

A SURVEY ON ZOONOTIC HELMINTHS IN FARMED FISH TO EVALUATE THE SAFETY OF ITALIAN AQUACULTURE PRODUCTS

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Introduction

The overarching goal of the EU Project ParaFishControl is to increase the sustainability and competitiveness of the European aquaculture industry by improving our understanding of fish-parasite interactions and by developing innovative solutions and tools for the prevention, control and mitigation of the most harmful parasitic species affecting the main European farmed fish species. WP7 “Fish Product Safety” includes several research activities aimed to ensure the quality and safety of European aquaculture products by tackling the presence of food-borne parasites and underpin competitiveness of EU aquaculture producers enforcing good practices to obtain safe and high-quality seafood products. In fact, several zoonotic helminths can be transmitted to humans by consumption of raw, undercooked, marinated or cold smoked fish products, representing a relevant public health concern.

Although up to now in Italy the presence of zoonotic helminths has been documented only in wild fish populations, extensive epidemiological surveys are needed in order to assess the possible zoonotic risks linked to consumption of national aquaculture products. At this purpose, a wide parasitological survey (first round survey) has been undertaken on rainbow trout *Oncorhynchus mykiss* (RBT), gilthead seabream *Sparus aurata* (GSB) and European seabass *Dicentrarchus labrax* (ESB) farmed in Italy.

Methodology

From spring 2016 to spring 2017 a total of 2347 fish have been examined. In particular, 738 RBT from 4 Italian freshwater trout farms (two farms located in the area endemic for Diphylobothriasis in Northwestern Italy, 1 in the area endemic for Opisthorchiasis in Central Italy and 1 in a highly productive area of Northeastern Italy) were subjected to methods aimed to search for larval stages of Diphylobothriid cestodes (visual inspection and candling) and Opisthorchiid digeneans (muscular compression/artificial digestion followed by microscopic examination). Furthermore, 781 GSB and 828 ESB from 4 marine farms (3 cage systems and 1 inland farm located in Tyrrhenian and Adriatic seas) were examined for Anisakid larvae by UV-press method and artificial digestion. A seasonal periodicity has been applied, sampling 65 specimens/fish species/farm/season in order to reach a statistically significant amount of fish at the end of the survey (260 fish/farm=1040 fish/species).

Marine farms

Farm	No. GSB examined	Farm	No. ESB examined
1	195	1	195
2	260	2	260
3	195	3	205
4	131	4	168
Total	781	Total	828

Anisakiasis

DETECTION OF ANISAKID LARVAE: Visual inspection of visceral organs and muscular portions + visual examination of fillets by white light transilluminator + UV-press method (partially adapted from PARASITE project <http://parasite-project.eu>) + artificial visceral digestion



Freshwater farms

Farm	No. RBT examined
1	195
2	154
3	195
4	194
Total	738

Diphylobothriasis

DETECTION OF PLEROCERCOID LARVAE OF DIPHYLOBOTHRID CESTODES: Visual inspection / Candling (adapted from Torres and Puga, 2011)

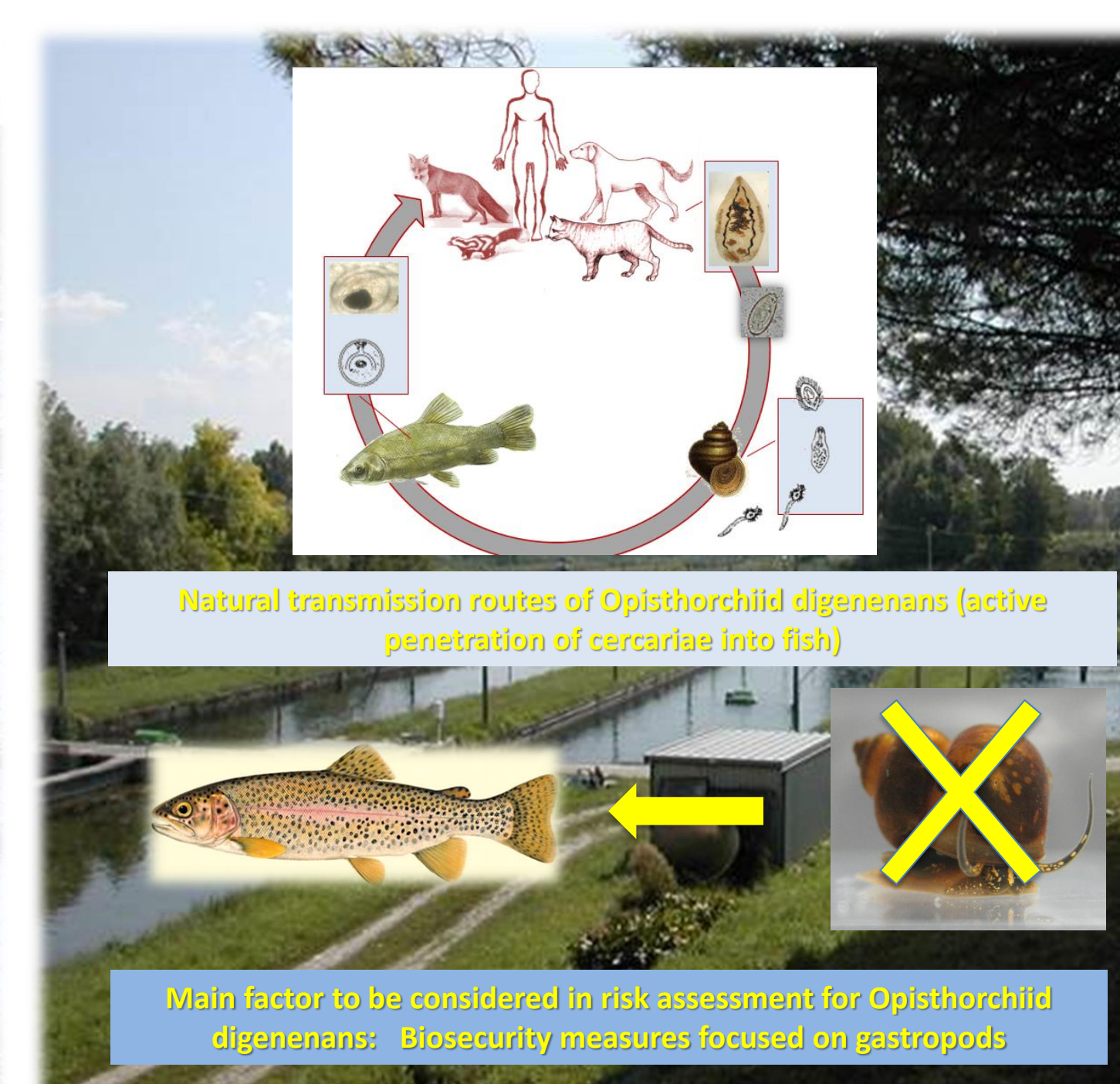
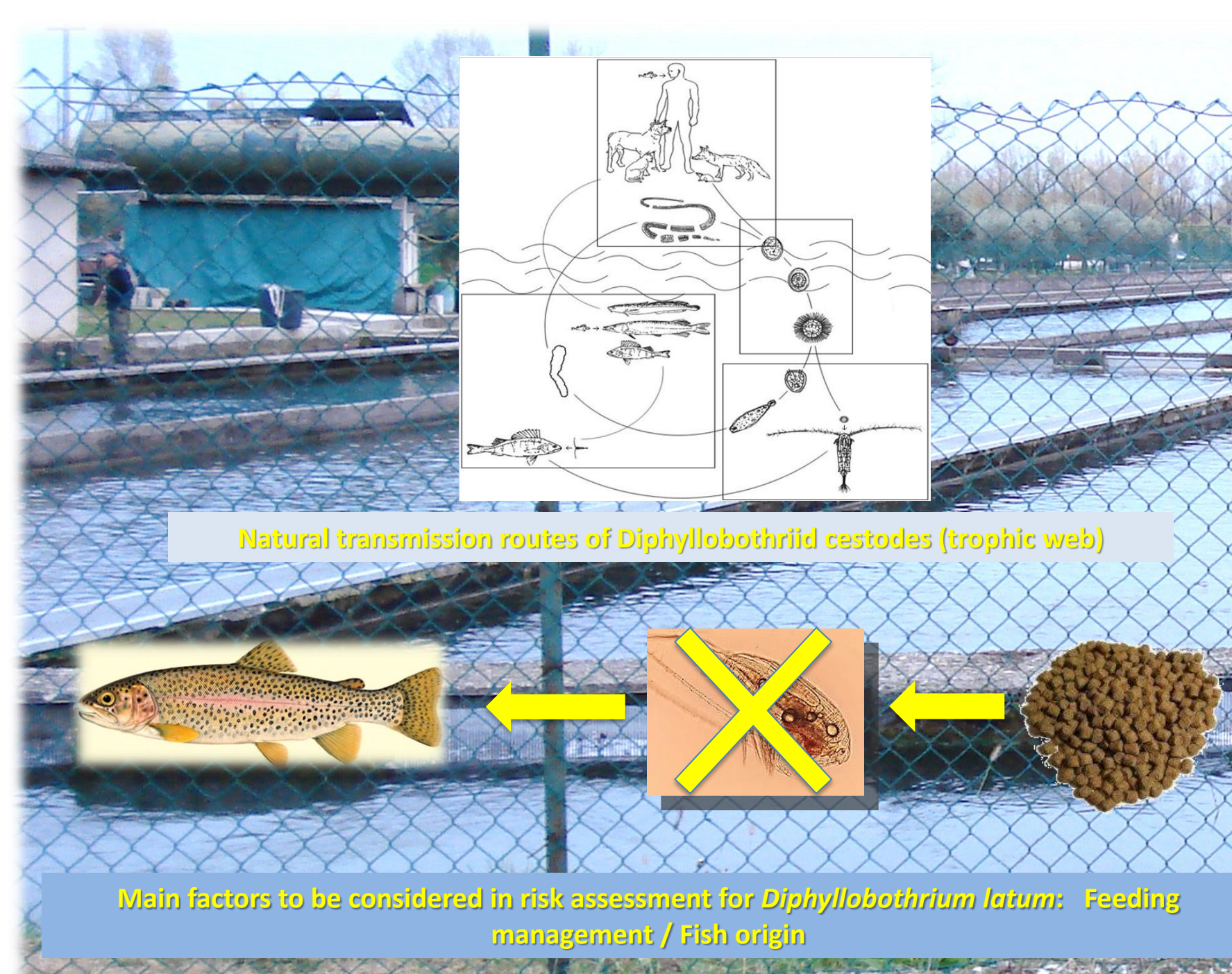
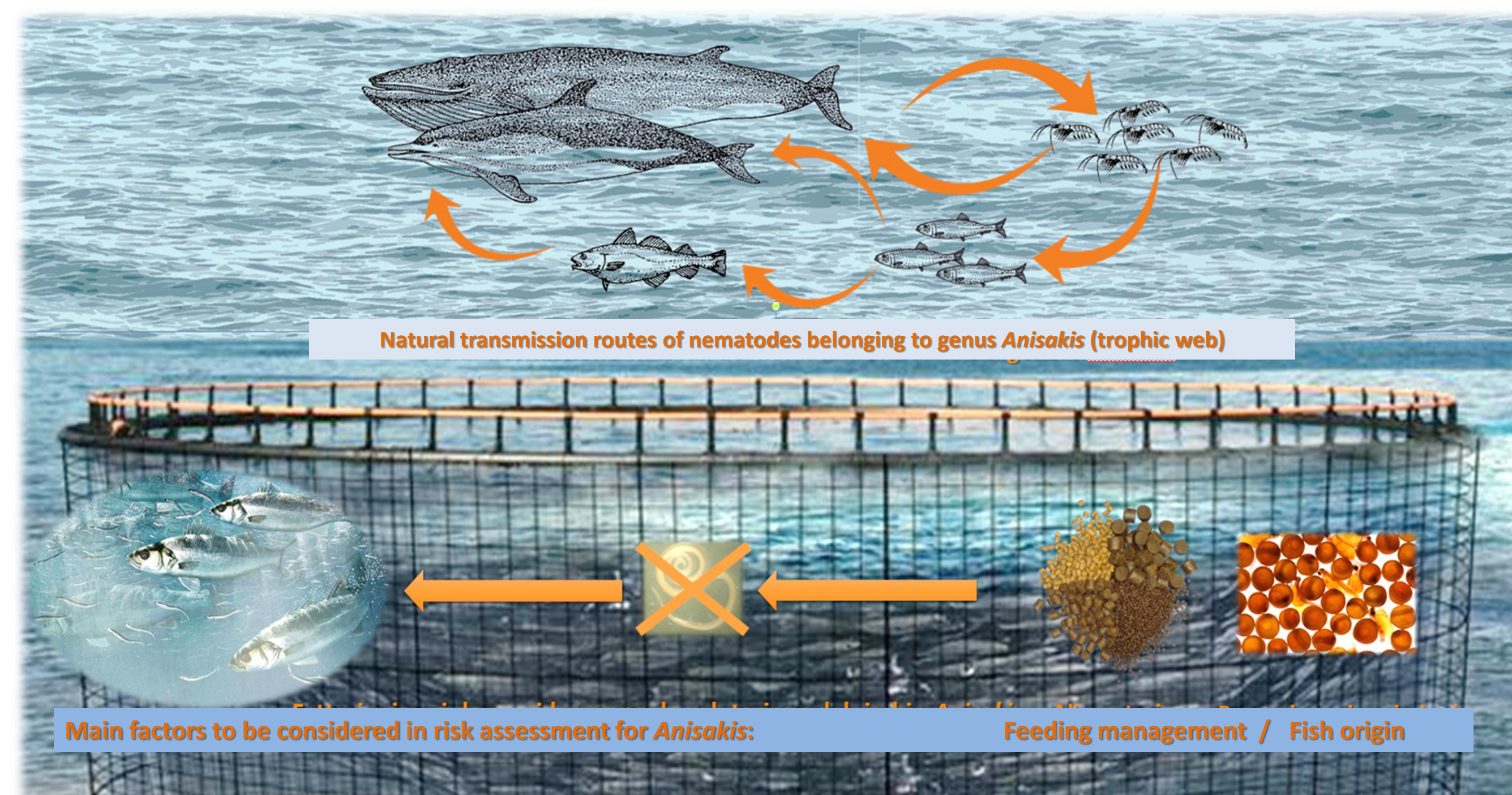
Opisthorchiasis

DETECTION OF OPISTHORCHIID METACERCARIAE: Compression and microscopical observation + Digestion by HCl + Pepsin solution (modified from SOP of European Union Reference Laboratory for Parasites, ISS, Rome)



RESULTS

No zoonotic parasites have been found in all the fish examined, at the level of confidence of 99% with a margin of error of 5%.



Anisakis and *Diphylobothrium* life cycles develop through the natural food chains and a correct feeding protocol, besides the exclusive introduction of hatchery produced fry, should minimize the “trophic contact” between fish and invertebrates which are natural intermediate hosts of these parasites. Regarding zoonotic opisthorchiid digeneans, transmitted to fish via active penetration of cercariae developed in snails, biosecurity measures focused on avoiding the presence of gastropods in freshwater farms located in endemic/risky areas should be applied.

CONCLUSIONS

The results so far obtained are encouraging and seem to indicate that the risks linked to zoonotic helminths in Italian aquacultured fish species are null or negligible, when good farming practices are applied along the production chain of RBT, GSB and ESB intensive farms. Once the first round survey will be completed, it will be possible to define a preliminary assessment of zoonotic risks in Italian aquaculture and plan a second round survey focused on identification of critical points and related appropriate prevention solutions for developing good practice protocols / voluntary control systems to be applied on farms.