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Quantitative Analyses of Parasite Load in the Cardinal Tetra (*Paracherodon axelrodii*), along the Period of Capture and Storage

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Abstract

Fish disease reduces productivity and quality of fish raised in fish farms all over the world and impacts the economic activity of exporting firms, leading also to credibility loss. The current paper is the result of examinations performed on two nature born batches received from the Barcelos region at the installations of a tropical fish exported. A total of 100 fish out of 1000 were removed and inspected for parasites, the remaining 900 fish were kept for a month at the company's facility where they were fed and treated for parasites. After this month, an additional 100 fish were inspected for ectoparasites. For most ectoparasites species, treatment reduced the quantity of the infection vector proving the effectiveness of the treatment used.

Keywords: Parasite; Cardinal tetra; Capture

Introduction

Parasite studies are one of the most important studies for the activity of fish husbandry. It is known that in infected fish, ecto or endo parasites can cause much harm to the hatchery activity, such as malnourishment, slow growth, and eventual death [1]. A fish with parasites suffers changes in its behaviour, making it easy to diagnose a sick fish without autopsy. For example, a sick fish' coloration changes and becomes darker, sick fish swim closer to the water surface with reduced velocity, and they eat less. Hoare et al. [2] proved that according to their parasite load they are segregated into different shoals.

In edible fish, parasites do not matter since when they reach ideal consumable size consumption occurs. On the other hand, upon dealing with tropical fish for aquariums that have to be kept alive in order to be sold, parasites become a bigger issue. The vast majority of parasites can be treated with manufactured drugs, for example, Malaquite green, Metilene blue, acryflavin, formalin, and tetracycline [1,3]. Besides using drugs, a couple prophylactic measures should be taken to guarantee the health of the tank or aquarium. These measures are: maintaining the water clean, using clean instruments to handle fish, removal of food left overs and faecal matter. Most importantly, the place where the fish is lodged must have a good filtration system and these filter systems have to be maintained constantly cleaned [1].

It is important to mention that the improper handling of the fishes can cause great harm to their health. Transporting fish to different locations roughly can lower the efficiency of their immune systems, making them more susceptible to diseases. For example, catfish that have a large bony spine on their lateral fins can pierce one another while being carried on recipients with little water and abrupt movements and these piercing can open way for opportunistic bacterial infections that may lead to death.

Most of the research dealing with Amazonian fish parasitology concentrates on the diagnosis of these parasitic fauna and most fieldwork concentrates on the parasites of *"Tambaqui"* (*Colossoma macropomum*) [4,5]. Very little is known about which parasites infect smaller fish, which, due to their size, are more susceptible to infections. For example, Tavarez et al. [6] made an important study establishing which parasites affect the common *Paracherodon axelrodii*.

The current work presented tries to quantitatively measure the diversity of parasitic fauna found on the *Paracherodon axelrodii* that arrives weekly from Barcelos to the farm of a tropical fish exporters in the city of Manaus. Further, this study followed the prophylactics treatment techniques for ectoparasites to measure its efficiency one month after reception of these fish during this quarantine period.

The *Paracherodon axelrodii* is the main species exported as tropical fish from the Amazon region, it corresponds to 70% of fish exported from the Amazon state [7]. This species is endemic to the Negro river, found in flooded forests (igapós) and small creeks (Iguarapés) [8] and is sensitive to ecosystem change and parasitic infection. According to Marshall et al. [8] the *Paracherodon axelrodii* is omnivorous and not selective in its diet. The fisheries of tropical fish represented 60% of the income of municipalities like Barcelos and Santa Isabel [9].

The objective of this study is to prove that the prophylactic treatment used at the local tropical fish export company, developed in partnership with local research institutions, improves the quality of the fish exported from the amazon region.

Methods

Two sets of fish of 1000 each were analysed from the secondary affluent of the Negro River, Daracoá, and located 60 Km upriver from the city of Barcelos. The company, Turkys Aquarium, received the fish on its farm during the months of February and March/2010. Upon arrival, 100 fish were removed from the incoming batch and euthanized using the French method (decapitation of the head) for parasitological analysis. The remaining 900 fish were placed on tanks for a month in order to receive the appropriate prophylactic treatment.

The treatment consisted of 20 ml malaquite green and acryflavin, 30 ml formalin, 350 ml oxitetraciclin, NaCl 20 ppm, and 2 ml/600 l of

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Ivomek (IVERMECTINA). The medication quantities were indicated on Stoskopf [3]. In order to proceed with treatment, all excrements were removed from the bottom of the tank and the water flow was stopped for 8 hours during the treatment, according to Stoskopf [3] recommended discontinuation of water flow during treatment administration After this period, the water was reopened to allow for a change of water and removal of the medicines. Water parameters remained constant during the whole process of the treatment (pH 4, 5; conductivity 10 microns, and temperature 27ºC). After month of the treatment, a batch of 100 fish was removed from the 900 fish that received the treatments in order to test for parasites occurrence. After looking at the total amount for each parasitic species type, the average occurrence was calculated per parasitic species per batch [10]. The parasitic identification was based on the keys from Stoskopf [3].

Results

A total of 400 fish (200 after arrival and 200 one month in quarantine and after chemical treatment) were analysed. The average abundance of parasites on the total batch was calculated by dividing the total number of parasites of a single species found on the total batch by the total number of possible hosts (numbers of individuals checked) [10]. The parasitic load was significantly lower after treatment and in most cases the incidence was reduced to zero. Five species of parasites were found on the batches. These were common species of ectoparasites, typical in Amazonian fish (Table 1). It is possible that if techniques of eletromacroscopy were used more species would have been found [11]. Apart from the camalanus, the research found a substantial decrease on the amount of parasites on the verified batches received [12].

Discussion

We found a positive correlation between the treatment and reduction in parasite abundance. The proportion of medication used was 10-20 % lower than that proposed by Stoskopf [3] because of different water characteristics (chemical and physical properties) from those tested in the book, since it was written for temperate regions. In addition, the high effectiveness of the treatment can be attributed to the fact that the fish being tested were from natural bodies of water. This meant they were naïve for any type of chemical treatments and the probability of the parasites being resistant to treatment was null [1].

The only parasite for which the treatment did not appear to work was Camalanus. The quantity of parasites was not reduced in any of the trials, possibly because low dosage. Ivomek was placed in the water together with the other medications, however, the proper way to use this medication is via oral ingestion where the medications has to be mixed with the food given to the infected fish [3]. The same author mentions that it is possible to treat camalanus with water bath, but the best treatment is via oral ingestion. Further work has to be done in order to find the best application method to reduce abundance of camalanus [13-18].

	Abundance pre-treatment infections		Abundance post-treatment infections	
	1° Batch	2° Batch	1°Batch	2° Batch
Dactilogyrus	0,01	0	0	0
Camalanus	0,05	0,01	0,04	0,01
Capillária	0,12	0	0	0
Piscinoodinium	2,5	0,25	0	0,04
Gyrodactylus	0,04	0	0	0

Table 1: Average abundance of the occurrence of parasites on two different batches processed at different times.

Discovering new treatment methods helps improve the health and quality of the fish being exported from the Amazon region, reducing losses on all stages of this production chain and making the fish better accepted on both national and international markets due to its good quality and resistance. This can be true for tropical and edible fish markets, both a significant source of income for local companies, government and local riverine people. When done properly, this trade can consist of a sustainable usage of the forest [18,19].

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