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Fish Commercialization in the Fairs of Boa Vista, Roraima, Brazil

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Abstract

This study was conducted at the fairs of Boa Vista, Roraima, with the objective of identifying the main agents and activities involved in the fish's commercialization; determining the marketed species of fish; recording the approximate production by species; identifying ways of commercialization and verify the fish's market price during the study period, between July 2014 and June 2015. For data collection was used direct observation and semi-structured interviews applied to 49% (18 of 37) of the fairs fishmongers. They were identified 57 fish species, being the fishing market kept mainly by farmed fish: Tambaqui – *Colossoma macropomum*, with 360,547 kg (57%) and matrinxã – *Brycon amazonicus* with 40,687 kg (6%). The Fish from fishing represented only 225,117 kg (37%) of the species, which originate mainly from Roraima (Caracaraí) and the State of Amazonas (Manaus). The usual form of presenting the fish was *in natura* and sold by the kilo. The price was mainly related to the fish's type (species); the average price per kilo was between R$ 16.6 for the most valuable species and R$ 4.4 to the secondary species. It was observed that the middlemen are the central actors in the market and the fairs are an important place of local and even regional trade relations.

Keywords

Fish Trade, Pisciculture, Fishery

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1. Introduction

The Fish's production coming from extractive fishing in Roraima has systematically decreased, going from 678 tons in 2007 to 386 tons in 2011 [4],[5]. In contrast, captive fish's production grew sharply in the state because in 2011 the fish reached a ten times higher level than that observed in 2007, from about 2,400 to about 25,000 tons. This sharp increase in fish farming may be a reflection of the investment in this sector by the Federal Government, which aimed to make Amazon a power in this segment, due to its abundance of water and species [5].

According to Gregolin [9], the fisheries and aquaculture sector in Brazil generates about 3.5 million jobs and approximately R$ 5 billions. It is therefore an important sector, though not as vigorous as the segments involved in beef cattle. According to IBGE [2] the production of cattle in Roraima is well marked, representing in 2012 about 206,000 kg. This competition of cattle production can be one of the reasons that explain the low fish production in Roraima, compared to other northern states, such as Pará and Amazonas. However, it is clear that the fish plays a role of great importance in Roraima's capital.

As reported by Ferreira et al. [7], Ferreira [8] and Ruffino [11], the fishing industry needs scientific information about their production levels and also of social and economic issues with which it is related. In this sense, studies of the exploited species, marketing strategies are fundamental as well as the recognition of the agents involved in the fish trade. Besides the scientific interest, such data are essential so fisheries

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management measures can be implemented and thus help the sector's sustainability. This research falls within this context; aimed at identifying the marketed species; fish's presentation forms; the approximate amount of marketed fish; the trading price of fish and the flow of the fish sector in this market.

2. Material and Methods

The research was conducted in four existing fairs in Boa Vista: Produtor, Passarão, Garimpeiro and Pintolândia. The Produtor's fair is located in the south and the others in the western part of the city. The fairs were classified into two categories: center fairs (located in the most central part of town, with fixed cover and administered by the state government) and neighborhood fairs (far from the city center, mounted on the street without coverage or with improvised coverage and administrated by the city hall). In the Center category fit the Produtor's fair, with 3 fishmongers and Passarão's fair, with 4 fishmongers. Both are open every day of the week from 6:00 to 19:00 hours. In this study, the interviews were conducted with all the fish sellers working there. These two fairs have a minimal infrastructure, with box, balcony and tap into an exclusive masonry space in the fair and each has its own administration.

The neighborhood fairs are located on the outskirts of the city, do not have adequate infrastructure, always occur in two avenues of great movement that are closed to vehicular traffic on weekends for your service to the public. They are assembled by their own fairground, being constituted only by fitting metal structures, tarps and improvised metal tables. This category includes the Pintolândia and Garimpeiro fairs that operate on weekends from 6:00 to 14: 00h. Pintolândia works on saturdays, 10 fishmongers, 4 of those used in the search. The Garimpeiro fair works on sundays, 20 fishmongers and 7 of these participated in research. In the four fairs were interviewed 49% (18 of 37) of the fishmongers.

Some center fairs fishmongers move on weekends for neighborhood fair to sell their fish. Besides that, most Saturday Fair fishmongers also act at the fair on Sunday. In other words, traders move between neighborhood fairs, which are mounted on public streets. Because of this, the choice of Fish's selling points for this research was made so as not to allow the interviewee to repeat between the fairs, eliminating the possibility of duplicate information. The choice of fishmongers on the neighborhood fairs was made to include proportionally large and small merchant in order to obtain the most real diagnosis as possible.

Visits to fairs were held fortnightly, between the months of July 2014 and June 2015, including the period of closed fishing (which occurs in March-June) and the period of non closed fishing (rest of the year). Initially, they were made pilot visits for the recognition of the study area and peculiarities of each fair. The term of consent and the research project were presented to the manager of the fair and for those who participated in the study. For data collection, it was used semi structured interviews with open and closed questions, with direct observation. For monthly price monitoring and production it was used a specific table. Interviews were conducted with fishmongers, managers and middleman who agreed to participate on the research.

They were identified eleven middlemen and from these, four (about 30%) were interviewed. It is considered here as fish's middleman who intermediated the buying and selling of fish between the producers (fish farmers and fishermen) and the fishmongers, working throughout the year and had a fixed address for fish trading (shacks fishes). Interviews were conducted with the help of targeted and open questions. The first questionnaire was directed to managers responsible for fairs aimed at collecting information about the quantity of fish stall, operation of fairs and marketers' regulation. The second questionnaire was applied to the stallholders, aimed at collecting information on the origin, price, variety of species traded, storage, forms of sale, quantity sold by species and function of workers. The third questionnaire sought to collect the same previous questionnaire information, however, directed to middlemen who transported the fish. To confirm the taxonomic identification of fish species, photographs taken at the fairs were compared with the manuals and identification keys for Amazon river fish available in the literature, in addition to consultation with INPA's experts.

The data collected in the interviews were tabulated in the computer program Excel and used dynamic spreadsheets and graphs. In the fairs where only a percentage of the fish stalls were interviewed, it was applied the correction calculation to estimate the amount of fish at 100%. Therefore, it was added the total amount of fish sold by stall fish interviewed during the year and the average was calculated and then multiplied by the total number of fish stalls in each of the two fairs. As for the sales price, net income for all species (sales revenue minus cost revenue) was calculated. For Tambaqui, the best-selling fish, were calculated a profitability (net profit/gross revenue x 100) and rate of return (net profit/total investment x 100).

3. Results and Discussion

Composition and forms of fish's presentation

They were found 57 species of fish in the Boa Vista Market, 29 of them being commercialized in all fairs. At the Produtor's fair 50 species were recorded; the Passarão's fair 32, the Produtor's fair 45 and Pintolândia's fair 53.

In addition to the whole fish *in natura*, they also sold parts of the fish, such as filet, sausage, roe, dried fish and carcass. Dry Pirarucu, Tambaqui fillet, leather fish fillet (especially the Catfishes Filhote and Dourada), are the products of higher values; such forms were found only in one center fair, and they were acquired by restaurants or consumers interested in special dishes.

The fishmongers reutilize the fish filleted carcasses in local trade, mainly Catfishes, but they also bought this product from Amazonia, which had it already bagged for resale. This product was more marketed in neighborhood fairs (periphery) due to its low price.

The filleting selects the best part of the fish (fillet) which is sold at a higher price, especially in the centre fairs. The carcass of the locally filleted fish is also sold mainly in the periphery fairs, serving to optimize merchant profit. The Tambaqui sausage was sold sporadically in Produtor's fair having its preparation still handmade and therefore in low production scale. The ova of Tambaqui was exceptionally registered at the Produtor Center Fair during Holy Week, when there is an increase in the sale of fish and accumulation of this organ from Tambaqui eviscerated.

Fish salted and dried were sold occasionally in Pintolândia fair and by a single fishmonger. This technique was used for fish that have not been sold fresh, thus avoiding the fish waste. Small fish were the main species used in this process, such as Pescada, Jaraqui and Curimatã. In general, the fish in the Centre Fair (Produtor e Passarão) were found well stored in freezers or in ice and sold in the shade in fish stalls. This was in contrast with the situation of neighborhood fairs (Garimpeiro and Pintolândia), that lacked adequate infrastructure and hygiene. In some fish stalls of Neighborhood Fairs, fish is often sold off the minimum standard required for a minimally organized fair

Estimated participation of marketed species

At the Center Fair (Produtor and Passarão), they were interviewed 100% of fishmongers, since there were no more than four stalls selling. The Produtor's fair marketed the amount of 262,925 kg of fish; the Passarão's fair 70,769 kg. At the neighborhood Fair (Garimpeiro and Pintolândia), they were interviewed 40% fish stalls, since there were 10 to 20 stalls selling. The Garimpeiro's fair sold 113,279 kg and Pintolândia's fair 184.358 kg based on the collected sample. However, the estimated value for the last two fairs was approximately 470.000 kg in Garimpeiro and 448.000 kg in Pintolândia.

Considering the total volume of fish in the four fairs, it is observed that the neighborhood fair (Garimpeiro and Pintolândia) sold an amount much higher of fish on weekends than the by the center fair (Produtor and Passarão) that worked every day of the week. The fact that these Neighborhood Fairs agglomerate more fishmongers than the Center Fair has influence on the competition, lowering the price and increasing the supply of the product. Other influencing fact is that most people do not work on weekends and have more time to go to the fairs.

About 65% of the fish traded in Boa Vista comes from fish farming, almost all of which (63%) is produced in the State of Roraima and only 2% from the fish farm in the neighboring State of Amazonas. The remaining commercial fish (55%) comes from fishing in nature, 21% of which are imported from the State of Amazonas and 14% from the Roraima rivers.

Fish farming in Roraima has been growing steadily in recent years, being this State one of the main suppliers of fish to the State of Amazonas. According to IBAMA [3] and ADERR [1], the Roraima state exported 3,057 tons (91%) of its Tambaqui production to the State of Amazonas, the remainder being consumed locally. This fact is highly significant, because until a few decades ago fish production in Roraima was so insignificant that it did not even appear in fishery statistics. On the other hand, the State of Amazonas has always been considered the largest center of production and consumption of fish in the Western Amazon. That is, there is clear evidence that fish production in this northern region of Brazil has been developing lately on the basis of fish farming and not in extractive fisheries, as in the past. This means that fish farming has been a major contributor to people's food supply and also to reducing the pressure of extractive fisheries on natural sewage and for centuries has been the main means of exploiting this important natural resource.

However, when comparing the amount of Tambaqui declared to the competent bodies and the amount observed by this research, it was possible to verify that only the production in Boa Vista (360.547kg) was higher than that recorded for the whole state. This also shows that there is great difficulty in managing the fisheries sector, the information is not systematized, that control is weak. As a result, it is clear that many traders violate the law and they do not provide information and evade taxes.

The specie with the largest representation in the trade of Boa Vista was Tambaqui derived exclusively from the local fish farming, with 360.547 kg, accounting for 57% of the total marketed production in the Boa Vista fairs, which was 626.351 kg.

The interviewed fishmongers reported that five years ago, i.e in 2009, the scenario was the opposite: there were plenty of species from fishing and fish from fish farming was rare.

They associated this decline in fish production to overfishing. Regarding the information on the low production of fish farming, the found results corroborates with Mello's data [10], where Tambaqui represented only 8% of the traded fish, while matrinxã was the most representative specie, with 32% in the markets of Boa Vista that year. This reveals that there has been a large investment in fish farming of Tambaqui in the state of Roraima, seeking to fill the lack of fish originated from fishing. Currently, fish farming has become the most common way to supply the local fish trade because, among other reasons, stabilizes fish's price in the market, since it decreases the fish taxes of imported Amazon fishing.

The second specie most commercialized during the research was matrinxã, derived from fish farming (40,687 kg) and from nature (41,011kg). This species has its origins in captivity both in Roraima and in Amazonas. That is, regardless of whether originating from fish farming or local fishing, this specie represented 12% of total production. The fish represented by the "Others" category accounted for 10% of the 46 species marketed. The other fish traded and included in the "other" category, accounted for about 10% of the production at Boa Vista fairs

Trading price

Tambaqui showed the largest movement of net income, reaching R$ 830.779,00, followed by matrinxã, with R$ 187.101,00. One kilo of Tambaqui had an average purchase price of R$ 6.4 and R$ 8,7 for the sale. Feio [6] shows that in the same period of this study, the Tambaqui was being sold in Manaus by R$ 25.0/kg.

The matrinxã is a bit more expensive, with an average purchase price of R$ 7.9 and sale of R$ 11.00. The species with the highest market price were the giant Pirarucu (*Arapaima gigas),* with R$ 12.90 from acquisition and R$ 21.3 per kilo, for the sale. Other important fish, in terms of price, were the great catfish Dourada and Filhote, both belonging to the genus Brachyplatystoma and coming mainly from de State of Amazonas, which ends up increasing the trading price in Boa Vista.

Fish farming species produced in Roraima commercialized at the fair in Boa Vista

Since Tambaqui showed the highest production in the local market (57%), traders have developed a classification list of prices for this fish based on size. So, they are called PP (extra small), P (small), M (medium) G (large) and GG (extra-large). The best-selling Tambaqui size in trade was Large, between 2.5 to 2.9 kg (39%), with an average purchase price at R$ 7.2 and sale at R $ 9,2.

Despite being the best-selling size, it was not the one bringing more financial return, because the profitability was 35% and the lucrativity 26%, which were the lowest percentages among Tambaqui sizes. The Tambaqui sized as PP with 600g to 1.4 kg (11%)) was the one that obtained the highest financial return, with the profitability of 43% and lucrativity of 30%, being the average purchase price of R$ 2.8 and sale R$ 4.00. It can be seen that the ideal Tambaqui size for commercial purposes was the PP, because it requires less investment, since the pisciculturist removes the fish of the reservoir in less time, thereby eliminating the costs, quickly recovering the invested amount and take profit. While lucrativity demonstrates the immediate gains of business in a specific period (a month, a semester, a year, etc.), profitability shows the return on the investment made in long term.

Fish's commercialization: from producers to the middlemen

The middleman is the agent that has more functions and features in commercial sector of fish. This category comprises small and big middlemen. Small middleman sells an average of 25,000 kilograms of fish and big middlemen 347,122 kg per year. As the name implies, small intermediaries have few financial resources and poor infrastructure. Generally, they are relatives or friends of the fishermen, that is, they work in family arrangements and, moreover, they usually market fish from extractive fishery, which involves less operational costs than fish farming.

The transport used to obtain and distribute the fish from the extractive fishery is less sophisticated than that used to transport fish from fish farming. It usually takes place along Highway BR-174, between the cities of Caracaraí and Boa Vista and is operated in trucks adapted with freezer or only with ice in styrofoam boxes. However, during the period of low production, which coincides with the flood peak of the rivers (March to June), these small intermediaries usually work with cultivated fish, usually Tambaqui, which is transported to indigenous communities in the State of Roraima. Another important change in the form of commercialization occurs in the closed period, in which the fish becomes more expensive and with less flow, precisely because it is an illegal operation.

Large middlemen have greater purchasing power. They prefer to work with larger volume of fish and so preferably with farmed fish, since the production is continuous and on a larger scale. They also work with big Siluriformes or catfishes coming from fishing in the Amazon State.

Large middlemen generally buy live fish, even in the tanks of the farmers, which gives them an even greater profit margin, since it discounts the possible costs of fish treatment and which they are better able to carry out. The main fish farming stations in the State of Roraima are located in the municipalities of Alto Alegre, Amajari, Cantá, Caroebe,

Mucajaí and Rorainópolis. These intermediaries generally transport the purchased fish in the fish farms to Boa Vista; There, they remove a small portion of the production for the local commerce, the rest being transported to the great consumer centers, especially Manaus, capital of Amazonas. During this study were found export records from Tambaqui to British Guiana, however, this is done illegally and only sporadically.

The middlemen are usually those who work with the fish transportation to Boa Vista but it happened that the fish farmers carried their own fish for direct sale to consumers in the fairs at a lower price than the other fishmongers. This is determined by the levels of demand for the product, which is extremely high during the Holy Week period.

It is noted, however, that not all fishmongers have adequate means of transport for large quantities of fish, and that intermediates are strategic players in the commercialization of this resource in this relatively isolated region of northern Brazil. Generally, the big middlemen bring to Boa Vista the truck loaded with fish caught from rivers and fish farming developed in the metropolitan area of Manaus (Manacapuru, Itacoatiara, Rio Preto da Eva). In this market the most imported species are matrinxã (31,857 kg), followed by Catfishes (Dourada, Filhote and Babão).

Marketing of fish

The sale of fish can occur in various ways, depending on the type of fairs and also the profile of the trader, which is considered small or large, according to the quantity or volume of fish sold. The small producers traded about 15,000 kilos per capita, while the big ones traded more than five times that volume (77,126 kg).

In the Fairs of the Center, which operate every day, the commercialization of fish by the fair is continuous; However, the large tradesmen work in adifferent way, since they need to be away to renew their fish stocks and so, often, have a chance to buy fish at prices that are very low compared to those that remain in sales; In this way, they end up having a much increased profit compared to small traders.

Sometimes some small traders buy the fish left over from the center's fairs to sell at the periphery fairs, especially on weekends, when demand is much higher. Because it is a fish that delays being sold, often being off the ice, it usually has the quality and price drastically diminished and is often lost by becoming improperfor human consumption.

Flowchart of the marketing

The fish sold in Boa Vista comes from two main sources: extractive fishery and fish farming, the latter being much more expressive in terms of production. However, for both, the intermediary agent plays a decisive and often polyvalent role, acting in the purchase, sale and transportation of the product. The commercialization of fish in Boa Vista is not limited to fairs, and also occurs in supermarkets, restaurants, indigenous communities in the interior, public institutions, such as the National Indian Foundation (FUNAI) and the Social Service of Industry (SESI). Neighboring countries, such as Venezuela and Guyana. The commercial relations that moved the largest volume of fish were between the intermediaries and the trade fairs (local trade) and between intermediaries and the state of Amazonas (foreign trade). The fairs in Boa Vista recorded 90,484 kg of fish traded from the natural fishery in the State of Roraima and 132,411 kg in the State of Amazonas

4. Conclusions

In the four Boa Vista fairs, 57 species of fish were identified, a relatively high number, considering that large fish markets such as Manaus, the number of species traded turn around 100.

The most important species of fish in the fishing market in Boa Vista are Tambaquis (*Colossoma macropomum*) and Matrinxã (*Brycon* spp) from fish farming, however much of this second species also originates from the extractive fishery in the State of Roraima.

There are several forms of fish presentation, predominantly in natura state, preserved in ice and sold in kilo. Some large fish such as the pirarucu (*Arapaima gigas*) and some catfish are also sold in salty and dry form.

The Center fairs (Producer and Passarão) present better infrastructure, greater control and control power and generally have better and more expensive fish. On the other hand, the periphery fairs (Garimpeiro and Pitolândia) have worse infrastructure, less control and control power, and generally have lower quality and cheaper fish.

Fish trade at Boa Vista fairs involves a relatively complex network of agents, including fishermen, fish farmers, market stalls, fishmongers, consumers and intermediaries, the latter playing a prominent role, having different tasks, having great power Bargaining and therefore, to a certain extent, determine the final price of the product.

The fish originated from the extractive fishery has great acceptance in the local market, however the greater volume of sale occurs with the fish originated from the fish culture, due to the fact that this provides greater stability in the offer and cheaper prices. On the other hand, the extractive fishery is very subject to the environmental variations, mainly as far as the ebb and flood cycle and the migrations conditioned by this.

The results of this study provide support to strengthen the local fishing industry with information that allows a better understanding of market dynamics. This information can generate actions for better management, development, expansion and / or conservation of fish, resulting mainly in a higher quality product for the final consumer, which is the social agent that sustains the segment of the local economy.

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