

# Commercialization of Fish at the Fairs of Manaus, Amazonia, During the Closed and Unclosed Seasons

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## Abstract

This study analyzes several aspects of the commercialization of fish in the fairs of Manaus during the closed and open periods of fishing. The study was conducted between 2013 and 2014, based on interviews with dispatchers, marketers and consumers. The sale of fish is usually done in several ways, including the unit (individual fish), the cambada (small fish encased by a vegetable fiber through the operculum) and weight in kilo. The price varies according to the species, size and quantity in the change. The diversity of the fish traded during the closed and open periods was around 14 commercial species and did not show a significant difference during the year, indicating that the prohibitions on the sale of some species in the closed period are not respected. It has been observed that several species protected by the closed standards are marketed openly, even at the fairs of the center. The vast majority are also unaware of the closed standards, not knowing the period in which this occurs, much less protected species and the body responsible for monitoring. The majority of respondents consider that some species of these fish may aggravate cases of infection or even cause diseases in the consumer's skin. The vast majority of persons prefer to consume fish from nature compared to fish produced in fish farming.

## Keywords

Fish Trade, Pisciculture, Fishery

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## 1. Introduction

Fishing is one of the most important human activities in the Amazon, constituting a source of food, commerce, income and leisure for much of its population. In the market of Manaus this fact is easily observed, because it is a metropolis located in the central portion of the region and in the axis of the great Amazon river and where the consumption of fish is one of the largest in the world.

The fish landing in Manaus oscillates around 39,000 tons per year of extractive fishery, which is supplemented by 10,000 tons of fish farming in the metropolitan region of Manaus

and 6,000 tons of fish farms in In neighboring states of Rondônia and Roraima [8]). About 50% of the total fish production landed in Manaus is marketed in the city's fairs, the remainder being destined for fridges, where it is benefited and destined for local supermarkets and for export to other cities in Brazil and abroad. Catfish or flatfish are the main species used in this type of activity [9].

Despite the great abundance of species with economic potential in the region, there is already a noticeable decrease in some fish stocks, because of excessive fishing pressure; this is easily verified, both by reducing the quantity and size of some species [1], [7], [10], [12]. To counteract this, the government has adopted some measures, most

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notably Ordinance N<sup>o</sup>. 48/2007 which prohibits the capture, transportation, marketing, storage and processing of some species during the reproductive period, from 15 of November to 15 of March [5,6] Initially, the species listed were Pirapitinga (*Piaractus brachypomus*), Mapará (*Hypophthalmus* spp), Sardine (*Triportheus* spp), Pacu (*Mylossoma* spp), Aruanã (*Osteoglossum bicirrhosum*) and Matrinxã (*Brycon* spp), however this list has been altered every year, removing some of these or including other species [1].

The Arapaima (*Arapaima gigas*) is protected by a separate legislation [4], which prohibits its fishing, transportation and commercialization from Juneto the end of November, and can only be sold the portion originated from fish farming and licensed by competent bodies authorized by Brazilian Institute of Environment and Renewable Natural Resources (IBAMA). Tambaqui (*Colossoma macropomum*) is also protected by separate legislation [5], with the same prohibitions, from Octoberto end of March. During the period of closure of these and other protected species, the fisherman receives the secured insurance, with the purpose of compensating the resources derived from the fishing and thus to be able to continue maintaining his family. Although fish is an abundant and widely accepted food in the Amazon, there are some taboos with respect to the consumption of some species [2],[3], however this situation has been changing continuously, as scientific knowledge propagates and the Amazon receives contingents coming from other species Regions where this type of taboo does not exist.

The present study aims to diagnose the diversity of the species traded, the type of fish commercialization, the variation of the price, some preferences or food restriction and the fulfillment of the closed season in the main fairs of the city of Manaus.

## 2. Material and Methods

The study was developed between November 2013 and July 2014 in twelve fairs of the city of Manaus, being divided into three categories, based on Santos *et al.* ([11]: center fairs (large market and high production); neighborhood fairs (small market and medium production) and free fairs (located on the street and small production). The data were collected from structured questionnaires applied to the fairs, managers and consumers of the fairs in Manaus. In addition, technical visits were made to all fairs in the city to observe the completion of the closed season, as well as the way of commercialization of the fish in these places.

The questionnaire applied to the fair asked for information on

the species traded during the collection period, the price and the fish supplier. The questionnaire applied to consumers sought to verify their knowledge about the period of closure. The questions referred to the period of protection, protected species, fish preferences, frequency of consumption and possible price variation of protected species during the closure.

The data obtained were scanned in electronic spreadsheets of Microsoft Excel 2010. In the same program graphs and tables were elaborated, which were divided according to the objectives proposed by the work. To compare the diversity of commercialized species in the closed and non-closed periods, the paired Student's t-test was used. The analyzes were performed by the bioEst program, version 5.3, and a value of  $p \leq 0.05$  and a 95% confidence interval were considered as statistically significant.

## 3. Results and Discussion

The diversity of the species traded during the closed and non-closed periods was around 14 and did not present a significant difference during the year, according to the results of Student's paired t test.

The commercialization of the fish is made in three distinct ways, usually associated with size or importance. Larger fish, such as Pirapitinga, Apapá, Aruanã and Tambaqui from fish farming are sold in units. Medium fish, such as smooth or leather fish, Acará and Tambaqui from the river are sold in kilo. Smalland cheaper fish, such as Aracu, Branquinha, Cubiu, Curimatã, Jaraqui, Pacu and others are sold in cambadas (usually six to ten specimens joined by a vegetable fiber through the operculum).

The price is very variable depending on the type of fish. There are very valuable species, such as Matrinxã and Tambaqui and secondary species, such as Aracus, Branquinhas and smooth fishes. The price also varies according to the size of the fish. In general, the largest fish sold in unit vary from R\$ 10,00 (Aruanã) to R\$ 50 (Tambaqui from pisciculture). Also according to size, Pirapitinga reaches up to R\$ 45,00 and Matrinxã (1 to 1,5 kilo) ranged from R\$ 10 to R\$ 20 per unit. The Tambaqui from the extractive fishing is very expensive, about R\$ 23,0 per kilo. In these terms, a fish weighing 10 kilos will cost up to R\$ 230,00, remembering that the Tambaqui can reach up to about 30 kilos, although it is very rare. Dry Piracuru is relatively the most expensive fish on the market, around R\$ 25.00 per kilo. Secondary fish fluctuate around 8,00 to 12,0 R\$ per kilo. The cheapest fish (Acará) is sold at an average price of R\$ 5.00 to R\$ 10,00 per kilogram.

The price difference between the closed and unclosed period is relatively small, possibly due to the large supply of Tambaqui and Matrinxã from fish farming throughout the year. Another factor of price uniformity is the entry into the fish market of the stocked fishes during the period of higher fish production, generally during the low water period or migration, and when fishing is more efficient.

It was observed that 94% of the female consumers and 41% of the masculine gender present some food restriction in relation to Pirarucu and Matrinxã. When questioned about the type of food restriction, consumers reported that the restriction is temporary, occurs only in the period of illness or when they are using some type of medication.

All male respondents reported having a food restriction on Pirarucu (*Arapaima gigas*) when they are suffering from an inflammatory disease or when they use some type of medication, since they consider that this fish aggravates the condition. Only 71% of women expressed this same type of restriction. In addition, 29% of women report that they do not eat Matrinxã (*Brycon* spp.) when they are with some type of disease, due to the great amount of fat of the species.

Half of the consumers interviewed at the center fairs claim to have preference for fish from the extractivism, and another half did not have a preference for fish origin. In the fairs of the neighborhood the percentage of preference for fish of the nature is much smaller, only 33% and in the fair smaller still, only 7%. Of course, such a preference is tied to price, since extractivism fish are generally more preferred than those derived from cultivation.

Quality and price are the two main factors for the preference to buy fish, however each of them has different weight or meaning, depending on the type of fair. Thus, for consumers of free and neighborhood fairs, the price is much more important (88% and 75%, respectively), while for consumers interviewed at the center fair price is the most important factor for only 68% of respondents. Conversely, fish quality is the most important factor for 32% of the consumers at the center fairs and only 12% for consumers of the fairs and neighborhood fairs.

The quality and the price of the fish are factors that maintain close relation with the economic level of the residents who live near these fairs. Quality is more important for consumers interviewed at the center fairs where per capita income is higher. In these fairs, fish of the highest quality predominate, such as Pirarucu, Tucunare, Hake and Tambaqui of river. The price factor, on the other hand, is of greater importance for consumers of free markets and neighborhoods, where per capita income is lower. In these fairs, fish of lower quality predominate, such as Jaraqui, Pacu, Sardines, and the young

Tambaqui or fish farm.

There is a great lack of knowledge about the closure period, which is much greater among those interviewed in the free and neighborhood fairs (88% and 83%, respectively) than in the center fairs (71%). For all of them, the knowledge of this norm comes through publicity campaigns made by the inspecting agency, the Institute of Environmental Protection of Amazonas (IPAAM), informative posters of the Brazilian Institute of Environment and Renewable Natural Resources (IBAMA) and the news programs Locations.

It was observed that the majority of the protected species (mainly Aruanã, Pacu, Sardinha and Tambaqui) were being commercialized openly in the closed period, even in the fairs of the center. Although some consumers claim to know the standard of defense, almost all of them reported not knowing the period of validity of the protected or no protected species.

## 4. Conclusions

The commercialization of the fish in the fairs analyzed is performed daily, mainly in the morning. The fish are exposed in masonry benches and at room temperature and sellers are not in the habit of wearing clothing recommended for this type of activity, such as aprons, caps, gloves, boots and knives of stainless material.

Tambaqui was one of the most abundant species in local markets in the 1980s, with specimens reaching about 1m and 30kg. Currently there is a huge reduction in the production of this species, besides the alteration of the size and value of this fish that can reach exorbitant values in the local market.

The closed season is the time when fishermen registered with the federal agency responsible for fisheries receive the insurance closed, that is, a financial reward for being suspended from this activity. The objective is to collaborate for the reproductive success of the most species targeted by the fishing, thus guaranteeing the sustainability of the fish stocks. It is noted, however, that despite this restrictive measure, illegal capture continues to occur and thus the purpose of the closure seems to be not being effectively achieved.

Some authors denounce the similar situation of disrespect to the closed season at fairs in the State of Pará and call attention to the need for investments in the system of supervision and management of fishery resources. Most commercialized fish are of extractivist, however, Tambaqui production is almost entirely derived from fish farming.

The main fish traded in the fairs of Manaus is made up of species of scales and this is due to the existence of taboos, myths or local beliefs of which species of smooth fish are

“reimosos”, that is, contains substances harmful to health. Taking into account that these smooth fish are widely used without problems by human populations from other regions of Brazil and the world, efforts must be made to reverse this situation, that is, that this great economic and food potential is not lost through Ignorance and to be used for the benefit of the Amazonian populations themselves.

There is a taboo in the Amazon about the consumption of smooth fish, motivated by the belief that they cause skin diseases, leprosy and cardiovascular problems. Some authors mention that this taboo is almost all over, due to commercial aspects and cultural influences. Usually, the fish considered reimosos or owning of reima are those that contain a high content of fat. However, according to some studies the fatty fish do not suffer any type of taboo among the populations of other regions; on the contrary, these fish are the most sought after for feeding.

Some scholars admit that the dietary restrictions on reimosos fish would be an adaptive behaviour to avoid the consumption of toxic substances present in animals at the top of the food chain, such as the fish of order Siluriformes. However, this seems inappropriate because other carnivorous species, such as Pirarucu (*Arapaima gigas*) and tucunaré (*Cichla* spp.) are widely consumed in the region.

The fishing season is important for the preservation of overexploited or vulnerable species, but it loses its meaning when it is not respected. So the winner is the unscrupulous at the expense of peers and at the expense of stocks and fishing in a broad and long-term fashion.

The production of fish in fish farming (especially Tambaqui) is relatively expensive, mainly because of the cost of the ration, however, the production of nature is still more onerous because of the expenses with fuel and food and utensils used in fishing distant from the consortium centers.

It was observed that the majority of the protected species (mainly Aruanã, Pacu, Sardinha and Tambaqui) were being commercialized openly in the closed period. If this happens in the fairs of the capital, due to the greater facilities of inspection, certainly occurs with much more intensity in the fairs in inner cities and even more so in rural areas where enforcement is not enough or is practically inoperative.

This fact evidences that the closure is not fulfilling its primordial function that is to protect some species during its reproductive phase. In this case, the fixed salary that the fisherman is entitled to receive during the closed season may serve much more as financial support to needy families than proper conservation of fishery resources. In this case, it is also necessary to adopt other more efficient measures to protect fish stocks, including not only the fishing activity

itself, but also other correlates that may be immensely more damaging to stocks and the environment, such as agriculture and livestock, mining and the construction of dams for energy production.

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