



Foreshortened Maxilla in Farmed Rainbow Trout (*Oncorhynchus mykiss*, Walbaum 1792) from Argentina

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Authors' contributions

This work was carried out in collaboration among all authors. Author LAR managed the writing and research of literature. Authors AFFM and VFP performed the autopsy and data collection. All authors read and approved the final manuscript.

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ABSTRACT

Several types of maxilla deformities have been reported in various species of fish. In salmonids, the maxilla deformities are observed with frequency. Here we report eight cases of a rainbow trout, five females and three males, adult, with upper maxilla foreshortening. The specimens studied came from an establishment located in the fish farmer located in the Patagonia, Argentina.

Keywords: Aquaculture; deformities; fish; foreshortened; maxilla.

1. INTRODUCTION

Over the years, with the growth of aquaculture, there have been several pathologies that cause

economic losses in the industry, among them the manifestation of a series of malformations and abnormalities that may be related to the intensification of the population, with an increase

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of some phenomena as the inbreeding [1,2]. A series of malformations has been reported, which includes the maxillary foreshortening, abnormalities in the vertebral column, in the flippers and agenesis of opercula [3,4].

Congenital heart defects and anatomic abdominal abnormalities are also reported [5,6]. Here we report eight cases of a rainbow trout, five females and three males, adult, with upper maxilla foreshortening. The specimens studied came from an establishment located in the fish farmer located in the reservoir of Alicurá under the Limay River in the northwestern region of Comahue (40°35'S 70°45'O). The biometric aspects of the specimens studied are observed in Table 1.

There was an upper maxilla foreshortening with a supraocular prominence, with no changes in the opercula and eyes. The body of the animals has

normal dimensions, not being observed other external anomalies (Figs. 1 and 2). The fish was euthanized with benzocaine (300 mg/L), and an autopsy was performed in accordance with preexisting protocol [7]. At necropsy visceral anomalies were not observed.

Table 1. Biometric aspects of the animals studied

Specimen N°	Weight (g)	Length (mm)	Sex
1	298	280	Female
2	351	290	Female
3	493	305	Female
4	522	425	Female
5	458	312	Female
6	401	312	Male
7	371	312	Male
8	426	310	Male



Fig. 1. Rainbow trout with upper maxilla foreshortening. It is noted that its normal body, without seeming impediment in feeding. Bar: 1.5 cm

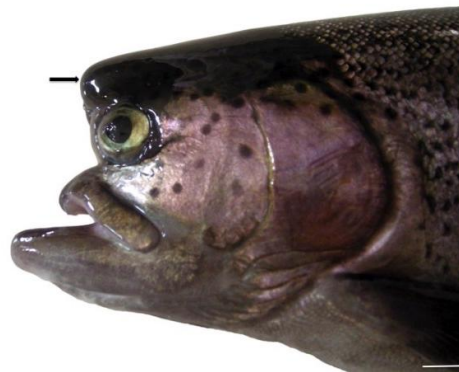


Fig. 2. Detail of the previous figure where it is possible to observe an upper maxilla foreshortening; eyes are normal, and it is possible to view certain cephalic "frontalism" (arrow). Bar: 3 cm

2. CONCLUSION

According to [8], who studied the vertebral deformities of rainbow trout, there seem to be multifactorial explanations, such as: The hereditary factor, some bacterial infections, some nutritional factors, although the levels of vitamin C do not seem to influence these deformities. Even though this upper maxilla foreshortening is not included in the vertebral malformations quoted by [9,10], they may have a certain etiologic similarity, thus we must consider the inbreeding [11,12].

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Poppe T, Hellberg H, Griffiths M, Meldal H. Swimbladder abnormality in farmed Atlantic salmon (*Salmo salar*). Dis. Aquat. Org. 1997;30:73-6.
2. Roberts RJ. Fish Pathology. 4th ed. Wiley-Blackwell; 2012.
3. Gemmill JF. Teratology of fishes. Maclehose and Sons: Glasgow; 1912.
4. Quigley DTG. A lower jawdeformity in juvenile and adult Atlantic salmon (*Salmo salar* L.). Bull. Eur. Ass. Fish Pathol. 1995; 15(6):206-209.
5. Poppe T, Midtlyng P, Sande D. Examination of abdominal organs and diagnosis of deficient septum transversum in Atlantic salmon, *Salmo salar* L., using diagnostic ultrasound imaging. J. Fish Dis. 1998;21:67-72.
6. Poppe T, Taksdal T. Ventricular hypoplasia in farmed Atlantic salmon (*Salmo salar*). Dis. Aquat. Org. 2000;42:35-40.
7. Romano LA, Sardella N, Russomando F. La necropsia en los peces. Un protocolo tipo Mallory. Revista de Investigación y Desarrollo Pesquero. 1987;8:83-86.
8. Madsen L, Dalsgaard I. Vertebral column deformities in farmed rainbow trout *Oncorhynchus mykiss*. Aquaculture. 1999; 171:41-48.
9. Eissa AE, Moustafa M, El-Husseiny IN, Saeid S, Saleh O, Borhan T. Identification of some skeletal deformities in freshwater teleosts raised in Egyptian aquaculture. Chemosphere. 2009;77:419-425.
10. De Azevedo AM, Losada AP, Barreiro A, Vázquez S, Quiroga MI. Skeletal Anomalies in Senegalese Sole (*Solea senegalensis*), an Anosteocytic Boned Flatfish Species. Vet Pathol. 2019;56:307-316.
11. Boglione C, Gavaia P, Koumoundouros G. Skeletal anomalies in reared European fish larvae and juveniles. Part 1: Normal and anomalous skeletogenic processes. Rev Aquaculture. 2013;5:99-120.
12. Cardeira J, Bensimon-Brito A, Pousã o-Ferreira P, et al. Lordotic-kyphotic vertebrae develop ectopic cartilage-like tissue in Senegalese sole (*Solea senegalensis*). J Appl Ichthyol. 2012;28:460-463.

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