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Original article

Characterizing the subsistance poultry breeding around a poultry matrix farm in Balsas county, Maranhão state, Brazil

Caracterização de criações avícolas de subsistência no entorno de uma granja matrizeira no município de Balsas, estado do Maranhão, Brasil

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A B S T R A C T

The aim of the present study is to feature subsistence poultry breeding around a poultry matrix farm located in Balsas County – MA, based on aspects associated with infrastructure, management, nutrition and sanitation. The research followed a cross-sectional design through situation diagnostics, based on the quali-quantitative methodology. The study counted on structured and non-structured interviews, as well as on direct observations. In total, 40 subsistence poultry breeders concentrated in a 10-km area around the poultry matrix farm were interviewed for the research. Based on the results, the hen houses were rustic, the birds were allowed to walk free throughout the properties and had straight contact with birds from neighbor breeders, as well as with wild birds and domestic animals. Water quality control was not observed, the water was provided by a well in 95% of the cases (n=38) and was stored in old tires or in plastic containers. It was also possible observing the use of fertilizer containers as feeders and water fountains for the poultry. In conclusion, the management system implemented in subsistence poultry breeding farms can lead to health issues, including the introduction of exotic diseases in these farms and in the poultry matrix farm. It is recommended to take actions to encourage small breeders in the area through public policies, mainly through policies focused on technical assistance, zootechnical guidance and education in sanitation procedures, in order to turn these subsistence activities into a new source of income to producer families.

Palavras-chave:
Avicultura caipira
Sanidade
Educação sanitária
Granja comercial

R E S U M O

Objetivou-se com o estudo caracterizar criações avícolas de subsistência no entorno de uma granja matrizeira localizada no município de Balsas – MA, focados em aspectos relacionados à infraestrutura, manejo, nutrição e sanidade. A pesquisa compreendeu um estudo transversal, por meio de um diagnóstico situacional, utilizando metodologia quali-quantitativa, fundamentado em entrevistas estruturadas e não estruturadas, bem como observações diretas. Para a realização do estudo, foram entrevistados 40 produtores de aves de subsistência concentrados em uma área de 10 km ao redor da granja matrizeira. Os resultados demonstraram instalações rústicas, com aves criadas soltas em contato direto com aves de criatórios vizinhos, aves silvestres e animais domésticos. Não foi verificado o controle de qualidade da água, sendo esta oriunda em 95% (n=38) de poços e fornecidas em pneus ou recipientes plásticos. Foi possível constatar, também, a utilização de embalagens de agrotóxicos como comedouros e bebedouros para as aves. Conclui-se que o manejo

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implementado nas criações avícolas de subsistência pode resultar em problemas sanitários, inclusive para introdução de doenças exóticas a estas criações e à granja matrizeira. Sugere-se o estabelecimento de medidas de estímulo às pequenas criações na área estudada por meio de políticas públicas voltadas aos produtores de aves de subsistência da região, requerendo, sobretudo, assistência técnica, orientações zootécnicas e educação sanitária, para assim deixar de ser apenas uma atividade de subsistência e passar a gerar maior renda para as famílias produtoras.

INTRODUCTION

The search by consumers for differentiated and high-quality products has been influencing current changes in systems used in broiler breeding (VERCOE et al., 2000). This sector seeks to fulfil the expectations of consumers who prioritize the intake of healthier food (CAIRES et al., 2010; SANTOS et al., 2010).

The intensive breeding system can lead to intense stress, and consequently, to physiological and behavioral responses that can seriously harm these animals' health and well-being (ABEYESINGHE et al., 2001). Therefore, the system known as "hillbilly poultry" or "subsistence breeding" allows broilers to have free access to forage areas and this process results in particular differences in the quality of the meat in comparison to confined broilers (SILVA et al., 2003).

Hillbilly poultry breeding in Brazil is a common practice in family farming. The birds are grown in inappropriate hen houses without adequate sanitation management, and it can lead to diseases, low productivity among affected animals and to increased mortality rates (GALVÃO JÚNIOR; BENTO; SOUZA, 2009; GOMES et al., 2009). Galvão Júnior; Bento; Souza (2009) highlight that industrial poultry demands high investments, its profit margin is narrow and risks are significant. All these features give hillbilly poultry a good part of the market uncovered by the poultry industry. It allows small breeders to enter the producer market with much lower investments, low risks and considerable profitability. According to Gomes et al. (2009), the lack of resources and breeders' poor knowledge make some diseases quite frequent in this breeding system.

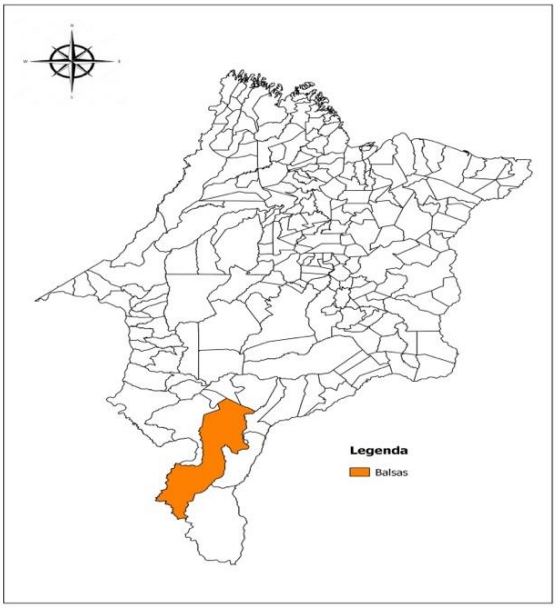
Thus, the aim of the present study was to feature the subsistence poultry breeding around a poultry matrix farm based on aspects related to infrastructure, management, nutrition and sanitation.

MATERIALS AND METHODS

Experimental site

The research was carried out in Balsas County, Gerais das Balsas micro-region, Southern Maranhão State (Figure 1). The county stands out for its mechanized agriculture, it is the third major soybean producer in the Northeastern region. It is considered the greatest national agricultural border nowadays, the so-called MATOPIBA (*cerrado* biome in Maranhão, Tocantins, Piauí and Bahia states). It accounts for most of the Brazilian grain and fiber production. The county is crossed by the *Transamazônica Road*, which links the Brazilian Northeastern and Northern regions (IBGE, 2010).

Figure 1 – geographic location of Balsas County, Southern Maranhão State.



Research sample

In total, 40 subsistence poultry breeders living in a 10-km area around a poultry matrix farm formed the population of the research. This number accounted for 100% of subsistence poultry breeders in the area.

The 10-km area was chosen because it encompasses a protection and surveillance zone between an affected property and a commercial poultry farm. The observed diseases were Newcastle and Avian Influenza, according to Standard 22, from May 13, 2002 (BRASIL, 2002).

The present research followed a cross-sectional design, through situational diagnostics, based on the quali-quantitative methodology. It also counted on structured and non-structured interviews, as well as on direct observations, which generated observation data, testimonies and written documents.

All participants signed a specific Free Consent Form, which was handed out to them. Two copies of the consent form were signed after participants were explained about the aims of the research and its details

and after they had their doubts about it clarified. One copy remained with the interviewee and the other one with the researcher. They were aware of the aims and methodology of the research, of the goal of their participation, of the secrecy of their identities, reliability, privacy and of their right to decline from the research at any moment, without any loss.

The questionnaires and the consent form were sent to the Research Ethics Committee (CEP) of Maranhão State University (UEMA), through *Sistema de Informação Plataforma Brasil do Ministério da Saúde* (Brazil Platform Information System of the Ministry of Health). CEP/UEMA analyzed the research project under code n. 82816317.1.0000.5554 by Presentation Certificate for Ethical Appreciation. The research was approved by Opinion n. 2.789.167 from July 28, 2018.

Data Collection Methods

Structured Interviews

The interviews were carried out with each of the subsistence poultry breeders. A multiple choice questionnaire was used for data collection. It encompassed 19 questions related to aspects such as the infrastructure, management, nutrition and sanitation procedures adopted by the breeders.

Non-structured interviews

These interviews were carried out in order to collect data that were not well expressed through the structured interviews or that were not addressed during the visits to the poultry farms. This interview type enabled clarifying critical points identified during the direct observations or even relevant information spontaneously provided by the interviewee – this information could be important to better understand the reality of the research.

Direct observations

This methodology was based on observation *in loco* during the visits to the poultry farms. It was possible analyzing the breeding system and the management procedures adopted by the breeders. Results corroborated, or not, with the answers given by the breeders to the questions in the questionnaires. It was done in order to list the critical points based on research aims.

Data analysis

Data collected from the questionnaires were processed, analyzed and interpreted. Information was stored in databases of the Excel software, ordered and presented as absolute and relative frequency.

RESULTS AND DISCUSSION

Based on results of the direct observations, 72.5% (n=29) of subsistence poultry breeders presented rustic hen houses manufactured with materials found in the property itself, such as wood, straw and canvas. The structure respected the natural habits of the birds such as scratching the ground, running and having easy access to water and food (Figure 2).

Figure 2 – Rustic hen houses of subsistence poultry farms around a poultry matrix farm in Balsas County – MA.

Source: Personal archives.

In total, 85% (n=34) of the interviewed breeders had improvised hen houses. However, the birds were bred free throughout the day, according to breeders' testimony, they had straight contact with birds growing on their own. Similar results were observed by Maia et al. (2011), who carried out a study around a poultry matrix farm in Feira de Santana City. They found that 92.85% of all birds were left free and had straight contact with birds from neighbor farms, as well as with wild birds. These findings corroborate outcomes recorded in the present research.

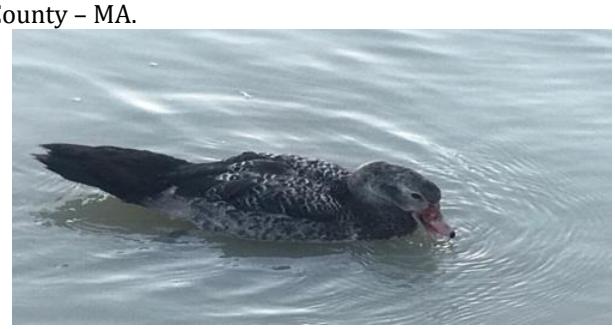
Of the 40 visited poultry breeding farms, 5% (n=2) were located less than 3 km away from the poultry matrix farm, 5% were between 8 and 10 km away from it (n=2) and 90% (n=36) were located between 4 and 7 km away from the matrix farm.

When it comes to the number of birds, 70% (n=28) of the breeders had more than 40 animals. When they were asked about the poultry species they were breeding, 100% (n=40) of them said that they were breeding *Gallus gallus domesticus,* of them, 25% (n=25) also bred other species such as ducks (*Anas platyrhynchos domesticus*), turkey (*Meleagris gallopavo)*, birds (Passerines), peacocks (*Pavo cristatus*) and guinea pigs (*Numida meleagris*).

It was possible observing the crossing between wild ducks and domestic ducks in one of the visited farms (Figure 3). This practice can lead to the introduction of exotic diseases to the birds, such as avian influenza, due to two basic aspects: (i) the docility and domestication

presented by animals bred in the property; and (ii) the lack of awareness about the behavioral, nutritional and sanitary habits of wild species by the breeders. Another poultry farm also bred quails (*Nothura maculosa*), pheasant (*Phasianus colchicus)* and guan (*Penelope obscura*); however, they were bred in separated nurseries.

Figure 3 – Duck bred (wild x domestic) in a visited poultry farm around the poultry matrix farm in Balsas County – MA.



In addition, interviewees in 90% of the farms said to breed many species along with the broilers, for instance, dogs (92.5%), swine (27.5%), bovines (20%), goats or ships (15%), among others, such as cats and horses (15%). Because virus samples isolated from birds can infect other animal species, there is the need of taking this possibility into account when one assesses some sanitation aspects of places where different animal species are simultaneously bred. Therefore, these aspects were taking into consideration in the present study.

Brown (2000) reports that the simultaneous breeding of different bird species and of other animal species, mainly, swine, can be relevant to the outbreak of some diseases such as the avian influenza. Swine animals play the role of amplifying the outbreak of influenza virus, because they work as intermediate hosts and favor the generation of viral strains of different origins. They raise the possibility of genic mutations and rearrangements between viruses of different origins; besides viruses' adaptation to mammal hosts, a fact that poses risk to birds and humans.

With respect to origin, 62.5% (n=25) of interviewees reported that domestic birds originated from the property itself; 32.5% (n=13) reported to have acquired them from neighbors, friends or relatives and 5% purchased the birds in veterinary retails or in free markets and fairs. Regarding the reason for breeding poultry, all the interviewed breeders (n=40) reported the meat and egg production for family consumption, 12.5% of them (n=5) reported to have the aim of selling the exceeding production. The commercial purpose was associated with financial demands.

Maize was the main food provided to the birds in the 40 visited farms, it is followed by agricultural waste, leftovers and millet, which is often thrown on the ground. Most of the water provided to the birds, 95% (n=38) was from wells and 5% (n=2) of it came from rivers and creeks. The water was stored in old tires or in plastic containers, without proper microbiological control.

With regards to nutrition, direct observations were reinforced to assess the likelihood of using fertilizer containers as feeders and fountains for birds, since the study site was located in an agricultural region for grain production. This is an important feature, because such containers retain toxic waste for a long period of time. Thus, food and water served in them can contaminate the birds and their products (meat and eggs). Was possible observing the use of fertilizer containers as feeders and water fountains for the poultry.

Water is an essential element for life maintenance; therefore, it calls the attention of many sectors, among them, the agricultural one. Due to its intense use in rural properties, water is an expressive source of microorganism widespread (GUERRA et al., 2011; KHELIL-ARFA et al., 2012; RANGEL et al., 2015). When birds are subjected to dissection, low-quality water can interfere in disease outbreaks, in zootechnical indices and in animals' well-being; therefore, it can lead to economic losses and to the outspread of pathogenic agents of diseases of public health interest (CARDOZO et al., 2015). Thus, it is recommended to take actions to guide and train breeders on the best use of water in poultry farming.

About management aspects, 82.5% (n=33) of the interviewed breeders have informed to only clean the poultry breeding hen houses when they were very dirty, mainly covered with organic matter (feces) and leftovers. In total, 20% of the farmers have reported to keep their broilers in confinement during the rainy season in order to avoid their access to small beans, maize and rice crops. Nevertheless, this practice can be a factor triggering disease outbreaks among birds, because of their high concentration in a single place covered with dirty.

The constant cleaning of containers used to provide water to birds was not observed or reported; a great amount of organic matter in and outside these containers was often seen. It is worth highlighting the presence of organic matter, as well as the development of algae, mineral deposition and dirty inside the fountains, a fact that favored the survival of microorganisms.

Only 25% (n=10) of the visited farms had specific structures to house the birds before they were slaughtered, the so-called "grajau" or "cevas" (Figure 4). Birds would be confined in these structures for fifteen days, without any contact with the other birds in the property or with the ground. They were subjected to a treatment with only maize and water. According to the interviewees, this practice was carried out to "clean" the birds before the slaughter.

Figure 4 – Rustic structure (grajau or cevas) used in poultry breeding around a poultry matrix farm in Balsas County – MA.

It was possible observing the moment when the birds were slaughtered for trading during one of the interviews. The slaughtering procedure was carried out in an improvised way and lacked hygienic-sanitation care (Figure 5). It is important calling the attention to the fact that ingesting contaminated food can cause many diseases, which have direct impact on the public health system and indirect impact on labor capacity. Accordingly, much effort has been made to elaborate rules and policies aimed at inhibiting and on eventually extinguishing illegal food manufacturing. Despite all this effort, these practices remain and make this business competitive.

Figure 5 – Poultry slaughtered in a subsistence poultry farm around the poultry matrix farm in Balsas County – MA.

When it comes to sanitation aspects, farmers were asked if they had evaluated the seek birds in the last two months and 65% (n=25) said no. When they were asked about what poultry diseases they knew, 72.5% of them have reported to know "gogo" and 27.5% (n=11) did not know any disease.

Animals with fowlpox and scabies were observed in two of the visited farms, scabies were treated with burnt oil (Figure 6). This finding reinforces the need of greater commitment of governmental organs to assist and train producers. These actions must focus on the best management and sanitation procedures, the adoption of vaccination calendars adequate to the local reality and of other hygiene and prophylaxis measures.

Figure 6 – Subsistence poultry breeding around a poultry matrix farm in Balsas County, MA.

In total, 92.5% (n=37) of the interviewed breeders have stated that the birds were sick. They used antibiotics to treat the birds, which were followed by other products such as vaccines and deworming, as well as by homemade medications. Based on folk knowledge, 92,5% (n=37) of farmers have reported to use alternative or prevention treatments in their birds, among them one finds bark from native trees (*sucupira, pau amarelo ou "amarelão", angico, fava d'anta, aroeira, catinga de porco, pau d'arco*) and other homemade medications such as pepper, lemon, mango leaf. Barbosa et al. (2008) recommend using water melon seeds, papaya, melon and banana tree tillers for deworming.

Maia et al. (2011) identified that 85.71% of the interviewed breeders around a poultry matrix farm in Feira de Santana City did not report symptoms of any disease in their birds during the time the research was still in course. When birds presented signs of clinical issues, they were treated with homemade medication in 71.43% of the cases. Some farmers have reported to have minimum sanitary control over their birds and it is achieved through vaccination; however, they did not follow any preventive vaccination calendar - vaccines were administered in a randomized way.

All interviewees (n=40) have reported low mortality rate (2,17%), which was sometimes associated with predators (foxes, haws, "mucuras" and even monkeys), or with some other unknown disease. In total, 62.5% (n=25) of the interviewees have reported to have bared their dead birds inside holes dug in the property.

When farmers were asked about who they contacted with when the birds were sick, 72.5% of them (n=29) have answered that they looked for assistance in the agricultural shops in the county, 12.5% (n=5) used to look for a veterinary. These outcomes are worrisome, because it is important to have a fast process to communicate the agricultural defense organ about the disease. It is essential to have sanitary measures taken in

order to avoid the disease to outbreak among birds in the property.

The non-structured interviews were carried out with 10% (n=4) of the breeders after the aforementioned findings were identified. It was done in order clarify the reason why they did not inform the defense organ of Maranhão State about the disease. Breeders have reported that they did not look for the official service because they did not know what its role was and because they believed in guidance from neighbors or from third parties.
The lack of knowledge shown by breeders, along with their unawareness about the role of the defense organ, rises the need of taking educational measures to guide breeders in the region about the symptoms of diseases of mandatory notification in poultry breeding areas.

Based on the recorded results, it is necessary establishing measures to encourage small poultry breeders by developing public policies focused on subsistence poultry breeding in the region, mainly on their training and technical assistance, on zootechnical guidance and on sanitary education. All together, these actions will improve the quality and quantity of poultry breeding farms, mainly because they would rationalize the food and sanitary management procedures, as well as develop productive models to express the competition in the sector.

CONCLUSIONS

Based on the results in the present study, one can state that:

- Subsistence poultry breeding around a poultry matrix farm in Balsas County – MA presents low technical level profile.

- The adopted breeding management can result in sanitary issues, including the introduction of exotic diseases to birds in subsistence breeding farms and in the poultry matrix farm. With respect to breeders, they lacked either technical assistance or information to improve sanitation measures and, consequently, to improve yield.

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