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# CHARACTERIZATION OF SMALL SWINE PROPERTIES IN A METROPOLITAN AREA OF BRAZIL

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**ABSTRACT -** Until this moment, there has been no work in the literature regarding about the pig farming in the Curitiba Metropolitan Area, by this way, this work aims to characterize the swine production in this region. Between November 2017 and December 2018 was developed a descriptive field research with pig farmers in CMA in the state of Paraná, Brazil. The results were obtained by applying a semi structured interview, exchanging with producers regarding sanitary issues and through personal observation. Participated in the survey 62 swine holders distributed in 14 counties in the area. Most of the evaluated properties (51.6%) had up to 10 hectares, 80.6% used only family labor and all analyzed producing facilities combined pig farming with other activities. Of the total, 52.5% had up to 10 pigs, 80.6% practiced full-cycle rearing and 45.2% kept the animals confined in pens. In swine feeding, was more frequently reported the use of corn and leftover food, which were obtained from their own property. It was observated that pig production in Curitiba Metropolitan Area is an activity that plays an economic and social role for small scale farmers. The visited properties, in general, develop pig farming as a subsistence activity, in association with other activities and through family labor.
**Keywords:** alternative food, family farming, subsistence.

# *CARACTERIZAÇÃO DE PEQUENAS PROPRIEDADES PRODUTORAS DE SUÍNOS EM UMA REGIÃO METROPOLITANA DO BRASIL*

**RESUMO -** Até o momento, não houve nenhum trabalho na literatura a respeito da suinocultura na Região Metropolitana de Curitiba, desta forma, este trabalho tem como objetivo caracterizar a produção de suínos nesta região. Entre novembro de 2017 e dezembro de 2018 foi desenvolvida uma pesquisa descritiva de campo com suinocultores da RMC no estado do Paraná, Brasil. Os resultados foram obtidos por meio da aplicação de entrevista semiestruturada, troca de informações com os produtores sobre questões sanitárias e observação pessoal. Participaram da pesquisa 62 suinocultores distribuídos em 14 municípios da região. A maioria das propriedades avaliadas (51,6%) possuía até 10 hectares, 80,6% utilizava apenas mão de obra familiar e todas as unidades produtoras analisadas combinavam a suinocultura com outras atividades. Do total, 52,5% possuíam até 10 suínos, 80,6% praticavam a produção em ciclo completo e 45,2% mantinham os animais confinados em baias. Na alimentação dos suínos, foi mais frequentemente relatado o uso de milho e sobras de comida, que eram obtidos na própria propriedade. Observou-se que a produção de suínos na Região Metropolitana de Curitiba é uma atividade que desempenha um papel econômico e social para os produtores de pequena escala. As propriedades visitadas, em geral, desenvolvem a suinocultura como atividade de subsistência, em associação com outras atividades e por meio da mão de obra familiar.
**Palavras-chave:** alimentos alternativos, agricultura familiar, subsistência.

## INTRODUCTION

Pig production is an activity of great importance to the Brazilian economy, generating employment and income for rural producers (COSTA JUNIOR et al., 2015). In recent decades, the Brazilian swine industry has been through several changes, including investments in genetics, nutrition, new technologies and animal health (MIELE; MIRANDA, 2013). There was an increase in the production scale and segmentation of the activity in multiple sites, mainly in integration systems in the South and Southeast regions (ABCS, 2014). These changes made an economic and representative increase on the sector in the global market (MIELE; MIRANDA, 2013), setting Brazil as number four player in pork production and export in the world (ABPA, 2020).

However, Brazilian swine production is not only restricted by large herds with high technological level developed farms, there are also simple properties with their production focus on self-consume. These breeding systems are generally rustic, traditionalist, with few financial resources and low technological investment (ROCHA et al., 2016; CLASS et al., 2020). Most producers have swine breeding for subsistence and for sale in association with other activities (MIELE; MIRANDA, 2013). Extensive and subsistence production are often neglected, and although they have low representation in the production of Brazilian

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pork, they play an important socio-economic and cultural function (SILVA FILHA et al., 2008). Projects in the small region of Curimataú Paraibano and Brejo Paraibano, located in the north east of Brazil, indicate this trend by the presence of extensive systems and small number of animals (SILVA FILHA et al., 2008; SOUZA et al., 2010).

The pig farming in the south of the Brazil consists mainly of family producers, integrated with companies or agroindustrial cooperatives (ABCS, 2014). Paraná is the second largest pig producer in Brazil (ABPA, 2020), its swine herd consists of over six million heads spread in approximately 114.000 producing establishments. Cities as Toledo and Marechal Cândido Rondon, located in the western region, represents the state largest production site (IBGE, 2017).

Curitiba Metropolitan Area (CMA), is composed by 29 municipalities, and has an area of 16,581 $Km^2$ and an population estimated of 3,693,891 people (COMEC, 2018; IBGE, 2020). According to agricultural census, in 2017 the pig herd in this region was 72,864 heads, raised in 6,886 establishments (IBGE, 2017). Until this moment, there has been no work in the literature regarding about the pig farming in this region. By this way, this work aims to characterize the swine production in the CMA.

## MATERIAL AND METHODS

This paper is a descriptive field research conducted between November 2017 and December 2018 with pig farmers in CMA in the state of Paraná, Brazil. The results were obtained by applying a semi structured interview, exchanging with producers regarding sanitary issues and through personal observation.

At first, the Secretariat of Agriculture of each of the CMA city ware contacted in order to obtain information regarding the number of swine holders, as well as, their corresponding address and telephone contact. Based on this information, it was possible to make contact with the producers aiming to describe the project scope, as well as, it's planed conduction. After the property owner's consent, an interview was scheduled. The interview scope was to getter information on size, water supply, farming activities, production destination, technical assistance, swine herd (number of animals, production cycle, housing type) and feeding type (kind of food, source, processing) of the analyzed property.

After the questionnaire application, swine holders received an information flyer with orientations about installation hygiene standards, biosecurity piglet and nutritional management. To support the information included in the flyer, a literature review was made based on swine and animal nutrition books and in scientific articles in the Scielo (Scientific Electronic Library Online), Pubmed and Portal Capes databases. The information was divided into topics and placed in a clear and objective way for a better understanding of the reader; image resources were also used to attract attention. The obtained data was evaluated by descriptive statistics, as well as, absolute and relative frequency distribution, using the Statistix 10.0 software (STATISTIX, 2013).

## RESULTS AND DISCUSSION

The study includes 14 counties of the CMA: Almirante Tamandaré, Bocaiúva do Sul, Campina Grande do Sul, Campo Largo, Cerro Azul, Colombo, Fazenda Rio Grande, Lapa, Mandirituba, Piraquara, Piên, Quatro Barras, Rio Branco do Sul e São José dos Pinhais.

The secretary of agriculture in eight of the 29 counties from the studied area, affirm to know the existence of subsistence pig producers, but due to lack of legal registration their contacts could not be informed. In five other counties, contact was successful, but with no participation acceptance from producers. The city of Curitiba and Pinhais do not count with a rural area, and according to the State Law n.13.331 and art. 344 of Decree n.5.711, the commercial breeding of animals is prohibited in an urban environment (PARANÁ, 2002). There were provided the contact of 121 swine holders, however 26 with no collaboration interest and 33 unavailable during research conduction period.

From the 62 swine holders used as basis for the evaluation, 52 (83.9%) destined their production for own family consumption and sporadic sale and eight other producers (12.9%) aimed only own consumption, both being classified as subsistence property. As an exception, two producers (3.2%) that had a major source of income in pig farming and devoted more attention to the activity.

From the sample, production activity was performed in 50 properties (80.6%) by own family members, the remaining 12 sites counted with external workforce. Among those places where employees were hired (12/62): 66.7% (8/12) had only one employee, 16.7% (2/12) two employees, 8.3% (1/12) three employees, and a single site (8.3%) was a rehabilitation clinic where all services were divided among the 15 hospitalized.

It is possible to infer that, as Silva Filha et al. (2008) verify in Paraíba, pig production in CMA is an activity that plays an economic and social role for small farmers, as it acts as a complement to family income and indirect income formation, due to the reduction of expenses with food (GRISA; SCHNEIDER, 2008). In addition, through informal conversations with producers, it was noted that they were satisfied to have pigs, due to the preference for meat originating from these systems and the maintenance of family tradition.

Among the interviewees, the vast majority, 50 (80.6%), practiced full-cycle rearing and 12 (19.4%) rearing finished pigs. Of the herds that practiced full cycle, two were recent and had not spawned piglets. In the 48 remaining properties, the total number of piglets born per calving, according to the producers, ranged from 3 to 12. In 2.1% (one) piglets were weaned at 21 days of age, in 43.7% (21/48) between 30 to 45 days, in 18.8% (9/48) between 45 to 60 days, in 18.8% between 60 to 90 days and in 16.6% (8/48) the piglets were naturally weaned. As it was expected, the data were different from the ones observed on technify systems.

The size of the properties, housing condition of the pigs, as well as numbers of pigs found and the breeds are shown in figure 1. Pig farming usually is conducted in small

properties. Of the 62 visited sites, 51.6% had less than 10 ha, similar to what observed in research with small-scale pig farmers in the state of Paraíba and in Uganda, which averaged respectively 7 to 1.2 ha (SILVA FILHA et al., 2008; OUMA et al., 2014). Due to low production capacity in the visited sites, 51.6% of the interviewed had a maximum of ten animals. The average number of animals reported in a research made in subsistence pig framing in Uganda was two to three (OUMA et al., 2014). In another research, with small producers of Senador Canedo, Goiás, an average of 42 pigs in the properties was reported (ROCHA et al., 2016). However, when comparing the production characteristics of the evaluated region with that of other countries it is necessary to understand that there are socioeconomic and cultural differences.

In nine farms (14.5%) pigs were exclusively bred in open environment, with a portion of them containing pickets, reducing installation investment, but in other hand increasing difficulty on handling the animals. Different from that, in the work of Ayizanga et al. (2018) developed in Ghana, most of the interviewed (55%) kept the pigs free.

It was verified the production of wild boars and animals resulting from their crossing with domestic pigs ("javaporco"). This practice is a risk for introducing disease into the herds, such as classical swine fever and agents as *Mycoplasma hyopneumoniae*, therefore, wild boars should not get in contact with domestic herds (BARCELLOS et al., 2008). In 2013, the Brazilian Institute of Environment and Renewable Natural Resources (IBAMA) published Normative Instruction nº 3/2013, which recognizes wild boar as harmful and capable of transmitting disease to humans, domestic animals and wild animals, regulates the control of this specie throughout the national territory and prohibits its breeding in captivity (IBAMA, 2013).

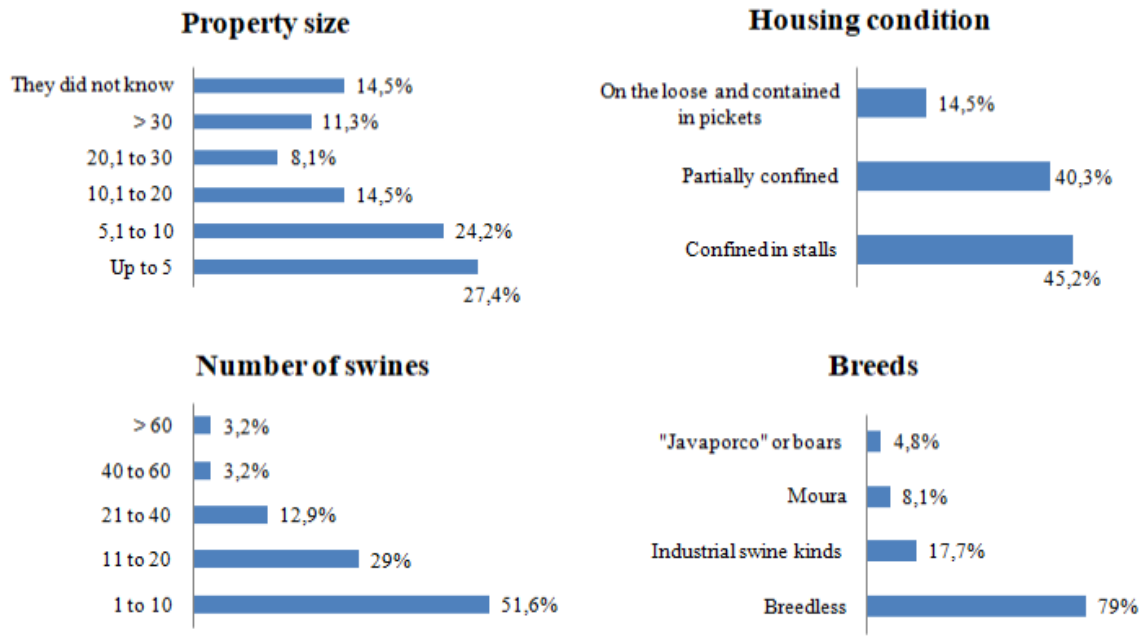


**FIGURE 1 -** Graphs illustrating property size, housing condition, number and breeds of swines in the 62 properties of Curitiba Metropolitan Area visited between November 2017 and December 2018. The sum of the values in the "Breeds" graph exceeds 100% because on some properties there was more than one pig breed. "Javaporco" is animal resulting from boars crossing with domestic pigs.

It was observed during the visits that most of the productions evaluated had a low degree of investment in facilities, and almost, no investment in technology. Studies developed in the state of Paraíba, Goiás and in Ghana also reported the existence of a rudimentary infrastructure where swine holders used locally available materials for housing construction as a way of reducing costs (SOUZA et al., 2010; ROCHA et al., 2016; AYIZANGA et al., 2018).

All analyzed producing facilities combined pig farming with other activities. From the sample, 47 properties (75.8%), were also engaged in agricultural production. From this amount 59.6% (28/47) based their farming in more than one crop type. Productions of other animal species occurred on 58 farms (93.5%), of which 81% (47/58) developed more than one livestock activity in association with pig farming. The activities developed are present in Table 1.

Taking water supply in consideration, 26 properties (41.9%) use artesian well as source, stream water is used by 24 producers (38.7%), seven counts with sanitation network (11.3%), four have their sources through rivers (6.5%), one property uses rainwater and the remaining one is supplied by a local lake (1.6%). The frequency of the main products used in pig feeding is shown in Table 2.

CMA swine holders used locally available household food and agricultural leftover as a source for swine feeding, besides that, in systems where animals were

kept loose, access to fruit trees and fodder was possible. Concentrate feed based on corn and soy bran, commercial or locally produced, was used in association with other food in 24 property (38.7%), not being used exclusively in any property. The majority [48/62 (77.4%)] obtained food from their own property, eight (12.9%) from local markets and vegetables fair in the region, two (3.2%) from restaurants, one (1.6%) in restaurants and industries in the region, one (1.6%) through neighbors and one (1.6%) used the leftovers of their own production. Only one producer (1.6%) needed to buy all the feed provided to the pigs. Five producers (8%) needed to buy food to supplement the feed they already had.

The use of local resources contributes to lower production costs, due to the lower demand of external inputs, which make the activity more viable for small producers (ROCHA et al., 2016). However, there are some difficulties related to this practice. The variation in the food used and the high moisture content make it difficult to offer a nutritionally balanced diet (MUTUA et al., 2012). When dealing specifically with food waste from home and restaurants, there is a risk of acting as a vehicle for the transmission of diseases such as classical swine fever, foot-and-mouth disease, toxoplasmosis and salmonellosis (SOUZA et al., 2010; WESTENDORF; MYER, 2015). In this study it was observed that none of the producers did the pasteurization/cooking process, representing a risk for disease transmission.

**TABLE 1 -** Activities developed in association with pig farming in the properties of Curitiba Metropolian Area visited between November 2017 and December 2018.

| Agriculture | Properties nº (%) | Livestock | Properties nº (%) |
|---|---|---|---|
| Maize | 43 (69.4) | Poultry | 47 (75.8) |
| Bean | 19 (30.6) | Cattle | 37 (59.7) |
| Manioc | 10 (16.1) | Goats | 10 (16.1) |
| Tobacco | 8 (12.9) | Sheep | 4 (6.5) |
| Soy | 4 (6.5) | Buffaloes | 4 (6.5) |
| Pumpkin | 3 (4.8) | Fishe | 3 (4.8) |
| Sugar cane | 3 (4.8) | Bees | 1 (1.6) |
| Wheat | 2 (3.2) | Rabbits | 1 (1.6) |
| Grape | 1 (1.6) | | |
| Chayote | 1 (1.6) | | |
| Green vegetables | 1 (1.6) | | |

NOTE: Most of the properties evaluated performed more than one activity. causing the sum of percentages to exceed 100%.

**TABLE 2 -** Main products used in pig feedingin the properties of Curitiba Metropolian Area visited between November 2017 and December 2018.

| Feed | Properties nº (%) |
|---|---|
| Maize | 53 (85.5) |
| Food waste | 33 (53.2) |
| Concentrate feed | 24 (38.7) |
| Fodder | 21 (33.9) |
| Cabagge | 20 (32.3) |
| Pumpkin | 14 (22.6) |
| Wheat | 14 (22.6) |
| Whey | 11 (17.8) |
| Manioc | 11 (17.8) |
| Lettucce | 8 (12.9) |
| Kale | 8 (12.9) |
| Fruit/vegetables/tubercles peel | 7 (11.3) |
| Cauliflower | 7 (11.3) |
| Carrot | 6 (9.7) |
| Sweet potato | 6 (9.7) |

Fifty percent of the swine holders affirm not to receive any kind of technical visit or veterinary assistance. From the other half. 11 reported looking for veterinarian aid towards swine production. and the others 20 properties reported received municipal veterinarian assistance for cattle-raising issues.

Since most producers receive no technical support for the development of pig farming. it is important to provide them with orientation about food. animal and farm management. It would be interesting to have a continuous follow-up. in order to establish a relationship of trust with the producer and thereby facilitate the change management

process. However. if government incentive measure is not implemented and marked accessibility is not facilitated. a zootechnical performance improvement the swine will not meet the demand of small pig famers (REGE et al.. 2011).

This study described the profile of swine production in the CMA. but contact with rural producers and the provision of information was made only once. Future research should focus on long-term monitoring of these productioeyns. to establish productive and economic data. in addition to determining the effects of technical guidance on the results obtained by these producers.

## CONCLUSIONS

The visited properties. located in the Curitiba Metropolitan Area. in general. develop pig farming as a subsistence activity. in association with other activities and through family labor.

In these productions. alternative food sources are used stead of commercial diets. in order to reduce costs.

It is important to emphasize that there were differences between the properties evaluated. demonstrating that each has its own characteristics.

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## BIOETHICS AND BIOSSECURITY COMMITTEE APPROVAL

This study was approved by the Ethics Committee in the Use of Animals of Universidade Federal do Paraná (UFPR). under protocol nº 98/2017.

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