

MSc Defence

Immunological effects of feeding prebiotic yeast, probiotic yeast, black soldier fly larvae meal and sodium butyrate on zebrafish

Nancy Gao

Date: November 5th 2024 at 2:00pm

The MSc Defence for Anna Naim has been scheduled for November 5th, 2024 at 2:00pm. The defence will be held in room 141 and online via Teams: https://teams.microsoft.com/l/meetup-join/19%3ameeting_NzJjZTYxZTgtNmY5Ni00YTg4LWI2ZjEtOWVjZDViYTYzYmJi%40thread.v2/0?context=%7b%22Tid%22%3a%22be62a12b-2cad-49a1-a5fa-85f4f3156a7d%22%2c%22Oid%22%3a%22fbd28915-dda5-478f-8ecb-a3682dcf0c3a%22%7d

Examining Chair: Dr. Christine Baes

Advisor: Dr. Niel Karrow

Advisory Committee Member: Dr. David Huyben

Additional Committee Member: Dr. Terry Van Raay

Abstract:

Functional ingredients, such as prebiotics, probiotics, insect meals and short chain fatty acids, are often utilized in the aquaculture industry to improve fish health and disease resistance. However, not much is known on how these ingredients produce these immunomodulatory and gut-enhancing effects. The aim of this thesis was to investigate the immunomodulatory effects of prebiotic yeast (PRE), probiotic yeast (PRO), black soldier fly larvae (BSFL) and sodium butyrate (NaB) on zebrafish as a model organism for production species, e.g. salmonids. A 63-day feeding trial was performed on adult zebrafish that were fed a control and the four above ingredients followed by two immune challenges: *Pseudomonas aeruginosa* lipopolysaccharide (LPS), or live *Flavobacterium psychrophilum*. Gene expression analysis revealed anti-inflammatory effects of NaB supplementation through the downregulation of pro-inflammatory cytokine genes, as well as immunomodulatory effects of BSFL as seen with the changes of pro-inflammatory genes between control and immune-challenged groups. A secondary experiment was conducted on larval zebrafish that were pre-treated with 3000 or 6000 μ M NaB followed by LPS challenge to further investigate the effects of sodium butyrate through RNA-sequencing analysis. LPS exposure activated their innate immune response, while NaB enhanced processes related to tissue regeneration and cell barrier integrity. Overall, these ingredients showed immunomodulatory effects with the BSFL and NaB exhibiting the most significant results with changes in genes related to inflammatory processes.