is also clearly shown in the report by the Ministry of Agriculture (MINADER, 2016). The marital status of those surveyed shows that 88,4% of people live in cohabitation. This is undoubtedly due to the concept of civil wedding in rural areas in particular and in Ivory Coast in general.

According to the results, 64,32% of respondents' main activity is agriculture. No livestock farmers have livestock farming as their main activity. This result confirms the fact that Ivorians do not have a pastoral vocation. This rate of farmer-livestock breeder could also be explained by the fact that it is farmers who have the opportunity to practise agroforestry, as a crop must first be established and then combined with trees and livestock breeding (FAO, 2005). The dominant farming system is semi-modern farming, practised by 55,3% of the poultry farmers surveyed. This is because traditional farming has low productivity, slow growth rates and insufficient profitability, even though traditional chicken is sought after for its quality and distinctive taste. Furthermore, the limited resources of this population favour this farming system. With regard to poultry breeds, the survey results showed a predominance of broiler chickens at 46,65% and laying hens at 44,7%. This could be explained by the short production cycle of broiler chickens, which lasts between 45 and 60 days (Kone, 2008), and the profitability of laying hens due to their egg production. This contrasts with hybrids and African chickens, which have long cycle. Analysis of the

survey results shows that a very small proportion of poultry farmers (9%) have their animals monitored by a specialist, while the remaining 91 % monitor their animals themselves. This is easily understood by the choice of farming system. In fact, almost all poultry farmers who consult a specialist use modern farming methods, while the others use traditional or semi-modern methods. The survey results show that 88 producers are satisfied with their production, or 99%, while only one obtained poor results, or 1%. These good results can be explained by the fact that poultry and trees go well together. Planting trees in chicken runs promotes their well-being and allows them to express their natural behaviours. This agroforestry practice, which combines trees and agriculture on the same plot of land, has many benefits for the animals, as well as environmental and even economic advantages. In the paddocks, trees contribute to the animals' well-being. Poultry need shelter every 20-25 metres to feel comfortable venturing into open spaces. The comb-like arrangement of shrubs at the exit of the building, followed by spaced trees along the rest of the route, encourages exploration of the entire space. By moving along the entire route, the chickens will develop their muscular system and strengthen their skeleton. Picking at insects and vegetation diversifies their nutritional intake.

The trees provide shelter and shade for the poultry, improving their comfort. Without fear, the poultry are better able to express their natural behaviours (The Gouessant, 2023). Trees improve thermal comfort in the run. Thanks to the trees, the hens can enjoy their run even during the hottest periods. This agroforestry practice has a considerable environmental impact on several levels (Puybasset, 2012). However, poultry manure can cause soil or water pollution, particularly due to the nitrates it generates. However, the root system of trees, which is often deep, captures these elements and reduces the risk of over-fertilisation and groundwater pollution (Puybasset, 2012). At the same time, this increases the yield of existing crops. Furthermore, as trees are carbon sinks, they not only help mitigate the effects of climate change, but also contribute to recapitalising soil carbon (Laszczyk, 2010) and recreating fertility and biodiversity in situ. Indeed, trees, like plant cover, reduce the need for tillage, all of which recreates in situ fertility and semi-natural habitats for wild flora and fauna. They contribute to restoring ecological continuity and help limit the use of inputs (Lubac, 2008). In terms of production, 99% of the poultry farmers surveyed reported satisfactory yields from their crops grown in association with poultry, while only 1 % reported poor yields. This is easily understandable given the benefits of the agroforestry system put in place, namely agrosilvopastoralism. This is one of the best agroforestry and agroecological systems for increasing producers' incomes in both poultry and agriculture, but also for combating soil degradation, loss of soil fertility and mitigating the effects of global warming

(CRA, 2009). The 1% poor production is explained by the presence of nitrate, which may be too high in chicken droppings or manure, as this producer did not have enough trees on his plot to absorb this chemical element.

## CONCLUSION

Analysis of the results of this study showed that the majority of farmers, 88 or 99%, obtained good crop yields, in addition to the poultry they raised, compared to 1 who obtained poor yields, or 1 %. Hybrid and laying hens thrive better on cocoa, rubber, palm or coffee plots, unlike broiler chickens, which find it somewhat difficult to adapt. Thus, agroforestry in poultry farming is a means of diversifying income and promoting sustainable development, which can be explained by the adoption of a land use method that combines trees, crops and poultry. This agroforestry technique is also an alternative to reforestation and soil fertility restoration.

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## CONFLICT OF INTERESTS

The authors declare no conflict of interest

## ETHICS APPROVAL

Not applicable

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## AI TOOL DECLARATION

The authors declares that no AI and related tools are used to write the scientific content of this manuscript.

## DATA AVAILABILITY

Data will be available on request

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