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Typology of local poultry breeding of *Gallus gallus* species in family poultry in Benin

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Abstract

ABSTRACT

The characterization of breeding systems enables to identify the types of breeding in order to elaborate development activities. The aim of this study was to characterize the types of local chicken breedings of Benin. Thus, 216 local chicken breeders of the twelve departments of Benin were interviewed. Three Types of breeding were identified. The Type 1 corresponds to livestock breeders who are not provided with schooling and includes farmers, artisans and housewives. They are distributed in almost all departments of Benin and constitute 77.78% of the survey population. The average herd size is 33 chickens and veterinary treatments or health follow-up are not practiced. In Type 2, the farmers are not provided with schooling; only a few have the primary or secondary standards. These farmers are more concentrated in Alibori, Atacora and Donga. This type of breeding regroups mostly housewives who do a food crops. The average herd size is 27 chickens and the sick birds are not usually treated. The sale of animals is not primordial. Farmers in this group represent 16.68% of the sampled population. Finally, in the Type 3, breeders have a high school standard and do agriculture as dominant activity. They represent 5.5% of the sampled population and practice their activities in north Benin. The herds are of large scale (92 heads) and the animals profit from a good medicare by administration of vitamin complex, antibiotics, vaccines and deworming based on veterinary requirements. Improving local chicken breeding must take into account the particularity of each breeding type.

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Introduction

The major challenge for countries in West Africa is to succeed to feed adequately in livestock products, a population more numerous, highly urbanized, but relatively poor (Mankor, 2009). These countries have therefore focused their development program of food safety and security on the production of conventional and unconventional species livestock in general and short-cycle species in particular. Among the breedings of short-cycle species, improved and traditional poultry breedings systems are an important source of animal protein supply for the population and income for producers and poultry sellers (Tougan, 2008; Teng, 2011).

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In Family poultry breeding, traditional breeding ensure 70% of the total production of eggs and poultry meat in low-income countries where food products are in deficit (Sonaiya and Swan, 2004). In the countries of sub-Saharan Africa, traditional chicken represent approximately 80% of the total poultry population and contribute to a significant proportion of meat production (25-70%) and eggs (12 to 36%) (Gueye, 1998). In Benin, the poultry enable usually to cover part of the nutritional needs of the family and more than 50% of farmers produce for subsistence and sometimes generate some cash income from the commercialization of products in the local market (Youssao *et al.,* 2009).

In order to preserve and develop the poultry sector, the government of Benin had implemented a policy of rural development by supporting the installation of young agricultural enterprises to intensify livestock production and reduce the imports of frozen products. But many endogenous factors (weak technical and managerial capacity of farmers, poor dissemination of technological innovations) or exogenous (import competition), which restrain the development of this sector (Agoli-Agbo, 2005). To find a solution to these endogenous and exogenous factors, a good characterization of the poultry sector is necessary in order to develop a mechanism of suitable and efficient integrated production systems. Several studies were carried out on the zootechnical and phenotypic characterization of local chickens in Benin in general (Tougan, 2008; Youssao *et al.,* 2009; Youssao *et al.,* 2010; Youssao *et al.,* 2012). The preceding works carried out by Youssao *et al.* (2012) on the comparison of growth performance, carcass characteristics and meat quality of Benin indigenous chickens and Label Rouge (T55×SA51) showed that significant differences exist among ecotypes of indigenous chickens of Benin. In spite of the fact that difference between the carcass traits of those ecotypes is well known, little knowledge exists on the typology of family poultry of Benin.

The aims of this study were to contribute to food safety in animal protein and to improve farmers' incomes by intensification or development of the poultry sector in Benin. Specifically, there were to: a) characterize the local chicken breedings of Benin on the social, economic, health and production plans; b) identify problems that prevent the development of poultry population in Benin; c) formulate concrete proposals to improve the productivity of poultry in Benin.

Materials and methods

Study area

The study on the typology of local chicken breedings of *Gallus gallus* family poultry was carried out in all the twelve Departments that account Benin country: Alibori, Atacora, Atlantic, Borgou, Collines Couffo, Donga, Littoral, Mono, Ouemé, Plateau and Zou. With area of 112622 km² (CountryStat, 2012), the Republic of Benin is limited by the Niger River in the north, in the northwest by Burkina Faso, in the west by Togo, in the east by Nigeria and in the south by the Atlantic Ocean. The Departments of Borgou, Alibori, Atacora, Donga and Collines are characterized by one dry season and one rainy season with an average pluviometry ranging from 900 to 1300 mm/year. The Departments of Atlantic, Littoral, Oueme, Plateau, Mono, Zou and Coufo are characterized by two rainy seasons: the high from April to July and the small from September to November. These two rainy seasons are interspersed with dry seasons. The average pluviometry is about 1200 mm/year

(ASECNA, 2012). The main Communes where the samples were taken in each department are presented in Fig. 1.

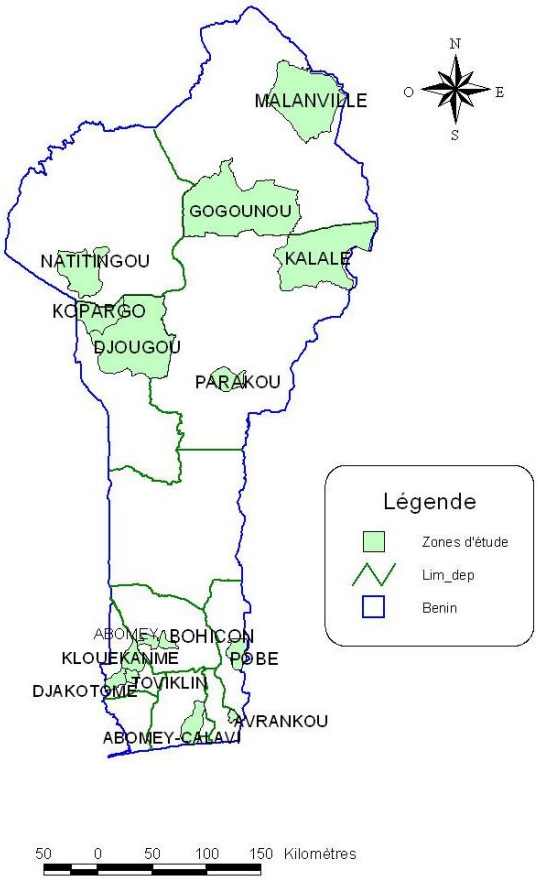

Fig. 1. Map of the study area.

Methodology

Data collection was carried out among local chicken breeders by using a survey guide which carries the following information: breeder and herd identity, herd history, herd management, feeding and health follow-up. During the investigation, the methodology used is that of retrospective survey by direct interview with the producers. During this survey, the surveyed population remember themselves the various stages of local chicken breeding. Thus, we proceeded to a purposive sampling where any person that had undertaken local chicken breeding was investigated. In total, 216 local chicken producers were surveyed throughout the country. After interview, the answers obtained from the survey guide were analyzed. During the counting, the data collected were reviewed, and then coded and stored in a database conceived on Excel. All information relating to the questionnaire was encoded by letters or numbers. During the counting and survey guide examination, the ages of chickens were grouped into three classes: from the birth to the weaning, between the laying of mother hen and the laying of its chick, and then after the first laying.

Statistical analysis

After examination of the survey guides and encoding, data were analyzed using SAS software (2006). The *Proc corresp* proceeding of SAS was used for Correspondence factor analysis (CFA). The variables taken into account were: the profile of chicken breeders, species bred, cultivated territory, feeding, age and time of animal sale, the number of animals kept by the breeder, the number of male and the one of female. A hierarchical cluster analysis based on the characteristics of the farms on the most significant components of CFA was then performed. The groups of Local chicken breeders were then identified and each group corresponds to one a type of breeding. For quantitative variables (age, number of chicks, number of birds by age, herd size), an analysis of variance at single factor was used and the type of breeding was the only source of variation. The *Proc GLM* procedure was used for analysis of variance and the F test was used to determine the significance of the effect of the breeding type on the variables. The means were calculated and compared by the t test. The frequencies were calculated by *Proc freq* procedure of SAS (2006) and compared by the Chi-square test and the bilateral Z test.

Results

Characteristics of types of farms

Three axis were selected for the interpretation of the correspondence analysis results ($\chi^2 = 1009.79$). Each axis corresponds to a group of breeders and each group corresponds to a type of breeding. Group 1 corresponds to the breeding type 1, group 2 to the breeding type 2 and group 3 to the breeding type 3. The results of the factorial correspondence analysis are given by group of chicken breeders in Fig. 2.

The Type 1 corresponded to livestock breeders who weren't provided with schooling or had rarely the primary or secondary school standard. This type of breeding included the farmers, artisans and housewives. They were distributed in almost all Departments of Benin (Alibori, Atacora Atlantic Borgou Couffo, Donga, Mono, Oueme, Plateau, Zou) and represent 77.78% of the surveyed population. In this group, farmers were predominantly men's (67.3%) and did agriculture and crafts as main activities. Ruminants were bred in this type of farming and herds were of an average size. Veterinary treatments are little performed with the use of antibiotics, vaccines, dewormers and deworming. Veterinary prescription is rare, the chicken produced are not only consumed by animals producers but also sold at an age corresponding to an adult weight.

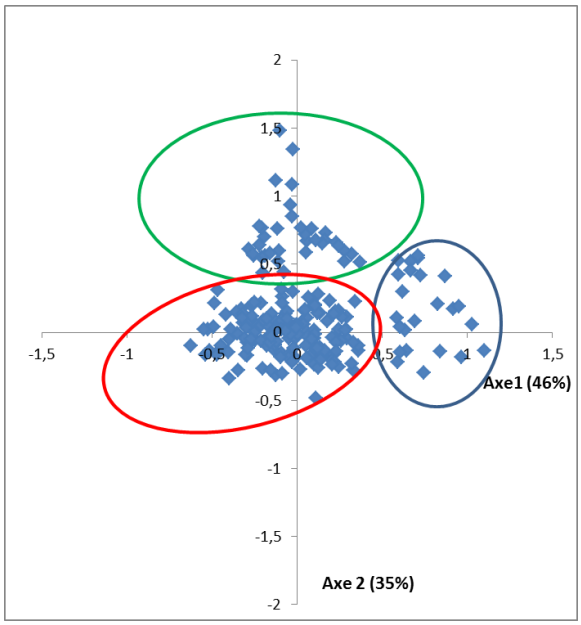

Fig. 2. Distribution of breeders by type of breeding by Correspondence Factorial Analysis.

In Type 2, the farmers weren't provided with schooling, only a few have the primary or secondary school standard. These Farmers are more concentrated in the Departments of Alibori, Atacora and Donga in the north of Benin. They were men (58.3%) and women (41.67%) and close to the half were not educated. Their main activities were the household for women and crafts in general. This type of farming gathered housewives for the women who produce some crops. Herds were of small scale and the animals were not regularly treated. The sale of animals is not primordial and the animals are bred for consumption. Breeders of this group represented 16.68% of the sampled population.

Finally, in the Type 3, breeders were from a high school grade and did agriculture as dominant activity. Farmers in this group were mostly men, and met in the North in general and in Alibori Department in particular. In our survey, they represent 5.5% of the sampled population. They grew food crops and did the breeding of duck, guinea fowl or pigeons. Herds are of large scale and the animals underwent suitable veterinary treatment characterized by the administration of vitamin complexes, antibiotics, vaccines, and deworming based on veterinary requirements. Animals are sold at adulthood.

Comparison between types of farms

Whatever the type of breeding, 33.33% of breeders bred the chickens for their rusticity. The Half of the farmers of group 2 bred chickens because of the quality of their meat. This proportion was significantly higher than those of breeders recorded in Type 1 and Type 3. Almost all farmers gave grain and did not use some feeds to feed the animals in the three types of breeding. Kitchen and crops waste were used by 33% to 44% of farmers in the three types of breeding. Termites are not used by breeders of Group 3 while 11% and 8% of the breeders used it respectively in the Type 2 and Type 1.

Out of consumption, breeders who sell animals to overcome their financial difficulties were more important ($P<0.001$) in breeding types 1 and 3 (respectively 93 and 83%) than in the type 2 (14%). 40% of chicken breeders of the breeding Type 2 don't sell animals while in the breeding type 3 and type 1, this proportion was respectively of 8% and 3%. The period of the sale of birds and their products had varied according to the groups of breeders. Thus, half of the breeders of the groups 1 and 3 sold their animals to resolve problem of lack of money, whereas 14% of breeders of the group 2 did it for the same need ($P<0.001$). Only the farmers of the Group 1 sold

their animals if need be. In times of celebration, breeders of groups 1 and 3, which sold their animals are more important than those of the group 2 (P<0.001). Other conditions of sale as overcrowding and disease were reported.

Table 1: Zoo-technical performance of local chickens in family poultry

Zoo-technical parameters	Group 1		Group 2		Group 3		Test of significance
	Mean	SE	Mean	SE	Mean	SE	
Average herd size	32.99a	1.71	27.14a	3.70	91.75b	6.41	***
Young $^{\beta}$	23.89a	1.41	18.06a	3.04	56.25b	5.27	***
Adulte †	9.10a	0.55	9.08a	1.18	35.50b	2.05	***
Adult Cock	2.67a	0.24	4.06b	0.51	9.67c	0.89	***
Adult Hen	6.42a	0.48	5.61a	1.04	27.08b	1.80	***
Breeding cock	2.68a	0.21	3.47a	0.46	9.67b	0.80	***
Breeding hen	6.40a	0.48	5.61a	1.04	27.08b	1.80	***

NS : P>0.05; *** : P<0.001; SE : Standard Error; $^{\beta}$: young : before laying age ; † : Adult : after laying age. The means between the classes of the same line followed by different letters differ significantly with the threshold of 5%.

The period of consumption of chicken and their products varied depending of breeder type. The majority of farmers in the three groups consumed their birds during the holidays in proportions of 84, 81 and 75%, respectively for groups 1, 2 and 3. In case of lack of meat, 25% of farmers of group 3 consumed their animals to 5-8% in other types of breeding (P<0.01). Males (cock) were the most sold in the three types of farming and the highest proportions were obtained in groups 1 and 3 while the breeders of group 2 were selling little animals. Less than 5% of the females were sold whatever the type of breeding and more than 20% of farmers in group 1 were regardless to the sex of animals sold. The frequency of farmers who sold their animals in relation to prevailing market price was significantly higher within the breeding types 1 and 3 compared to the group 2 (P <0.001).

The mortality rates varied according to age. Whatever the type of breeding, 83 to 94% of breeders reported that the highest mortalities were observed in chicks from hatching to weaning. Between weaning age and the laying age, 11 breeders out of 100 in the group 1 said that they received more death to 17% for group 3, while the group 2 didn't recorded any mortality during this period. Beyond the first laying, mortality rates were negligible in all three types of breeding. The same trends were obtained for morbidity by age and type of breeding. According to the farmers interviewed, diseases were the main cause of mortality (94-100%) of animals before weaning in Benin, then coming season, predators and accidents. Between the laying of the mother and the age of first laying of its hen, diseases was the main death factor followed by predators, season and finally accidents. In the reproductive adults, disease, predators, season and accidents were the main causes of mortality.

In the north of Benin, breeders of three classes reported that most deaths recorded before weaning, from weaning to the laying phase or after the first laying occur in the dry season than in the rainy season. In the south of Benin, from hatching to weaning in the groups of breeders 1 and 2, the mortality was reported in the long rainy season with respectively 34 and 28%; whereas no mortality was observed (P <0.05) in the breeding type 3. Then, the deaths in the long dry season came in the proportions

of 20, 14 and 8%, respectively for breeding Types 1, 2 and 3.

The breeders who did no treatment for their animals represent 78% in group 2, and this frequency was higher (P <0.05) than the one recorded in breeders of group 3 (42%). Among those who treated their animals, breeders of the breeding type 1 and 3 used at more modern method (Veterinary medicare) than livestock breeders Type 2 (P <0.05). The traditional method (Pharmacopoeia) was practiced by 4% of breeders in group 1 and 8% in groups 2 and 3. Most of veterinary products used were prescribed by veterinarians in Types 1 and 3, while very few breeders used the veterinary requirements in the breeding type 2 (P <0.01).

The number of animals by breeding varied from a breeding type to another. The total number of animals by chicken breeders in the breeding type 1 (92 heads) was significantly higher than those observed in the breeding types 1 (33 heads) and 2 (27 heads). Thus, the average size of the population was 34 chickens in group 3 (P <0.001). Young chickens were the most numerous in the breeding type 3 (56 heads) than in the type 1 (24 heads) and Type 2 (18 heads). The same trend was observed at the adult size of the three breeding types (P <0.001). Adult roosters in the breeding represented at the same time breeding cocks and their number were 3 and 4 in the first two types of breeding to an average 10 in the group 3 (P <0.001). Finally, the chickens in breeding type 3 were highly more numerous than those of Types 1 and 2 (P <0.001) with an average number of 6.4, 5.61 and 27.08 birds, respectively for the breeding types 1, 2 and 3. Table 1 shows the herd structure by type of breeding.

Discussion

Characteristics of types of breeding

The Type 1 is breeding widespread throughout the country and is practiced by the majority of the population. Benin's population is predominantly made up of farmers, artisans and housewives. The local chicken breeding is justified by the fact that these animals are used to resolve small financial problems. If necessary, they use the birds to cover their animal protein needs. Generally, in this type of breeding, poultry farming plays important social functions. Among farmers of this group, some of them raise small ruminants to solve the most important financial problems. Chickens in family poultry are then used as buffers or banks in cases where they are sold to pay for school fees, medical costs, village taxes and other uncertainties. The extent to which chickens are used as buffers or banks depends on the socioeconomic status of each rural household (Muchadeyi et al., 2004). As for this group in Benin, family poultry is very important and is a means of livelihood for households in developing countries (Ali et al., 2011). By the same way, in Zimbabwe (Mapiye et al., 2008), village chickens provide cheap, readily harvestable protein-enriched white meat and eggs with high quality, digestible protein for immediate home consumption and sale for income generation (Mapiye and Sibanda, 2005; Miao, 2005). Thus, there is need to assess the monetary value of chicken and eggs and estimate their contribution to household income and food security. In Lao PDR, smallholder poultry production is ubiquitous and is a crucial income-generating opportunity for one of the poorest country in the Greater Mekong Subregion (Behnke et *al.,* 2010; Teng Theara, 2011).

According to Sonaiya and Swan (2004), family poultry is a common component of mixed farming systems (agriculture and breeding integration) of which domestic birds are of small size, multiply easily, do not require large investments and feed themselves with kitchen waste, broken grains, earthworms, snails, insects and vegetation. This type of farming is similar to the one of Type 1 practiced in Benin.

The breeders of the breeding type 2 are more concentrated in the north of Benin and more specifically in Alibori, Atacora and Donga Departments. This type of farming is practiced by artisans and housewives who manage a prestige

breeding. Since chicken breeding is not for profit, the breeders don't take any care for the birds on the health and zoo-technical plan; that justifies the small size of the herds. Indigenous chicken production in family poultry in Benin is then more men activity than women. This finding coincides with the results of another study carried out in Zimbabwe by Muchadeyi *et al.* (2004) which showed that boys had more participation in chicken keeping activities than girls. Boys were mentioned to carry out almost all the activities including making chicken shelters while girls participate more in cleaning and feeding activities. Nevertheless, this result differs from the one reported from Morocco (Benabdeljelil and Arfaoui, 2000) and Botswana (Moreki and Masupu, 2001) who all reported women to dominate village poultry farming. The birds are reared mainly for cash income and to lesser extent for consumption, sacrifice, gift, etc.

The Food and Agriculture Organization of the United Nations has classified poultry production systems in four categories (Sectors 1, 2, 3 & 4) based on the level of integration of operations, the marketing system and the level of biosecurity: extensive free range system, extensive in backyard system, semi-intensive system and intensive system (Sonaiya, Swan, 2004). In a large number of low-income countries, backyard/household production (Sector 4) is the largest system of poultry production and a critical source of income and nutrition for poor households (Ahuja and Sen, 2007; Fassina, 2011). These type of breeding approaches the free range extensive breeding system where the birds feed themselves by scavenging. It is a system where there is no regular distribution of water or food. Few farmers are in this category in Benin despite the advocacy efforts deployed by many projects to support poultry breeding such as the Program of Modern Poultry Support for Development (PADAM), Project of Village Poultry Support for Development (PADAV), the Project of Agricultural Sectors Support for Development (PADFA) and Project of Country People Support (PAMR).

The breeding type 3 includes agro-pastoralists who practice poultry breeding as income generating activities. Out of chickens, they also breed ducks, guinea fowls or pigeons which enable the diversification of income sources. In this type of breeding, farming is a for-profit business whose profitability is an indicator of sustainability. Therefore, all health and zoo-technical measures are taken to improve animal productivity. This justifies the large scale of the herd in this group, and the herd structure reflects the successful exploitation of animals. This group represents a minority of the population studied and is found in the north of Benin.

According to Bebay (2006), poultry breedings are classified into 4 types in family poultry, from the more satisfying (Type 1) to the least satisfying (Type 4). These farms take into account the modern poultry and family poultry. The type 1 corresponds to farms with very high biosafety level, the supply of inputs is important, the installation of the livestock exploitation is done in the outskirts of large cities, and the animals are raised in confinement and are followed up on health plan. The animal Bred are of improved breeds. Those of type 4 have a biosafety level nonexistent or very low with very weak input supply and livestock exploitation installation is done in the rural areas.

Moreover, Bebay (2006) reported that the types of poultry breedings 3 and 4 correspond to family poultry with 65% of Type 3. Compared with the results of this study, the breeding type 1 of our study is similar to that of Type 3 reported by Bebay (2006); the type 2 in our study is similar to the type 4 described by Babay (2006) and the Type 3 of this study is similar to the type 2 reported by Bebay (2006). Indeed, the Type 2 Bebay (2006) is characterized by a middle level of biosecurity; the farms are found in urban or rural areas, the supply of inputs is important; the breedings are located in large cities with the presence of building, etc...

In Swaziland (Rajiur Rahman, 2011), family poultry production system is mainly three types: 1) semi-

scavenging system: small flocks of native or improved birds that are reared partly in free-range in particular time in a day and partly managed intensively during the rest of the time; 2) scavenging system: small flocks of native birds allowed for full scavenge without feed supplementation; 3) Small-scale intensive system: Farmers usually rear broilers under small scale intensive system (100-500 birds per flock).

Comparison between types of farms

Whatever the type of breeding, 33.33% of breeders raise chickens for their rusticity. The half of the breeders of the Group 2 breeds the chickens because of the quality traits of their meat, and this proportion is significantly higher than those of farmers of the breeding type 1 and Type 3. In the breeding type 2, the quality is preferred because the animals are not sold but are consumed by farmers themselves. Generally, the preference of the farmer for raising local chickens is primarily based on its taste value, its adaptation to the environment and its maternal behavior (Fosta *et al.,* 2007) despite its small body size, slow growth rate, low egg production and late maturity (Mlozi *et al.,* 2003).

The breeding of local chickens in Benin is of family type with an extensive breeding system. Only a parent (mother) is known for the mode of reproduction and rarely the both (Tougan, 2008). In general, animals don't receive any sanitary or medical follow-up and are left to fend for themselves and the scavenging is the rule (Sonaiya and Swan, 2004; Ahuja and Sen, 2007). Reproduction is essentially of natural type with à part of breeders of the breeding Type 3 who practice artificial incubation. About feeding, breeder groups identified in Benin give most often grain to animals and this confirm the results of the work of Tougan (2008) carried out on the breeding system and molecular polymorphism of indigenous poultry population of *Gallus gallus* specie of Benin. The foods most distributed in Cameroon are maize, cassava, bananas and kitchen waste (Fosta *et al.,* 2007). The three types of livestock breeding distribute kitchen and crop residues to the animals. Family poultry is a common component of mixed farming systems in which domestic birds don't require large investments, and accept kitchen waste, broken grains, worms, snails, of insects and vegetation (Sonaiya and Swan, 2004). These characteristics of family poultry breeding recorded in Benin are also observed in Kenya in Kenya (Menge *et al.,* 2005) and Ethiopia (Tadelle *et al.,* 2000) where management interventions are limited or non-existent under most of breeding systems.

The breeding of local chickens will usually cover a portion of the nutritional needs of the family and in some cases generate some cash income from the commercialization of production in local markets (Agoli-Agbo *et al.,* 2005). In this study, most animals bred in breeding Types 1 and 2 are mainly used for consumption. Family poultry is then an effective way to improve the living conditions of farmers and especially to reduce poverty. Out of consumption, the breeders of the breeding type 3 sell the birds for financial reasons because animals are a kind of "credit card", available at any time to sell or barter in societies where species are scarce (Sonaiya and Swan, 2004). Maho *et al.* (2000) reported that the proceeds from the sales of village chickens are used for the purchase of clothes, medicine, soap, kitchen salt, etc. On the other hand, village hen eggs are used mainly for reproduction.

In this study, sometimes, animals are sold when they become vicious, sick, or when the females are at the end of laying. The sale price is often determined by consideration of the client's social grade. Nevertheless, in Cameroon, according Fosta et al. (2007), the criteria for fixing the selling price of most birds depend on the size and format of chicken (63.2%) than the physical appearance of the client (29.5%) and the price on the market (6.6%).

In Family poultry, diseases are a major problem for farmers in Benin. Livestock is often decimated by diseases of all kinds. Because of these diseases caused by non-controlling breeding techniques, it is recorded on average each year between 15 to 20% of mortality rate (Tougan, 2008). In the present study, almost all

farmers surveyed reported that diseases are the main cause of morbidity and mortality before the weaning of animal in Benin. The mortalities in 28% of cases are due to diseases whose symptoms look like those of Newcastle disease, cholera and typhoid (Ekue *et al.,* 2002). The observation in this report that diseases were the major causes of losses in the village chickens agree with reports by El-Yuguda *et al.* (2005; 2007) in Nigeria. Out of diseases, several causes lead to the death of animals in farms of Benin: accidents, predators and the effect of season. The rainy season is reported to be the main season of animal death and morbidity in the North of Benin, whereas in the South, it is the long dry season. This effect of the season on the mortality rate and the morbidity rate confirms the results of Mapiye *et al.* (2008) in Zimbabwe who observed that mortality was observed to be the major limitation to village chicken production in Zimbabwe (Kusina *et al.,* 2001; Pedersen, 2002; Maphosa *et al.,* 2004) and most chickens die during the hot-wet and hot-dry seasons (Maphosa *et al.,* 2004; Muchadeyi *et al.,* 2005).

This variability of the factors that cause death of birds or prevent family poultry development in this study is also reported in various studies where diseases have been identified as the major constraint to the poultry industry (Minga *et al.,* 1989; Awan *et al.,* 1994; Dinka *et al.*, 2010). It has also been shown that a high prevalence of other factors like helminthoses, ectoparasites, low nutritional status and predation contribute to mortalities (Permin *et al.,* 1997; Mwalusanya, 1998; Magwisha *et al.,* 2002).

The management of the production system may be improved and the disease must be prevented to ensure better productivity of traditional breedings. But because of ignorance, negligence and for some lack of financial resources and others (Fosta *et al.,* 2007), animals don't profit from any health and zoo-technical following-up. Thus, the results of this study showed that most of farmers of the breeding types 1 and 2 grants no special care for their animals. Among those who treat their animals, the breeders of type 3 use frequently veterinary products most often on veterinary prescription and this justifies the structure and the size of their herds. Moreover, the traditional medicine (Pharmacopoeia) was practiced by 4% of breeders in group 1 and 8% in the groups 2 and 3 in the present study. By the same way, the review carried out by Mapiye *et al.* (2008) on village chicken production constraints and opportunities in Zimbabwe from most studies done in Zimbabwe revealed that the majority of smallholder farmers that treat their chickens use ethno-veterinary medicine (Muchadeyi *et al.,* 2004; Mwale *et al.,* 2005). The wide use of traditional medicine is due to its low cost, local availability, easiness of application and it does not require modern technologies such as refrigeration. Examples of herbs used to treat chicken diseases in rural areas are *Boswellia serata, Adansonia digitata, Addendum multifor, Aloe vera, Cussonia arborea, Cycnium adonense, Cyperus articulatus, Allium sativum, Capsicum frutescens and Carica papaya* (Pedersen, 2002; Muchadeyi *et al.,* 2004; Mwale *et al.,* 2005). Aloe species are the predominantly used plant species for chicken health management in the smallholder sector (Mwale *et al.,* 2005). Aloe species have several pharmacological properties: it is antibacterial, antifungal, antivenin and has immunological properties (Mapiye *et al.,* 2008). Ethno-veterinary medicine is also used to control predators for instance *Annona senegalensis* and *Allium sativum* repel snakes and *Cucumis pustulus* (muskmelon) repel hawks. *Trephrosia vogelii, Nasturtium trapaeolum, Ozoroa reticulata* and *Strychnos spinosa* are used to control parasites (Mwale *et al.,* 2005). In monitoring studies done in Rushinga communal areas, large flock sizes were obtained among farmers that used traditional medicine (Mapiye and Sibanda, 2005). This indicates that traditional medicines do work and have the potential to improve the health status of village flocks. Farmers justify the potency of the ethno-veterinary remedies in relation to chicken's health and production performance in terms of feed intake, body weight, carcass size and quality (Muchadeyi *et al.,* 2005; Mwale *et al.,* 2005). The use of locally available and cheap ethnoveterinary medicines is probably the most sustainable health management strategy for

households with limited resources (Muchadeyi *et al.,* 2005; Mapiye *et al.,* 2008). Hence, there is a need for validation of the therapeutic functions, active ingredients and their effectiveness and determination of optimum dosages for various age groups and proper mode of application of ethno-veterinary medicine before their commercial application (Mapiye *et al.,* 2008).

In the majority of farms, age of pullets at first laying is on average of 40 weeks in the three breeding types in Benin. In a study carried out by Youssao *et al.* (2010) on laying performance and egg quality of local chickens, in which animals are bred in confinement and profit from a health and zoo-technical followed-up, the first laying age of pullets a varies between 26.6 and 27.8 weeks. This difference can be explained by the lack of prophylactic and zoo-technical follow-up in the traditional system of local chicken rearing. In sub-Saharan Africa, the age of the first laying in pullets varied on average from 22-25 weeks (Youssao *et al.,* 2011). However, the age of first laying is more advanced (26-32 week) in Oriental Africa such as in Ethiopia (Tadelle *et al.,* 2003) and Tanzania (Mwalusanya et al., 2001). Furthermore, the age of first laying of local chicken in Congo reported by Moula *et al.* (2012) is on average 27 weeks.

Conclusion

The typology of local chicken breedings carried out in this study presents a large diversity of traditional production systems in Benin. The results revealed three types of breedings. The breeding type 1 is practiced throughout the territory of Benin and is mainly characterized by free range of the birds in scavenging and where no special care is given to chickens unless the distribution of veterinary products from time to time without any prescription from a specialist. The breeding type 2 is practiced in the north of Benin, especially in Alibori, Atacora and Donga Departments and is conducted by craftsman and housewives who do this activity for prestige. The breeding type 3 includes agro-pastoralists who undertake poultry breeding as income generating activities and where all health and zoo-technical means are taken to improve animal productivity. At the end of this survey, it should be noted that efforts are needed to ensure a better development of the poultry sector in Benin. To achieve this, the following suggestions are made to improve the performance of local chicken breeding in Benin. In the breeding type 1 and 2, there are: a) educate farmers by showing them the importance of livestock breeding in general and poultry breeding in particular b) Improve their abilities in the management of breeding system and enable them to access easily to information on technical innovations c) make available livestock inputs of best quality such as basic raw materials for feeds and veterinary products d) make available to the breeders skilled or competent technicians in animal husbandry and animal health e) train the chicken breeders f) intensify production in these two types of breeding to cover partially the nutritional needs of families and the one of entire population of Benin. In the breeding type 3, it is necessary to: a) increase the abilities of breeders in management of the breeding system b) make available livestock inputs of best quality by facilitating their supply and negotiate the taxes discount on livestock inputs with the government d) facilitate the opening on the national markets to allow proper marketing of the breeding products.

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