



HAL
open science

Nutritional programming and epigenetics: the teleost challenge

Lucie Marandel, Inge Geurden, Stéphane Panserat

► **To cite this version:**

Lucie Marandel, Inge Geurden, Stéphane Panserat. Nutritional programming and epigenetics: the teleost challenge. SEB Annual Meeting, Jun 2015, Prague, Czech Republic. hal-01901416

HAL Id: hal-01901416

<https://hal.science/hal-01901416>

Submitted on 5 Jun 2020

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

Nutritional programming and epigenetics: the teleost challenge

Lucie Marandel*, Inge Geurden, Stéphane Panserat

Institut National de la Recherche Agronomique (INRA), NuMeA unit, France

*presenting author: lucie.marandel@st-pee.inra.fr

Nutritional programming is one strategy to prepare phenotypes to better match to the future environment (including nutrition). Based on this concept it was recently demonstrated that feeding rainbow trout fry with high-carbohydrate diet during first-feeding had a long-term effect on later glucose metabolism in muscle but not on hepatic gluconeogenesis (Geurden *et al.*, 2014). Mechanisms underlying long-lasting early-diet induced molecular modifications remain unknown in trout. Nevertheless epigenetic modifications are the likeliest candidates as they are influenced by metabolic state and can be induced by environmental perturbations (Rando and Simmons, 2015). Thus studying epigenetic regulation may help to understand long-term effects related with the early nutritional environment. In teleosts, a specific challenge consists of considering the regulation of all duplicated genes retained after whole genome duplication (WGD). After WGD, duplicated genes can be neo/sub-functionalised and their regulation can differ including that by the environment. We propose to illustrate this challenge with the gluconeogenic gene encoding glucose-6-phosphatase. We identified in trout five genes co-orthologous to the mammalian *G6pc* gene. mRNA levels of three of them decreased in the liver of juvenile trout fed high-carbohydrate diet whereas those of the two others surprisingly increased, a result never shown before the recent sequencing of trout genome. The latter atypical expression patterns were already established during first-feeding suggesting that programming of gluconeogenesis during this early life-stage may occur too late to induce persistent effect later in life. Altogether these results highlighted the importance of considering duplicated gene fate in the perspective of nutritional programming.