

Assessing population stress in Atlantic salmon (*Salmo salar*) with fecal corticosteroid metabolites

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Aquaculture production of Atlantic salmon (*Salmo salar*) faces the unique challenge of rearing and maintaining fish while incorporating the growing standards on welfare in farmed animals. The ability to quantify negative affective states in non-mammalian animals has proved difficult. Plasma cortisol is the current gold standard method to measure stress in teleosts, however, this is an invasive handling method that often induces hypothalamic-pituitary-interrenal (HPI) axis activation in the fish, and only provides an individual's snapshot of stress out of a tank population. In this study, fecal corticosteroid metabolites (FCM) were measured from feces sampled from Atlantic salmon tanks, using a corticosterone immunoassay. The goal is to determine if this non-invasive method of measuring FCM can provide a good measure of stress at the population level. Twelve tanks of Atlantic salmon with sixteen fish each were enrolled, six tanks were exposed to *Chaetoceros* spp. culture three times, to replicate common harmful diatom blooms in the marine phase of grow out, and then challenged with *Tenacibaculum maritimum*, a bacterium known to cause severe skin lesions in Atlantic salmon. The other six tanks acted as controls (unstressed). Feces were collected from the tanks 24 hours after each stress event and samples for FCM over the course of 6 weeks. The study will assess whether FCM levels measured from feces collected from tanks can be used to detect stress in a population. Quantification of population stress allows for early intervention during disease outbreaks or stressful events, and a humane way to assess the welfare of fish as our understanding of this topic develops.

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