BIA
BOLETIM DE INDÚSTRIA ANIMAL

ANIMAL ORIGIN PRODUCTS QUALITY

OBSERVATIONAL ASSESSMENT OF THE HYGIENIC CONDITIONS OF THREE FAIRS IN THE MUNICIPALITY OF MANAUS, AM, BRAZIL

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Received: 25/01/2022
Approved: 23/02/2024

Abstract

The consumer fishing operation can be engaged in fishing problems in consumer health, so the present work as structural conditions and manipulation of the municipal fair of Manaus. Observations were made at three Centro, Santo Antônio and Betânia district fairs. Note that the hygienic and sanitary conditions of the workers are precarious; in one of the fairs, it was possible to verify the protective equipment such as gloves, caps, the presence of animals near the window where the fish is exposed for sale, styrofoam boxes used for the storage in an inappropriate state, dirty and the company of parcels with fish on the floor without any secondary packaging for protection. Therefore, it is concluded that it is necessary to train users on the dangers that can affect the lack of adequate handling of the consumer's health, which may interfere directly with the local fishing sector.

Keywords

Amazon, health, hygiene, production.

AVALIAÇÃO OBSERVACIONAL DAS CONDIÇÕES HIGIÊNICO-SANITÁRIAS DE TRÊS FEIRAS DO MUNICÍPIO DE MANAUS, AM, BRASIL

Resumo

Devido à ascensão da comercialização do pescado em Manaus é possível identificar alguns problemas nos pontos de vendas que podem influenciar na qualidade do pescado e na saúde do consumidor, por isso o presente trabalho tem como objetivo avaliar as condições estruturais e manipulação do pescado em feiras municipais de Manaus. Foram realizadas observações em três feiras, localizadas no bairro Centro, Santo Antônio e Betânia. Observou-se que as condições higiênicas e sanitárias dos trabalhadores são precárias, em uma das feiras foi possível verificar vendedores não utilizando os equipamentos de proteção como luvas, toucas, a presença de animais domésticos próximos à vitrine onde é exposto o pescado para a venda, caixas de isopor utilizadas para o armazenamento em estado inapropriado, sujas e a presença de caixas com peixes no chão sem nenhuma embalagem secundária para proteção. Portanto, conclui-se que é necessária a capacitação dos vendedores sobre os perigos que podem causar a falta de manipulação adequada à saúde do consumidor, podendo interferir diretamente no setor pesqueiro local.

Palavras-chave

Amazônia, higiene, produção, saúde.

INTRODUCTION

Brazil occupies 25th place in the ranking of extractive fishing and 17th in aquaculture, with the most prevalent fish in the North region being tambaqui and pirarucu. In the Northeast region, it is tilapia and marine shrimp; in the Southeast, the tilapia is already more present in aquaculture, in the South it is carp, tilapia, oysters and mussels and in the Central-West it is tambaqui, pacu and painted fish (LIEBL et al., 2022; 2021; BUSSONS et al., 2021; PANTOJA- LIMA et al., 2021; 2015; ARIDE et al., 2020; 2018; 2016; LIMA et al., 2021; 2020; MATTOS et al., 2021; NASCIMENTO et al., 2020).

Thus, fish is considered a food with high nutritional value, as it contains essential nutrients for health, such as vitamins and minerals, and is a source of polyunsaturated fatty acids, essential nutrients that reduce the risk of cardiovascular diseases, and improvement of neurological functions, especially in the early stages of development (ANDRADE et al., 2023; OLIVEIRA et al., 2023; LIEBL et al., 2021; LIMA et al., 2021).

However, the capture of fish is carried out by old vessels; the majority are built of wood and have been in circulation for more than 20 years, so the way the fish is packaged and the hygienic conditions are not adequate, a fact that compromises conservation and functionality of these nutrients (LADISLAU et al., 2021).

Thus, fairs are essential in the food supply, especially fish and meat, where fish requires adequate attention, as fish deteriorates quickly due to factors such as the high water content and the pH close to neutrality, which facilitate the development of microorganisms, compromising consumer health with foodborne illnesses (FADs). In addition to these factors, storage time, refrigeration, and inappropriate handling can favor the proliferation of microorganisms (SANTIAGO et al., 2013). Correct fish storage must be wrapped in ice or cold storage, in clean plastic boxes, adequately identified and separated into different piles (SANTANA and LUCENA, 2022). Therefore, the containers should not be exposed to the sun, and the fish should not be on the floor or under dirty surfaces, cleaning utensils should not be placed with the fish to avoid cross-contamination (FREIRE et al., 2011; SANTANA and LUCENA, 2022; BRASIL, 2004).

Fish must follow specific characteristics to be considered in appropriate

conditions. Therefore, the body must have a metallic shine and no different pigmentation; the eyes must be alive and bright; the gills must be red or pink, as well as shiny and with a natural odor; the abdomen should not be bulging; the scales must be polished, and the flesh must be firm (BRASIL, 2017).

Hygienic and sanitary quality has been addressed due to cases of DTA occurring due to the lack of efficient transfer or the adoption of good food handling practices. Among the affected foods, fish stands out due to several factors that affect the speed of microbiological changes. Therefore, the effectiveness of sanitary measures is essential to ensure quality fish and provide reliability to the consumer (SANTIAGO et al., 2013). Considering the importance of hygienic and clean conditions in fish marketing, the present work aims to evaluate fish's structural needs and handling in three municipal fairs in Manaus, Amazonas.

MATERIALS AND METHODS

The work was conducted at three municipal fairs in Manaus, Amazonas (Figure 1).

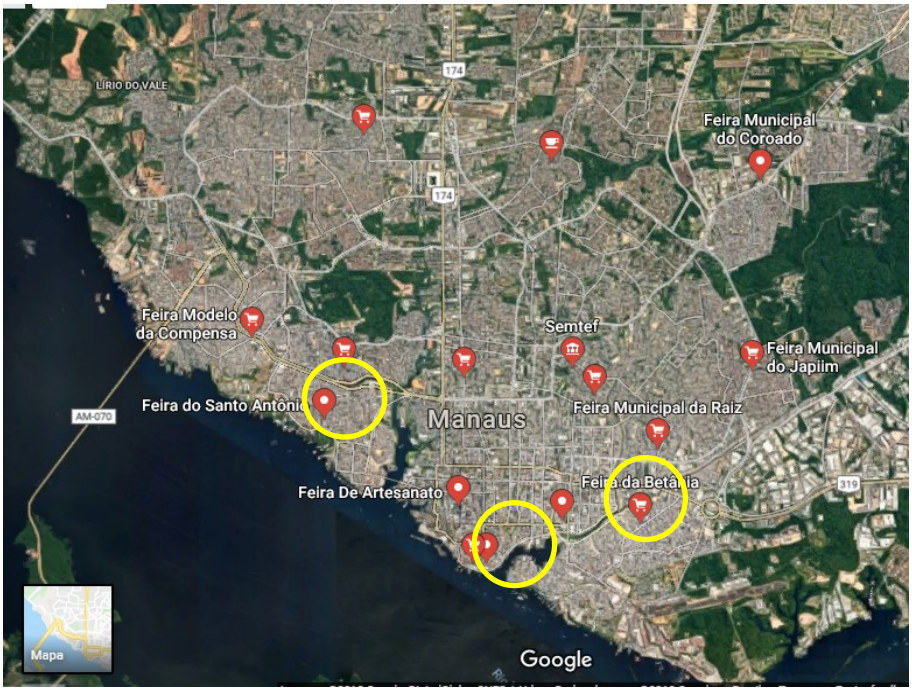

Figure 1. Map of the location of the fairs visited: fairs in the Centro, Santo Antônio and Betânia neighborhoods in Manaus, Amazonas. Source: googlemaps.com

The first fair is located in the Centro neighborhood, called "Feira da Manaus Moderna." it has around 674 stalls and 240 stalls, 40 dedicated to selling fish. Due to its proximity to the port of Manaus and producers, the location has established itself as

the most significant supply center in Manaus, in addition to standing out as a tourist attraction (LIMA et al., 2019). The second is located in the Santo Antônio neighborhood and serves around 200 permit holders; its location close to the port in the São Raimundo neighborhood makes it strategic for receiving food. It has 30 stalls, ten dedicated to selling fish. The third fair, located in the Betânia neighborhood, contains around 192 spaces between boxes and stalls and is close to the port of Manaus, where it has 30 stalls dedicated to selling fish. The three fairs were selected because they are located close to some fish unloading points in the city, and in them, all stalls were sampled to carry out the present study.

For the field research, a form was prepared containing the main hygienic and sanitary points observed during the technical visits. The visits took place between August and December 2018, during the morning shift due to the greater flow of people. A visual analysis of the fish sales boxes at each of these fairs was carried out, evaluating aspects of good practices by Resolution of the Collegiate Board of Directors -RDC No. 216 of September 15, 2004, of the National Health Surveillance Agency (ANVISA).

Among the relevant information is the use of personal protective equipment (PPE), the hygienic conditions of the boxes, the utensils used, and the handling carried out by the sellers who receive the money and catch the fish.

The fair located in the Centro neighborhood was coded as A, the Santo Antônio fair as B, and the Betânia fair as C. In all fairs, equipment, stallholders and fish were analyzed, assigning each item the "conforming" designation (C) or "non-conforming" (NC) based on the indications contained in RDC no. 216/04 and images to illustrate the facts and answers to the questions sought.

RESULTS AND DISCUSSION

Table 1 presents the assessments obtained in the present study. For equipment, there were similar results between Fair B and C; in addition, Fair A was the one that brought the best evaluations. In the assessment of the stallholders, there were similarities between the three fairs, and in the assessment of the fish, Fair A was the one that presented the best results. Through visual analysis, it was possible to observe that the stalls evaluated at both fairs were not following RDC nº 216/04 from ANVISA, as they presented non-conformities in hygienic-sanitary criteria for selling

Table 1. Results of the hygienic assessment of three fairs located in Manaus, Amazonas.

Criteria observed	Fair A	Fair B	Fair C
Structure and hygiene			
Existence of toilets	C	C	C
Drinking water available	C	C	C
Organized environment	NC	NC	NC
Clean environment	NC	NC	NC
Lighting	NC	NC	NC
Drains	NC	NC	NC
Visible stallholder registration	C	NC	NC
Exclusive person to charge	NC	NC	NC
Marketers			
Use of apron	NC	NC	NC
Use of hair protection	NC	NC	NC
Use of disposable gloves	NC	NC	NC
Wearing light clothing	NC	NC	NC
Fish			
Existence of showcase	C	C	C
Adequate supply of refrigerated product	NC	NC	NC
Product with visible origin/identification	NC	NC	NC
Use of suitable utensils	C	NC	NC

Caption: C= conform; NC= non-compliant

fish.

According to RDC No. 216/04, stallholders should be adequately uniformed with light, clean clothes, properly clean aprons, a hat to protect their hair, closed shoes, stainless steel countertops, knives maintained and clean, and trash kept in an appropriate place and sanitized.

In Fair A, located in the city center neighborhood, the structural condition was considered adequate due to having been recently renovated. At fair B, located in the Santo Antônio neighborhood, it was possible to find some non-conformities in the boxes, which, despite having a smooth, waterproof and washable coating, are not maintained well, and some points on the walls have broken tiles. At fair C, problems were observed with the electrical part and installations in the pits. The ceilings in the three fairs are of adequate height, facilitating ventilation inside them, but they are not frequently cleaned due to difficult access (as pointed out by stallholders).

The lighting at fairs B and C must comply, as the lamps are incandescent and

connected directly to the wiring without any adequate protection, which would be the use of luminaires that can already be seen at fair A. Silva Junior et al. (2016), when evaluating the hygienic-sanitary aspects of fairs that sell fish in the city of Macapá, Amapá, observed structural conditions that were 90% in compliance with those recommended.

The packaging location at all fairs investigated indicates the presence of frost-free Styrofoam boxes and sanitized plastic boxes, in contrast to what is described in the legislation. Some materials, such as Styrofoam and plastic boxes, have a roughness that compromises the hygiene of the materials and is a source of contamination. Silva Júnior et al. (2016) also found this inadequate storage condition at a fair in Amapá.

In the three fairs, non-conformities were found in the standardization criteria and the use of PPE. At fair A, some sellers wore protective caps, but others wore hats, their uniforms and aprons were light but dirty. In both fairs B and C, none of the vendors used protective equipment, their uniforms did not follow the standard established by the legislation of being in light colors, some wore adornments such as rings, watches, bracelets, aprons were dirty, and they did not wear closed shoes. In a study conducted at two fairs in Bahia, a lack of appropriate clothing was observed in 100% of the observations evaluated, in addition to the clothes used being always dirty and unhygienic (SANTOS et al., 2021). Souza and Atayde (2017) point out significant statistical differences between the researcher's hygienic-sanitary perception compared to those portrayed by the stallholders, so it is possible to affirm that the stallholders do not follow the recommendations of the legislation.

Regarding water supply, the three fairs complied with RDC No. 216/04, as the fairs have water supplied by the Manaus water concessionaire and portability assessment is carried out regularly. At fairs in the city of Santana in the state of Amapá, Silva Junior et al. (2017) observed that the water that supplies the locality is not piped, is stored in buckets and drums, and its source is of dubious quality, a different record from those observed in the present study. At the three fairs, it was also observed that the drains are not siphoned, most are open and without vector protection screens.

Buildings, facilities and furniture were not free from vectors and urban pests. For example, dogs and cats roamed the indoor and outdoor areas of the fairs, in addition to many flies landed on the fish displayed in the windows. Sellers used fans

to keep flies away, but they were dirty, and RDC no. 216/04 does not allow using equipment with mist spraying over food, the resolution determines that ventilation must guarantee air renewal and maintenance of a free environment. Although good practices in food services do not permit this presence, it is common in open-air markets and deserves attention from food handlers and managers. Therefore, more efficient control of vectors and urban pests must be done. The waste used in the handling areas is stored in open drums, which generates sources of contamination, problems and vectors such as rats, flies and cockroaches.

Through visual exploration of the hygienic and sanitary criteria, it was possible to verify that hygiene procedures are essential to guarantee product quality. The primary source of contamination, in addition to the vessels, were the handlers themselves carrying out incorrect actions such as the use of ornaments, rings, necklaces, lack of hygiene with their clothes, women with nail polish (SANTANA and LUCENA, 2022). The appropriate use of uniforms and good food-handling practices still need to be a reality at some fairs in the country (HOLANDA et al., 2013).

One of the ways to improve the quality of fish is by disseminating knowledge of good handling and hygiene practices. At the fairs investigated, it was observed that there are no posters guiding handlers on hand antisepsis and other hygiene habits, nor suitable places to carry out these activities. The results of the present study are similar to the findings of Santos et al. (2021), who also observed a lack of hand hygiene. To guarantee the quality of fish, all handlers who come into contact with food must receive adequate instructions on good handling practices, which consist of hygienic-sanitary requirements, personal hygiene, and basic notions of good manufacturing practices. Furthermore, routine annual health checks for handlers must be mandatory to avoid possible cross-contamination.

It is essential for places that sell food to have clean storage equipment in good condition to provide an adequate temperature delay chemical reactions and enzymatic action, which are one of the leading causes of the development of microorganisms. However, in fairs A, B, and C, fish were observed incorrectly packed in Styrofoam boxes with roughness and dirt, cardboard boxes, and fish exposed without protective packaging on the floor.

Different from the research by Holanda et al. (2013), in which the utensils were in excellent condition, fairs A, B, and C were found to be non-conforming. This

situation is worrying because it can cause contamination in the fish sold and affect the consumer's health. Therefore, it disagrees with work developed in the area of Hygiene and Inspection of Products of Animal Origin and is in dispute with RDC no. 216/04, which regulates that handling instruments must be in excellent condition and clean.

In the visual assessment, the fish for sale agreed with the freshness characteristics recommended in the Regulations for the Industrial and Sanitary Inspection of Products of Animal Origin (BRASIL, 2004). Even with inadequate hygienic and sanitary conditions in fairs A, B and C, no macroscopic changes were found that would demonstrate the deterioration process.

The high consumption and demand for fish, generating faster sales, means that the products do not accumulate in boxes, counters or freezers for a long time, all in inadequate conditions as mentioned above, which would be relevant in detecting fish deterioration. Due to insufficient hygienic-sanitary conditions and poor handling practices, microbiological contamination is likely in the fish sold. Souza et al. (2021) carried out microbiological analyses on Jaraqui *Semaprochilodus insignis* and tambaqui *Colossoma macropomum,* in which the presence of total and thermotolerant coliforms, aerobic mesophiles, *Staphylococcus* sp. and *Salmonella* was verified, with values higher than those recommended for total coliforms and Staphylococcus sp. These same authors indicate a greater need for authorities to monitor the production and marketing chain of fresh fish in Manaus.

It was also observed that due to the greater flow of people and being a tourist spot, fair A was more organized, in the internal areas, there were few disused objects, and the equipment was in a better state of conservation when compared to fairs B and C This different situation between fairs is not favorable, considering that this is a strategy that involves public health for the city of Manaus. Improvements in facilities and greater adoption of good hygiene and fish handling practices must be accompanied by awareness-raising actions among stallholders and more excellent supervision by the responsible bodies.

CONCLUSION

Considering the fish marketing practices in the markets studied, there is a risk to consumer health due to several criteria that disagree with federal legislation. Fairs B and C require more rigorous improvements in the requirements of buildings, facilities

and personal hygiene of stallholders, similar to the compliance observed in Fair A, recently renovated. Despite the benefits of the reform, structural changes in the researched fairs will only be efficient for public health when they ensure full compliance with formally established hygienic-sanitary requirements.

ACKNOWLEDGEMENT

Oliveira AT is grateful for the research productivity grant and the postdoctoral grant granted by the National Council for Scientific and Technological Development (CNPq, process 315713/2020-8 and 102455/2022-8).

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