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**THESIS**

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| **TITLE** | Calprotectin in Atlantic salmon |
| RESEARCH QUESTION | Can faecal calprotectin be used as a non-invasive marker of intestinal inflammation in Salmo salar? |
| SUPERVISOR | Arjen Roem/Matthew Owen |
| LOCATION | Wageningen flexible |
| PERIOD | 2013-2015 flexible |
| LINK FOR MORE INFORMATION LINK IS MADE BY AFI SECRETARIAT! | |

**MORE INFORMATION (if available)**

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| SHORT DESCRIPTION |
| The drive to reduce the use of unsustainable marine derived proteins in formulated feeds for intensively cultured fish has led to an increase in the use of plant protein sources, however these plant proteins contain anti-nutritional factors, such as complex sugars and soy saponins, which have been proven to induce inflammation in the hind gut of *Salmo salar* (Baeverfjord and Krogdahl 1996). This inflammation is characterised by a shortening of the villus folds, a loss of enterocyte vacuolisation, and an infiltration of eosinophillic granule cells around the basal membranes of the lumen (Bakke-McKellep, Press et al. 2000; Krogdahl, Bakke-McKellep et al. 2003; Bakke-McKellep, Penn et al. 2007). However these diagnostic measures can only be presently performed post mortem. Thus a non-invasive marker of inflammation would be of great value in determining the incidence and severity of gastro-intestinal inflammation in fish experiencing enteritis. Non-invasive markers would also allow a streamlining of the work required to investigate amelioration strategies to increase the use of sustainable proteins in aquafeeds.  Calprotectin is a calcium and zinc binding protein that accounts for up to 40% of the cytostol of the human neutrophil. Calprotectin levels have been proven to strongly correlate to 111 indium labelled leukocyte infiltration around the intestine during irritable bowel syndrome, which is widely viewed to be the best current method for quantifying inflammation in the human gut (Tibble, Teahon et al. 2000). Due to the stable nature of calprotectin, and it’s resistance to enzymatic degradation, it can be easily measured, using commercially available ELISA based test kits, in the faeces of affected individuals. Faecal and blood serum calprotectin levels have been proven to correlate to intestinal inflammation in humans and dogs (Tibble, Teahon et al. 2000; Heilmann, Suchodolski et al. 2008) however there are currently no reports of its use in teleosts. |

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| RESEARCH AIM/ SCOPE |
| We therefore propose to investigate if faecal calprotectin can be recovered from the faeces of fish with intestinal inflammation and compared to fish without inflammation. If successful we can then correlate this back to the validated quantitative histology measures currently used. |

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| REQUIREMENTS |
| Experience in molecular and immunological techniques is an advantage.  Project requires preliminary preparations before the MSc can start, so careful planning is essential. |

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| OTHER INFORMATION |
| Project includes the following steps:  - identify genetic code of salmon calprotectin from literature  - outsource design of 3-D molecular model of calprotectin to identify active site  - outsource production of specific peptide of active site  - produce antibodies against this peptide (rabbits or chicken eggs)  - develop Elisa with antibodies  - test faeces samples  - data-analysis and thesis writing/reporting  Co-supervision will be sought with Dept. Immunology at WUR. |