**O-054.**

**Stomach metabolic alterations in response to AHPND infection in shrimp**

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Abstract
Acute hepatopancreatic necrosis disease (AHPND), previously termed early mortality syndrome, is an emerging shrimp disease with very serious impacts on Asian shrimp aquaculture. This disease is caused by pathogenic bacteria *Vibrio parahaemolyticus* (Vp) containing a unique virulence plasmid (pVA), with genes encoding a binary toxin PirABVp. Molecular pathogenesis of this emerging disease and host responses against AHPND remain unclear. To further explore AHPND pathogenesis, a systems biology approach was used to identify the significant pathway[s] in transcriptome and metabolome of AHPND-infected shrimp stomach. Using UHPLC-QTOF-MS-based metabolomics profiling, 503 and 634 differentially expressed metabolites were selected from positive and negative ion modes. These metabolites were combined with our in-house transcriptome database to obtain global host responses in stomachs of AHPND-infected shrimp. With this strategy, it was determined that several lipid metabolism related pathways in shrimp stomachs were dysregulated during AHPND infection. A gene-to-gene correlation network was created to identify candidate genes, with gene expression subsequently confirmed with real-time PCR. Cytosolic phospholipase A2 (cPLA2) and JHE-like carboxylesterase (JHE-L CE) were significantly expressed in stomachs of AHPND-infected shrimp. These findings are new knowledge regarding AHPND pathogenesis and will contribute to development of an evidence-based biosecurity approach for shrimp aquaculture industry.
**Keywords:** AHPND, metabolomics, lipid metabolism, Cytosolic phospholipase A2, JHE-like carboxyesterase

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**O-055.**

**Characterization and development of focal red and melanised changes in the Atlantic salmon**

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Abstract
The occurrence of melanised changes in the muscle fillets in the Norwegian salmon industry is approximately 20% and leads to quality reduction and severe economic losses. The condition is common for Atlantic salmon farming in general, but prevalence are not available outside Norway. Here, we investigated the occurrence of focal red and melanised changes in a regular field production net-pen population, throughout the saltwater production period. We found that the prevalence of focal acute red changes was stable throughout the production period and that these changes develop into focal melanised changes over time. The presence of bacteria and virus in focal red changes was addressed but could not explain the acute manifestations, however, accumulations of lipids was a common finding. Lipid depositions were located within degenerative muscle cells. Infection with *Piscine orthoreovirus* 1 (PRV-1), which is ubiquitous in sea farmed Atlantic salmon, appeared in the population at Week 23 post sea transfer. Chronic melanised changes appeared after the identification of PRV-1, and cells with replicating virus was always present in the chronic melanised changes that were characterized as granulomatous inflammation. We further addressed the inflammatory responses by targeting different cell markers.
**Keywords:** Granuloma; inflammation; lipids: melano-macrophage; PRV

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**O-056.**

**Endocrine regulation of the thymic function in European sea bass: Interactions between environmental factors and the reproductive system development**

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Abstract
Jawed vertebrates have a powerful immune system that must be tightly regulated to maintain homeostasis and to ensure trade-offs with other energy-demanding functions, such as reproduction. With respect to the latter, immune system regulation is become apparent by the immunomodulatory function of gonad-derived hormones. In mammals, the thymus, involved in T cell-maturation, is a highly plastic organ, the function of which is drastically modulated by high levels of estrogen and testosterone. In teleost fish, recent findings indicate that the estrogenic regulation may be evolutionary conserved. A knowledge gap exists, however, with regard to the immunomodulatory role of testosterone in teleosts. Moreover, in addition to physiological changes related to reproductive investment, poikilotherm animals living in seasonally changing environments must adapt their immune system to widely varying temperatures. Consequently, to discriminate environmental and endogenous factors that regulate thymus function in European sea bass, *Dicentrarchus labrax*, we analyzed the thymuses of juvenile fish with monthly sampling from 95 to 430 days post-hatching covering the sexual differentiation-period and the first seasonal gonad investment, which were kept separately in either constant conditions, or in conditions mimicking the natural variation of photoperiod and temperature. The thymuses were sampled for qRT-PCR-analysis, thymocytescount, viability, in vitro steroid-responsiveness as well as immunofluorescence measurement of DLT15+ and DLIg3+ cells by flow cytometry. DLIg3 and DLT15 are antisera for sea bass IgM and a Pan-T cell marker. We observed that temperature regulates thymus size without affecting the proportion of DLT15+ and DLIg3+ thymocytes or thymocyte viability. A decrease of the DLT15+ cell-proportion and thymocyte-viability was observed concomitantly with an increase of the gonadosomatic index, but without a significant decrease in the intraperitoneal adiposomatic index. Overall, the results suggest that temperature regulates thymocyte number and is likely to modulate the amount of T cell-egress. However, with reproductive investment and the associated increase of plasmatic steroid hormone levels, thymic T cell proportions as well as viability of immature T cell are modulated. As the adiposomatic index was not altered, this suggests that steroid hormones modulate thymic T cell-maturation and -fate, i.e., apoptosis or differentiation, which are likely to alter the TCR-repertoire of exported mature T cells. Ongoing measurements aim to (1) quantify changes in plasma steroid levels and to (2) determine the effect on thymic T maturation.