a mean infection load of 1.25 . 106 ± 3.12 . 105 GAV copies μg-1 TNA. After 14 days of feeding the experimental diets, eight shrimp per diet were sampled and their GAV infection load was quantified to determine the relative change. GAV infection loads increased over the 14 days, however, shrimp fed the three functional feeds, B-glucan, PHB or microbial floc, on average had 10-fold lower GAV infection compared to shrimp fed the basal diet. Although the functional feeds did not clear pre-existing infections, the results suggests they may have increased the immune capacity of shrimp to better control GAV proliferation compared with the standard diet. The impact of these functional feeds was further explored by measuring several immune parameters from haemolymph samples collected from the same eight prawns that GAV titre was quantified, including total haemocyte counts, phenoloxidase activity and the production of reactive oxidative species and antioxidants.

Keywords: Functional feeds, immunostimulant, GAV, immune response, shrimp

Corresponding author.
E-mail address: tansyn.noble@csiro.au (T. Noble).

O-068.

Antibody repertoire and kinetics in atlantic salmon following vaccination and challenge with Salmonid alpha virus

Anne Bakke [1,#], Hege Lund [1], Ingunn Sommerset [2], Gro Vee [2], Petter Frost [2], Aleksei Krasnov [3], Preben Boysen [1].

[1] *Institute for Food Safety and Infection Biology*, *Faculty of Veterinary Medicine*, Norwegian University of Life Sciences (NMBU)
[2] MSD Animal Health, *Bergen*, *Norway*
[3] Nofima AS, Ås, *Norway*

Abstract
Immunoglobulin M (IgM) is important in protection against disease in Atlantic salmon (*Salmo salar*). For many diseases, specific antibody response may be good despite poor disease protection, and vice versa. Non-specific antibodies (NAB), broadly cross-reactive antibodies with low affinity, are typically abundant in the blood of Atlantic salmon, but their role in disease protection is poorly understood.
In this study, we have examined the antibody repertoire and the immune gene expression of Atlantic salmon following vaccination and experimental infection. Parr was vaccinated with an commercial multivalent vaccine that included inactivated Salmonid alpha virus (SAV), and three weeks after vaccination the fish was transferred to sea water and infected with SAV subtype 3 in a shedder-cohabitant model. Blood plasma and samples from lymphoid tissue and heart were collected at several timepoints pre -and post-vaccination and post-infection.
Multiplex antibody assays of blood plasma from vaccinated fish showed an increase of specific antibodies to antigenic components of the vaccine after 6 - 9 weeks. In parallel, titers of non-specific antibodies increased in plasma of vaccinated fish, showing an earlier onset of increase than specific antibodies. The presence of non-specific antibodies is detected by the recognition of a synthetic hapten-carrier complex. In contrast to vaccinated fish, titers of non-specific antibodies in plasma of control (saline-injected) fish first increased after challenge with SAV. Based on these findings, high-throughput immunoglobulin sequencing (IgSeq) of the variable (antigen-binding) region of the B cell antibody receptor will be performed. With this technology, we can study the presence of shared (present in multiple individuals) and unique (present only in one individual) B-cell clonotypes in vaccinated and control fish before and after challenge. Results from microarray transcriptome analysis and RT-qPCR of selected immune genes will also be presented.
This work was funded by the Research Council of Norway, grant 267644: «*IMCOM: Development of tools for assessment of the immune competence of Atlantic salmon smolts and growers*».
Keywords: Vaccination, Atlantic salmon, Salmonid alpha virus, Antibody-repertoire

Corresponding author.
E-mail address: annba@nmbu.no (A. Bakke).

O-069.

Characterization of ten CCL20-like cc chemokines in rainbow trout (*Oncorhynchus mykiss*): Sequence and expression analysis

Fuguo Liu [1], Tingyu Wang [1], Chris Secombes [1,#], Tiehui Wang [1,#].

[1] Scottish Fish Immunology Research Centre, School of Biological Sciences, University of Aberdeen, Aberdeen, United Kingdom

Abstract
Mammalian CCL20, or macrophage inflammatory protein-3α, can function as a homeostatic and inflammatory chemokine. In relation to the latter, it is responsible for the chemoattraction of lymphocytes and dendritic cells to mucosal immune sites under inflammatory and pathological conditions. CK1, CK8A and CK8B are rainbow trout (*Oncorhynchus mykiss*) CC chemokines that were reported previously to be phylogenetically related to mammalian CCL20. In the current study, an additional seven CCL20-like paralogs in rainbow trout are reported, that are divided into three subgroups (by phylogenetic tree, homology and synteny analysis) in agreement with past studies in fish. They have been designated here as: CCL20L1a (also referred to as CK1), CCL20L1b1, CCL20L1b2, CCL20L2a (CK8A), CCL20L2b (CK8B), CCL20L3a, CCL20L3b1, CCL20L3b2, CCL20L3b3 and CCL20L3b4. Like mammalian CCL20, rainbow trout CCL20-like molecules possess a high positive net charge with a pI of 9.34-10.16, that is reported to be important for antimicrobial activity. Rainbow trout CCL20-like paralogs are differentially expressed and in general highly expressed in mucosal tissues, such as gills, intestine and thymus. The expression levels of rainbow trout CCL20-like paralogs are increased during development and following PAMP/cytokine stimulation. For example, in RTS-11 cells CCL20L3b1 and CCL20L3b2 are highly up-regulated by LPS, poly I:C, recombinant(r) IFNa and rIL-1β. Trout CCL20-like paralogs are also increased after *Yersinia ruckeri* infection or poly I:C stimulation *in vivo*, with CCL20L3b1 and CCL20L3b2 again highly up-regulated. Overall, this is the first report of the complete CCL20 chemokine subfamily in rainbow trout, and the analysis of their expression and modulation *in vitro* and *in vivo*. These results suggest that teleosts possess divergent CCL20-like molecules that may have important roles in mucosal immunity.
Keywords: Rainbow trout, CCL20-like chemokine, characterisation, expression, mucosal immune response

Corresponding author.
E-mail address: t.h.wang@abdn.ac.uk (C. Secombes).

O-070.

Temperature drives the immune respose in atlantic salmon infected with sea lice: Novel insights through transcriptome sequencing analyses

G. Núñez-Acuña, V. Valenzuela-Muñoz, C. Sáez-Vera, C. Gallardo-Escárate[#].

Laboratory of Biotechnology and Aquatic Genomics, Interdisciplinary Center for Aquaculture Research, Universidad de Concepción, Concepción, Chile

Abstract
The sea louse Caligus rogercresseyi is a copepod species responsible for the most relevant parasitic infections in the Chilean salmon industry. This ectoparasite causes immunosuppression and stressful conditions in farmed fishes, which led to the activation of key elements of host's immune system. However, how these host-parasite interactions are being impacted by environmental conditions such as temperature variations is