



HAL
open science

Impacts of Early Thermal Manipulation on Gene Expressions at Hatch in Mule Duck

C Andrieux, S Biasutti, J Barrieu, P Morganx, M Marchand, M Morisson, V Coustham, S Panserat, M Houssier

► **To cite this version:**

C Andrieux, S Biasutti, J Barrieu, P Morganx, M Marchand, et al.. Impacts of Early Thermal Manipulation on Gene Expressions at Hatch in Mule Duck. IFRG, Oct 2022, Leiden (Netherlands), Netherlands. hal-04181272

HAL Id: hal-04181272

<https://hal.inrae.fr/hal-04181272v1>

Submitted on 15 Aug 2023

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.

Impacts of Early Thermal Manipulation on Gene Expressions at Hatch in Mule Duck

C. Andrieux¹, S. Biasutti², J. Barrieu³, P. Morganx³, M. Marchand¹, M. Morisson⁴, V. Coustham¹,
S. Panserat¹, M. Houssier¹

¹Univ Pau & Pays Adour, E2S UPPA, INRAE, UMR 1419, Nutrition, Métabolisme, Aquaculture, Saint Pée sur Nivelle, 64310, France

²Univ Pau & Pays Adour, E2S UPPA, IUT Génie Biologique, 40000 Mont de Marsan, France

³INRAE Bordeaux-Aquitaine, UEPPG (Unité Expérimentale Palmipèdes à Foie Gras), Domaine d'Artiguères 1076, route de Haut Mauco, 40280 Benquet, France.

⁴GenPhySE, Université de Toulouse, INRAE, ENVT, 31326 Castanet Tolosan, France

Corresponding Author: charlotte.andrieux@univ-pau.fr

Temperature changes during the embryogenesis are well known to modify either thermotolerance of broilers or hepatic metabolism in mule ducks. This study will focus on the impact of the temperature increase (+1°C, 16h/24, from embryonic day 13th to 27th) in mule ducks. We firstly analysed the direct impact of temperature changes during the embryogenesis. One hour after the increase of temperature, relative expressions of genes involved in lipid synthesis, thyroid and inflammation pathways were up-regulated. Heat shock proteins (HSPs) were also significantly stimulated by the thermal manipulation, with up and down regulations depending of the studied HSP gene. These genes were also significantly modified after days of temperature increase, confirming a direct regulation of gene expressions by the thermal manipulation. Indeed, lipid, inflammation, cell proliferation, thyroid and heat shock protein genes were up-regulated at the embryonic days 16th, 20th and 24th. Only gene involved in epigenetic mechanisms was down-regulated at the embryonic day 20th. In order to test if the thermal manipulation could have a permanent effect later in life, we also analysed gene expressions at hatch, this period corresponding to a critical period for the animals. In relation to the early thermal manipulation, animals presented lower weights at hatch but also lower gene expressions for genes linked to heat shock proteins and thyroid pathway. Moreover, genes involved in lipid metabolism and inflammation were up-regulated. Our results strongly suggest a long-term effect of the early thermal manipulation in ducks. Further studies are now in progress to understand the mechanisms of the observed programming in hatching ducks.

Keywords: Mule duck, thermal manipulation, gene expression, heat shock protein, metabolic programming