

P-040.**Effect of aloe vera natural additive on enteritis caused by diets that include soybean meal in Atlantic salmon**K. Fehrmann^{1,2,3,*}, M. Vega^{1,*}, M. Allende^{3,*}, C. Feijóo^{2,*}, A. Romero^{1,4,#}.¹ Instituto de Patología Animal, Facultad de Ciencias Veterinarias, Universidad Austral, Valdivia, Chile² Departamento de Ciencias Biológicas, Facultad de Ciencias de la Vida, Universidad Andrés Bello, Santiago, Chile³ Departamento de Biología, Facultad de Ciencias, Centro FONDAP de Regulación del Genoma, Universidad de Chile, Santiago, Chile⁴ Centro Interdisciplinario para la Investigación Acuicola (INCAR), Centro FONDAP, Concepción, Chile**Abstract**

Soybean meal is one of the most widely used alternatives to replace fishmeal. However, its ingestion triggers an intestinal inflammatory process that compromises fish health. Finding strategies that reduce its deleterious effects will be relevant. In this work we analyzed the effects of aloe vera (*Aloe barbadensis* miller, AV) as additives in a soybean meal-based diet on intestinal inflammation in Atlantic salmon.

To determine the immunomodulatory effect of AV, we supplemented fishmeal (FM) and soybean meal (SBM) based diets with AV. 4 groups in duplicate of 40 Atlantic salmon each, with an average weight of 75 gr at the beginning of the study were fed for 28 days with the FM, SBM, FM + AV and SBM + AV diets. At the end of the feeding period, the length of fish fed with SBM was significantly lower than that of fish fed with the FM, FM + AV or SBM + AV diets. Weight gain was similar between fish fed with SBM, FM and FM + AV diets, whereas fish fed SBM + AV gained 11% more weight than the SBM group. Samples of the distal intestine of 12 fish per treatment were taken for histological analysis. A semi-quantitative scoring system was used to assess the degree of morphological changes induced by different diets. A higher score was evidenced for the SBM group compared with the FM group, suggesting SBM triggered an inflammatory process. On the other hand, the SBM + AV group had a significantly lower score compared to the SBM group, evidencing the intestinal protection granted by AV. To complement our result, we characterized the expression of cytokine markers *il-1 β* and *il-10* by qPCR, obtaining higher expression of inflammatory related genes in the SBM group when compared with SBM+AV or FM group. The present study suggests that aloe vera could be used as additive in farmed fish diets to facilitate the replacement of fishmeal by soybean meal without affecting intestinal health.

keywords: Soybean meal, enteritis, natural additive, distal intestine, histology

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P-041.**Identification and bioactivity of a granulocyte colony-stimulating factor b homologue from large yellow croaker (*Larimichthys crocea*)**Qiuhua Li¹, Jingjie Chen¹, Jingqun Ao³, Xinhua Chen^{1,2,#}.¹ Institute of Oceanology, College of Animal Sciences, Fujian Agriculture and Forestry University, Fuzhou 350002, China² Laboratory for Marine Biology and Biotechnology, Qingdao National Laboratory for Marine Science and Technology, Qingdao 266071, China³ Key Laboratory of Marine Biogenetic Resources, Third Institute of Oceanography, State Oceanic Administration, Xiamen, 361005, China**Abstract**

Granulocyte colony-stimulating factor (GCSF) is a pleiotropic cytokine that plays a key role in regulation of hematopoiesis, innate and adaptive im-

mune responses in mammals. However, bioactivity of GCSF in teleost fish remains largely unknown. In this study, a GCSFb homologue from large yellow croaker (*Larimichthys crocea*) (LcGCSFb) was cloned by RACE-PCR techniques. The open reading frame (ORF) of LcGCSFb is 603 bp long and encoded a protein precursor of 200 amino acids (aa), with a 19-aa signal peptide and a 181-aa mature peptide. In healthy fish, the LcGCSFb was constitutively expressed in all examined tissues, with the highest levels in mucous tissues, such as gills, intestine, and stomach. Its transcripts in head kidney, spleen and gills were significantly induced by *Vibrio alginolyticus* challenge. LcGCSFb transcripts were also detected in primary head kidney leukocytes (PKL), primary head kidney macrophages (PKM), primary head kidney granulocytes (PKG) and head kidney cell line (LYCK), and markedly up-regulated by inactivated *Vibrio alginolyticus*. These data suggested that LcGCSFb may play a role in immune response against bacterial infection. *In vivo* administration of recombinant LcGCSFb protein (rLcGCSFb) significantly up-regulated the expression levels of the inflammatory cytokines (IL-6 and TNF α), and transcription factor C/EBP β , which is required for proliferation of neutrophils. Furthermore, rLcGCSFb showed an ability to strengthen the phagocytosis of PKL *in vitro*. Taken together, LcGCSFb may be involved in antibacterial immunity via promoting the inflammatory response and the phagocytic activity of leukocytes. To our knowledge, this is the first report on immunoregulatory roles of GCSF in teleost.

keywords: Granulocyte colony-stimulating factor (GCSF); Large yellow croaker (*Larimichthys crocea*); inflammatory response; bacterial infection; phagocytosis

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P-042.**Role of the spleen in the immune response of turbot (*Scophthalmus maximus*) to vaccination with the ciliate parasite *Philasterides dicentrarchi***F. Fontenla-Iglesias¹, I. Estensoro^{2,3}, A. Valle¹, M. Noia¹, C. Tafalla³, A. Sitjà-Bobadilla², J.M. Leiro⁴, J. Lamas^{1,#}.¹ Biología Celular, Dpto. de Biología Funcional, Facultad de Biología e Instituto de Acuicultura, Universidad de Santiago de Compostela, Santiago de Compostela, Spain² Fish Pathology Group, Institute of Aquaculture Torre de la Sal (IATS), Consejo Superior de Investigaciones Científicas (CSIC), Castellón, Spain³ Animal Health Research Centre, National Institute for Agricultural and Food Research, Valdeolmos 28130, Madrid, Spain⁴ Dpto. de Microbiología y Parasitología, I. de Investigación y Análisis Alimentarios, Universidad de Santiago de Compostela, 15782 Santiago de Compostela, Spain**Abstract**

Fish spleen is rich in lymphocytes, particularly in B lymphocytes, and plays an important role in the adaptive immune response after vaccination. After vaccination of fish by intraperitoneal injection, there is a strong migration of antigen-containing cells to the spleen, where antigen presentation occurs. In the present study, we analysed the B cell populations (IgM, IgT or IgD positive cells) and gene expression (IgM, IgT, IgD, MHCII, and several immune-related genes) in the spleen of turbot immunized with a vaccine containing an oleous adjuvant and a particulate *Philasterides dicentrarchi* antigen. Fish were immunized on days 0 and 30, and samples were obtained on days 3, 7, 33, 37 and 60. The vaccine provoked a significant increase in specific and total serum IgM at 37 dpi and at 60 dpi, but the specific IgT levels did not vary significantly in vaccinated fish. No significant regulation of slgT, mIgT, slgM, mIgM and IgD occurred before 37 dpi, whereas at 37 and 60 dpi, overexpression of slgT and mIgT was detected in fish injected with adjuvant alone or with the vaccine. Immunofluorescence analysis enabled classification of the B lymphocytes into four groups: IgM+IgD-IgT- (the majority of IgM+ cells), IgM+IgD+IgT-, IgM-IgD+IgT- (very few cells, probably corresponding to lymphocytes with low levels of