

A PRELIMINARY MARKET RESEARCH ABOUT TAMBAQUI (*Colossoma macropomum*) IN COSTA RICA

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RESUMEN

En los meses de enero a julio 1995 se desarrolló una prueba de mercado con el pez de agua dulce «tambaqui» (*Colossoma macropomum*) en Costa Rica. Unos 1.200 peces de aproximadamente 800 g. peso promedio se obtuvieron de la estación piscícola de la Universidad Nacional, en La Rita, Guápiles. Un promedio de 20 peces fueron suministrados semanalmente a cada una de 4 pescaderías en Limón, Guápiles, San José y Heredia. El precio al productor fue el equivalente de 1,40 dólares/kg., calculado para cubrir los costos de producción, el precio al consumidor fue de 1,97 dólares/kg.

Las motivaciones de los consumidores para comprar el pescado fueron: curiosidad, bajo precio, buen sabor y la recomendación de los vendedores. La mayoría de los consumidores apreció mucho el sabor, la textura, la frescura, el color y la apariencia de la carne. Algunos criticaron la presencia de espinas intramusculares.

El 89% de los consumidores manifestaron que volverían a comprar el pez y el 38% lo preferían a cualquier otra especie. No hubo ninguna relación ($P \geq 0,05$) entre sexo, tamaño de la unidad familiar y nivel de ingresos de los consumidores con las respuestas. La población china fue el único subgrupo identificable entre los consumidores. Casi todos los consumidores opinaron que este pez tiene buenas posibilidades de mercado en Costa Rica. La prueba mostró que el precio puede incrementarse algo más sin perder muchos consumidores, pero hay que

promocionar el producto para que sea más conocido entre la población costarricense. Este producto podría cubrir parte de la demanda de pescado entero a bajo precio en Costa Rica.

ABSTRACT

From January to July 1995, a market trial was conducted in Costa Rica with the freshwater fish species, *Colossoma macropomum*, commonly named «tambaqui». About 1.200 fish with an average weight of 800 g. were obtained from the fish culture station of the Universidad Nacional near La Rita, Guápiles. About 20 fish were delivered each Monday initially to three and later to each of four fishdealers in Limón, Guápiles, San José and Heredia. The shopkeepers purchased the fish at a price of \$1.40/kg., covering all production and transport costs, and sold it for \$1.97/kg.

The motivations of the consumers for purchasing the fish were: curiosity, low price, good taste and recommendations by the shopkeepers. Most of the participants appreciated the taste, meat texture, freshness, colour and appearance very much. Some respondents criticized the amount of intramuscular spines in the fish.

Eighty nine percent of the consumers intended to purchase more of the fish and 38% preferred this fish species above all other species. There was no effect ($p > 0.05$) of gender, householdsize or income level on the responses of the consumers. Chinese customers were the only

group discernible in the survey. Almost all participants thought tambaqui could get a good market position in Costa Rica. This trial shows that the price can be increased a little without losing much customers, but promotion would be necessary to get the product more known among the Costa Rican population. The production of tambaqui could meet part of the demand for low priced fish in Costa Rica.

INTRODUCTION

As a result of the growing world population and of changing trends in meat consumption, the supply of fish has to increase strongly in the next decades. In face of the depletion of the ocean resources by overfishing, it seems improbable that the productivity of harvest fisheries can still improve in the future. By the year 2025, the total world demand of fish is estimated to be 115 million tons of food-grade seafood and a gap of about 55 million tonnes fish must be supplied by aquaculture (AIKEN and SINCLAIR 1995).

As in most Latin American countries, the demand in Costa Rica for fish products is still low and slowly increasing. The important aquaculture enterprises are export orientated (tilapia, marine shrimp, about 5.000 tons/year) while the production for the domestic consumption is still rather small (tilapia, trout, about 100 tons/year). The Costa Rican government has promoted for the past twenty years tilapia culture under small landowners, but with very limited success. One reason for this failure is the difficulty to control the spontaneous reproduction of tilapias in ponds and to guarantee marketable sizes.

Since 1989 the Universidad Nacional in Heredia, initiated research with the freshwater species *Colossoma macropomum* (vernacular names: tambaqui, Brazil, cachama negra, Colombia and Venezuela, gamitana, Perú), imported from the Amazon and Orinoco river systems. Tambaqui is the main fishery in the Amazonas and is a widely accepted consumption fish in countries like Brasil, Colombia, Perú and Venezuela (AMAYA 1992).

Tambaqui does not reproduce spontaneously

in ponds and requires hormonal induced spawning. It does not grow well when ponds are only fertilized (FERRARI *et al.* 1986, VAN DER MEER and MARTINEZ 1993) but grows very well with excellent food conversion rates with pelleted feed (GÜNTHER and BOZA 1992). It is a hardy fish and tolerant of high temperatures and low oxygen levels (SAINT PAUL 1986, GONZALEZ and HEREDIA 1989). Maximum growth is supported by high protein (45%) diets, but the fish stills grows fast with 35% protein pellets (unpublished observations).

Since 1994 tambaqui is grown under commercial conditions in the fish culture station of the UNA in La Rita, Guápiles, and sold locally. The aim of this study was to conduct a wider market trial, offering the fish over a longer time period of five months at three locations in Costa Rica and sampling and analyzing the opinions of the consumers.

MATERIALS AND METHODS

For the market trial three locations were chosen because of transport convenience and because of geographic, social and cultural diversity: Limón, Guápiles and San José. In San José and Limón the fish was offered to randomly chosen shopkeepers with fish stands in the central market. In Guápiles it was the only fish shop in the town. All invited shopkeepers wanted to cooperate in this experiment of product introduction.

Fish were offered to the shopkeepers without viscera at \$1.40/kg. and they were asked to sell the fish for \$ 1.97/kg. Fish which was not sold could be returned by the shopkeepers. They were provided with posters of the fish with some general information, which were demonstrated in the shop.

From January until July, the fish were caught each Monday, cleaned and transported to the shops. The shopkeepers were asked every week for the number of fish they wanted. This amount increased from about 5 fish per shopkeeper at the beginning of the experiment to about 30 fishes at the end of the period. In total about 1.200 fish with 800 g. mean weight were sold.

The shopkeepers were provided with documents containing some general information about the species and they were asked to fill in the names and addresses/phone numbers of the tambaqui buyers so that they could be interviewed later. At the end of the period some fish was also sold in Heredia and in the UNA and a few more consumers were interviewed.

The information about the buyers was collected each Monday. The customers with telephone were called the same week. When only an address was obtained, almost all customers were interviewed within one month. During the visits the poster of the fish was shown to the people to be interviewed.

In total 76 names of consumers were obtained of which 65 could be interviewed to complete the questionnaires. 35 were obtained during visits and 30 by phone. The questionnaire contained 40 questions: 8 of them were to obtain demographic and socio-demographic information, including sex, age, occupation, size of household and income level. The other questions were aimed to obtain knowledge about the possible acceptance of this fish species on the Costa Rican market and some general fish consumption habits of the consumers.

Chi-square analysis (MEULENBERG 1992) commonly used to determine the effects of certain categories on the consumers responses, was applied to specify the effects of gender, household size and economic level on the responses and to establish the representativity of the consumer group with regard to the whole Costa Rican population. Data for the Costa Rican population were obtained from the Asociación Demográfica Costarricense.

Scores on product attributes were assumed to be interval scaled, (much=9; regular=6; little=3; not at all=0), to derive the overall attitude of the customers towards tambaqui. Demographic and consumers characteristics were expressed in proportions and frequency distributions.

RESULTS

During the research period the customers purchased in total about 1.200 fishes with weights

ranging from 600-1.200 g. The majority of the customers were willing to participate and 65 respondents participated in the survey. Of these, 55% were male, 57% were between 30 and 49 years old, 89% completed at least primary school, 71% of the households where the fish was prepared were smaller than 6 persons and 87% had total monthly incomes under \$560 (table 1). With regard to gender, size of household and income level the group of consumers were not significantly different from the whole Costa Rican population.

Seventy four percent of the customers consumed fish or fish products more than once a week (table 2). The majority of the participants bought the fish on Mondays or Tuesdays and ate it the same day, so the fish was very fresh, and 74% of the consumers thought it was fresher than the seafood they commonly bought.

The most frequent motivations for purchasing tambaqui were curiosity of this new fish (36%) and its low price (18%) (figure 1). Nevertheless, 78% of the customers responded the fish was also recommended by the shopkeepers.

Five of the six product attributes of tambaqui (taste, meat texture, freshness, colour and appearance) received a very high rating by the participants. More than 60% of the customers liked taste, texture, freshness and appearance very much

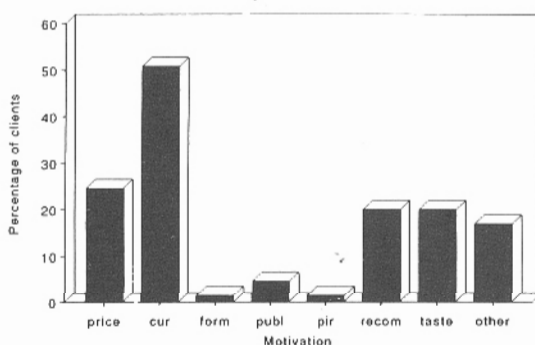


Figure 1. The motives for buying tambaqui according to the consumers. Price=low price, cur=curiosity, form=appearance, publ=publicity, pir=looks like Piraña, recom=recommended, taste=good taste.

Table 1.
Socio-demographic characteristics of the tambaqui consumers

Demographic category	Percent (%)	Frequency
Gender		
Female	45	29
Male	55	36
Total	100	65
Age groups		
1-29 years	20	13
30-49 years	57	37
50-69 years	23	15
70 and over	0	0
Total	100	65
Degree of education		
No primary school	11	7
Primary school	43	28
Secondary sc.	28	18
University	18	12
Total	100	65
Monthly household income		
Below \$140/month	25	16
\$140-\$280	37	24
\$280-\$560	25	16
over \$560/month	13	9
Total	100	65
Size of household		
1 person	5	3
2 persons	12	8
3 persons	15	10
4 persons	20	13
5 persons	19	12
6 persons	12	8
7 persons	8	5
8 persons	6	4
9 and more	3	2
Total	100	65

(figure 2). The number of intramuscular spines was much criticized by about 40% of the consumers.

The majority of the participants ate the whole fish fried; other ways of preparation were frying in

Table 2.
Fish consumption of tambaqui consumers

Category	Percent (%)	Frequency
Fish consumption frequency		
< 1/week	6	4
1/week	20	13
2/week	32	21
3/week	28	18
4/week	3	2
5/week	2	1
6/week	3	2
7/week	6	4
Total	100	65
Preferred fish species		
Sailfish	3	4
Tuna	5	6
Snook	18	21
Corvina	23	27
Redsnapper	34	40
Shark	4	5
Mackerel	4	5
Only freshwater species	3	3
Other	6	7
Total	100	118

pieces, cooking whole fish, steaming whole fish, frying filets and pieces in sauce. The most popular items eaten with tambaqui were in order of importance: rice, vegetables, salad, potatoes and beans. Other fish species the customers of tambaqui habitually preferred to buy were redsnapper (*Lutjanus*), corvina (*Cynoscion*) and snook (*Centropomus*).

Tilapia and the indigenous guapotes (*Cichlasoma managuense*, *C. dovii*) were known and eaten by most of the participants. Other freshwater fishes eaten in some households were the indigenous mogas (*Cichlasoma nicaraguense*), barbudos (catfish, *Rhamdia*) and trout.

Chinese were the only ethnic group that was distinguished among the consumers and represented

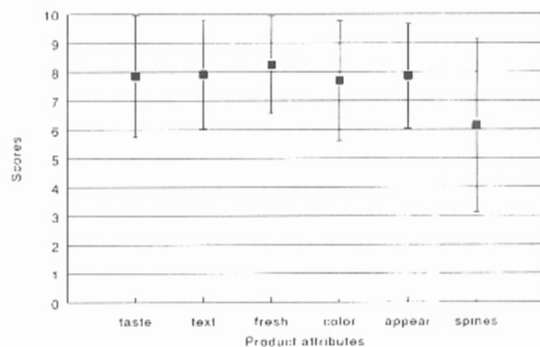


Figure 2. Appreciation of 6 product attributes by the consumers of tambaqui in mean scores and standard deviations: taste, meat texture, freshness, colour, appearance, number of spines.

23% of the participants in the study. Eighty nine percent of the participants intended to purchase more tambaqui and 38% answered to appreciate tambaqui more than any other fish species.

The tambaqui was sold for \$1.97/kg. as whole fish and the customers were asked what would be the maximum price they were willing to pay for this product. Twenty-one percent of the respondents did not answer this question, but from the remaining respondents ($n=51$) could be concluded that 98.5 would still buy tambaqui at a price of \$2.25/kg.; 63% would still buy the fish at \$2.50/kg., and 20% of the customers would even buy the tambaqui at a price of \$2.75/kg. (figure 3).

The final question of the questionnaire, whether the participants thought that tambaqui could obtain a good market position in Costa Rica, was responded affirmatively by almost all participants.

DISCUSSION

In general, all people involved in this study were willing to participate. The number of customer addresses obtained, declined however after the first months, in part, as the shopkeepers said, because they were the same buyers. The main buyer group, the chinese, were also the most reticent to give information. In general, phone interviews were

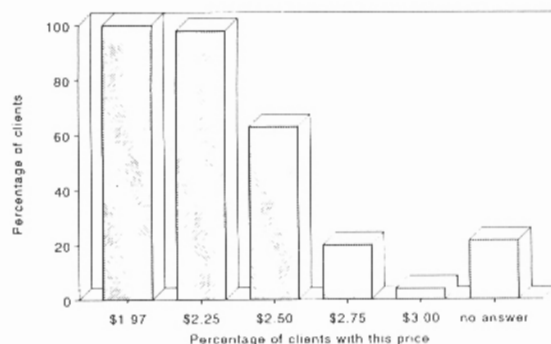


Figure 3. The number of purchasers of tambaqui in percentages which still would buy the fish at the following prices.

much easier than personal visits, mainly because of the difficulty to localize people by the very incomplete addresses in the Costa Rican countryside. There was only one slight difference in answers between both categories: telephone interviewed consumers gave on average a little more positive answers on the product characteristics.

The group of the respondents which rendered complete questionnaires ($n=65$) was with regard to gender, size of household and economic level not significantly different from the whole Costa Rican population ($P \geq 0.05$). No analysis could be made with regard to age distribution and education level, since no consumers under 16 years old were recorded while this age segment makes about 35% of the Costa Rican population.

The reaction of the market to the introduction of this new product was positive. Almost all the fish offered was sold, less than 5% was returned by the shopkeepers. Consumption of fish per shopkeeper increased steadily during the market trial from about 5 fish to about 30 fish per shopkeeper at the end. Since much of the fish (60%) was sold within the first two days, it would appear that the demand was still not satisfied. On the other hand, much of the fish in the last months was bought by repetitive buyers. The demand in San José and Limón seemed to be higher than in Heredia and Guápiles.

The overall appraisal of five product attributes was very high. Only the number of spines was

much criticized by nearly half of the respondents and shows that this characteristic is the main drawback of the fish, as had been also noted in a market survey in Panamá (PRETTO 1989). Gender, householdsize and economic level had no influence on customers responses. The majority of respondents were frequent fish consumers, and curiosity, low price, good taste and the recommendations of the shopkeepers were the primary factors prompting them to purchase the new product. Curiosity and recommendations by the shopkeepers were important reasons for purchasing this fish species the first time, yet the repeating buying behaviour demonstrates that other factors became more important on the long run. This repeated buying behaviour resulted in few new buyers because the people who already consumed the fish knew when the fresh fish was delivered at the shops and bought it immediately.

In this market trial it was easy to distinguish one large subgroup of consumers, the chinese people. They represented 23% of the purchasers of tambaqui, but probably a much larger segment with regard to the volume of fish bought. This group of consumers is a rather large minority in Costa Rica with purchasing habits inherent to its culture. In general, chinese eat more often fish or fishproducts and are less suspicious to freshwater fish species. They appreciate the freshness of the product very much. Many of them are small gastronomic entrepreneurs and are for this reason an important market segment.

All shopkeepers who joined this marketing trial were willing to sell also other freshwater species when supplied, probably because of the increasingly erratic marine fish supply. They made 40% profit on each kg. tambaqui sold, a profit margin which is common in the Costa Rican

fishmarket. In this market introduction the fish was sold for a price which just covered the production and transport costs. However, the results indicate that a small rise in retail prices will cause only a slight decrease in market demand. If the retail price would be raised to \$2.50/kg. the price elasticity of demand would be -1, that is, the quantity demanded would change by the same percentage as the price. The opportunity to increase the price and the reduction of costs caused by the economies of scale, would offer enough possibilities for a profitable production of this fish by small scale producers in Costa Rica.

This market trial shows that the product tambaqui can fill part of the gap between demand and supply of freshwater fish. Since the product was offered only unprocessed (whole fish of about 1 kg.) and only at three retail places, the overall demand in the country may be much higher than that determined in this trial. Low price was an important motivation factor, so it seems that the success of this fish will be linked to the possibility of offering it as a low price, competitive product for popular consumption.

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