



SUSCEPTIBILITY TO VHSV AND IHNV OF REDFIN PERCH AND MARBLE TROUT

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Redfin Perch

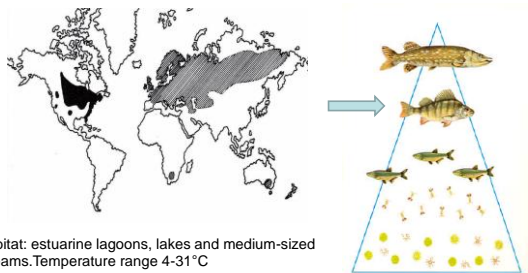
Perca fluviatilis (Linnaeus, 1758)
Actinopterygii > Perciformes > Percidae > Percinae



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Distribution area

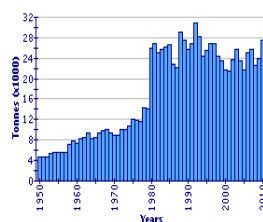


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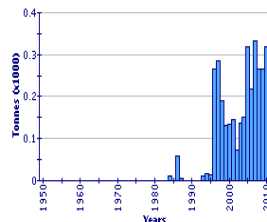


Production data

Global Capture production for *Perca fluviatilis*
(FAO Fishery Statistic)



Global Aquaculture production for *Perca fluviatilis*
(FAO Fishery Statistic)



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Marble Trout

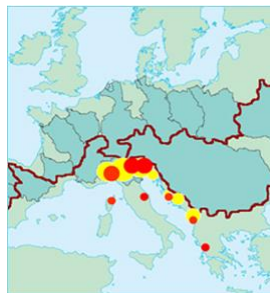
Salmo marmoratus (Cuvier)
Actinopterygii > Salmoniformes > Salmonidae >
Salmoninae



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Distribution area



The geographical distribution is restricted to:

- the Po basin in northern Italy,
- the Adriatic basin of Slovenia,
- Croatia,
- Bosnia-Herzegovina
- Albania

● marble trout described by early researchers
● mtDNA of marmoratus lineage found



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Production data

- No official data on the production of this species available. Estimates of the Italian production are less than 1M fish/year
- Marble trout are now farmed in Northern Italy and Slovenia with the main purpose of restocking
- Marble trout is one of the **most endangered freshwater species**
- The main threat to marble trout is hybridization with brown trout



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Viral diseases in redfin perch

- American yellow perch (*P. flavescens*) is susceptible to VHS IVb both naturally and experimentally (Olson et al. 2013)
- Redfin perch (*P. fluviatilis*) is generally considered resistant to VHS (McAllister et al. 1990; EFSA opinion 2007)
- There was a description of VHS isolation from redfin perch (farmed together with positive rainbow trout) in Italy (Selli et al. 2004)
- No data for IHN



P. fluviatilis is not listed as a "susceptible" nor "vector" species according to the EU legislation (EC/88/2006 and EC/1251/2008)



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Viral diseases in marble trout

- An experimental infection performed in *S. marmoratus* has been performed in Italy in 2004 (Borghesan et al. 2004)
- Results showed a partial resistance of marble trout to VHS and suggested it as resistant to IHN.
- Unfortunately only virus isolation was performed at that time.
- No other data available



S. marmoratus is not listed as a "susceptible" nor "vector" species according to the EU legislation (EC/88/2006 and EC/1251/2008)



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Aim

The aim of the present study was:

1. to assess the ability of VHSV and IHNV to produce disease and associated mortality in redfin perch and in marble trout
2. to determine whether a carrier status can result in these species after experimental infection

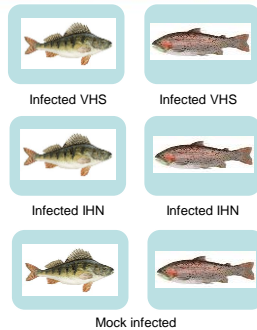


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Experimental design/perch

- Perch 9 ± 1 g
- Rainbow trout 10 ± 1 g
- 28 fish per group
- $10^\circ \pm 1^\circ \text{C}$
- VHS 80/V10 and IHN 409/V06
- 4h bath infection
- 10^5 TCID₅₀/ml

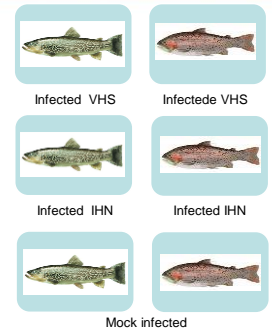


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Experimental design/marble trout

- Marble trout 4 ± 1 g
- Rainbow trout 3 ± 1 g
- 90 fish per group
- $10^\circ \pm 1^\circ \text{C}$
- VHS 80/V10 and IHN 409/V06
- 4h bath infection
- 10^5 TCID₅₀/ml



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Experimental design/marble trout

During the experiment we tested three different local strains of marble trout called:

1. Adige (A)
2. Brenta (B)
3. Piave (P)

referring to the parents' river basin of provenience in Italy.

These strain were described to posses different genetic characteristic.

Therefore, the same experiment was performed in parallel for the 3 strains (A, B, P)

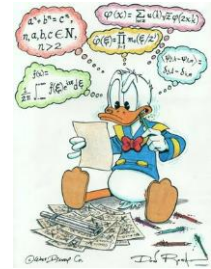


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M&M/statistics

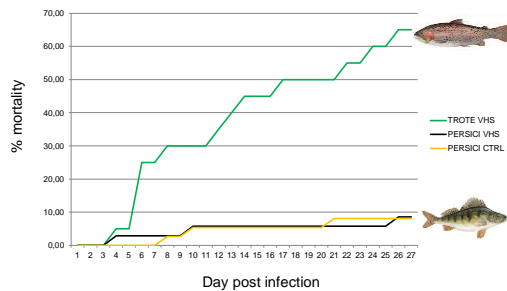
- Two different species: perciformes vs salmonids
- Two different hypotesis: resistant vs sensitive
- Two different statistical approach: 30 vs 90 fish per group



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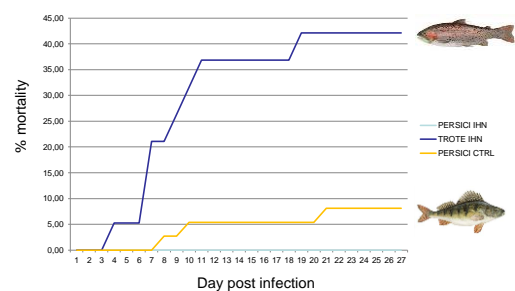
Results-Perch-VHS



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Resulsts-Perch-IHN

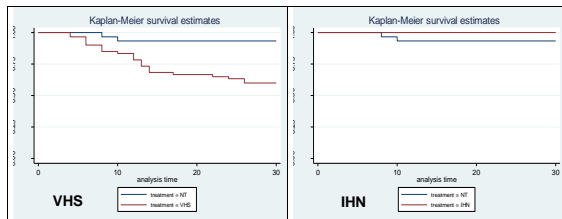


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Results-Perch-Survival

Cox's analysis showed that there is no statistically significant difference between the survival curves of the infected and control perch ($p < 0.05$)



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Results-Perch-other analysis

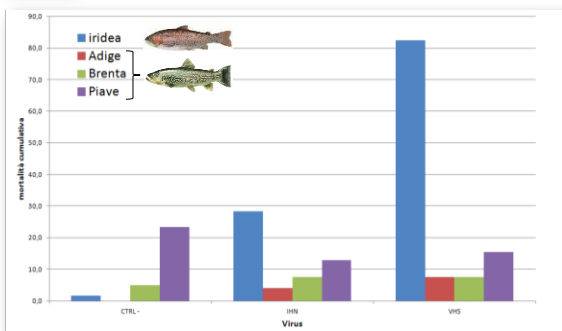
- No positive result by virus isolation nor real time PCR for VHS and IHN in perch
- All the dead rainbow trout were confirmed to be positive



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Results-Marble trout-VHS-IHN



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Results-marble trout-VHS-IHN

- Challenge with VHSV: $7.1 \pm 0.5\%$ mortality in marble trout vs 82.5% in rainbow
- Challenge with IHN: 3.2 ± 2.1 mortality in marble trout vs 28.4% in rainbow
- A little higher mortality was recorded in the Piave strain in all treatments, including negative control. Statistical analyses reported that this mortality was independent from the treatment

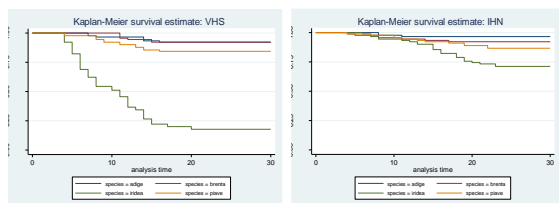


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Results-Marble trout- Survival

Low mortality for all the tested strains of marble trout with no statistically significant differences among strains ($p > 0.05$)



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Species	Strain	virus	N° positive fish/dead	% positive fish among dead	N° positive fish/ survivors	% positive fish among survivors
rainbow	rainbow	VHS	74/74	100,0	12/16	75,0
marble	adige	VHS	6/7	85,7	0/83	0,0
marble	brenta	VHS	7/7	100,0	1/83	1,2
marble	piave	VHS	6/14	42,9	2/76	2,6
rainbow	rainbow	IHN	26/26	100,0	2/64	3,8
marble	adige	IHN	2/4	50,0	1/86	1,0
marble	brenta	IHN	5/7	71,4	0/83	0,0
marble	piave	IHN	1/12	8,3	0/74	0,0



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Final considerations

The hypothesis for both experiments have been confirmed:

- **Perch are resistant** to Italian strains of VHSV and IHNV under simulated natural conditions. Moreover, this species does not seem to be a carrier of these pathologies.
- **Marble trout show low susceptibility** to both VHSV and IHNV under simulated natural conditions, and a carrier status of this species for these pathologies is possible. No difference amongst the three different tested strains has been recorded



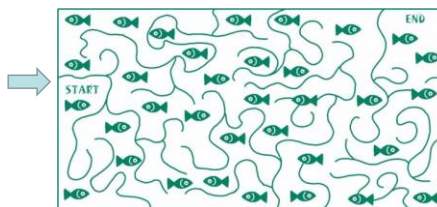
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....and you for your attention!



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