

## **Paula Enes**

*Curriculum Vitae*

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### **PROFESSIONAL ACTIVITIES AND EDUCATION**

2015 - 2018: Post-doctoral researcher at CIIMAR. Research conducted at CIIMAR (Fish Nutrition and Immunobiology Group) and University of Plymouth, Devon, UK (School of Biological Sciences- Faculty of Science & Environment). Granted by Portuguese Science and Technology Foundation (FCT) (SFRH/BPD/101012/2014).

**Subject:** Potential of novel probiotics screened within sea bass (*Dicentrarchus labrax*) gut microbiota for improving plant feedstuffs utilization, disease resistance and gut homeostasis.

2008 - 2014: Post-doctoral researcher at CIIMAR. Research conducted at CIIMAR (Fish Nutrition and Immunobiology Group), University of Barcelona, Barcelona, Spain (Department of Physiology and Immunology) and Norwegian School of Veterinary Science, Oslo, Norway (Department of Basic Sciences and Aquatic Medicine, Aquaculture Protein Centre). Granted by FCT (SFRH/BPD/39688/2007).

**Subject:** Evaluation of functional ingredients (probiotics and prebiotics) in improving carbohydrate metabolism and utilization, gut welfare, microbiota modulation, immune response and disease resistance in fish.

2004 - 2008: PhD student. Faculty of Science, University of Porto, Portugal (supervised by A. Oliva-Teles). Research conducted at CIIMAR and French National Institute for Agricultural Research (INRA), Hydrobiology Station, Bordeaux Aquitaine, St.-Pée-sur-Nivelle, France (supervised by S. Kaushik and S. Panserat). Granted by FCT (SFRH/BD/11414/2002).

**Subject:** "Utilization of dietary carbohydrates by European sea bass (*Dicentrarchus labrax* L.) and gilthead sea bream (*Sparus aurata* L.) juveniles".

2000 - 2003: Research grant (BI). Project "Interference of organotins with gastropod physiology associated to the imposex phenomenon "(PDCTM/Mar/15284/99). Research conducted at Faculty of Sciences, University of Porto, Portugal (supervised by M.N. Vieira) and CIIMAR (supervised by M.A. Reis-Henriques and M.M. Santos). Granted by FCT.

1994 - 2000: Teacher in Elementary and Secondary schools, Portugal. Subjects: Mathematics, Natural Sciences, Earth and Life Sciences, Biology and Biology Laboratory Techniques.

1994 - 1996: MSc degree in Ecology. Faculty of Sciences, University of Porto, Portugal (supervised by T. Borges). Granted by National Board for Scientific and Technical Research (JNICT) (PRAXIS XXI/BM/7214/95).

**Subject:** "Evaluation of microalgae, fish farm effluents and industrial cheese whey as diets for the European clam (*Tapes decussatus* L.)".

1990 - 1994: Degree in Biology (14/20). Faculty of Sciences, University of Porto, Portugal.

### **DOMAIN OF SPECIALIZATION**

Fish Nutrition and Physiology.

### **MAIN RESEARCH TOPICS**

Potential of dietary carbohydrates as energy source and deeper insight of the metabolic utilization of dietary carbohydrates in marine fish species; Determination of activities and gene expression of key enzymes of glucose, lipid and protein metabolism and metabolite levels in blood and tissues.

Hormonal regulation of glucose metabolism and nutritional strategies to improve dietary carbohydrate utilization in marine fish species.

Nutritional strategies for improving fish health and welfare and for the reduction of environmental impact of feeding in aquaculture; Evaluation of the replacement of fish meal by alternative ingredients on growth performance, functional gut metabolism, immune status, disease resistance and welfare of fish.

Determination of antioxidant defenses and oxidative damage biomarkers in fish.

Potential of functional ingredients (prebiotics and probiotics) in improving glucose metabolism and utilization, gut welfare, microbiota modulation, immune response and disease resistance in fish.

### **LABORATORIAL SKILLS AND COMPETENCES**

Maintenance of microalgae and clam seed cultures;

Formulation and elaboration of experimental diets for aquaculture fish species;

Performance of growth and digestible trials;

Proximate analysis of feedstuffs, diets, whole-body composition and faces;

Plasma biochemical analysis;

Determination of enzymatic activities of key enzymes of carbohydrate, lipid and amino acid metabolism;

Determination of digestive enzymes activities;

Determination of enzymatic and non-enzymatic antioxidant defenses and oxidative stress biomarkers;

Molecular Biology - PCR (Polymerase Chain Reaction) and RT-PCR (Real-Time Polymerase Chain Reaction) techniques of gene expression;  
Hormonal measurements by RIA (radioimmunoassay) technique;  
Qualitative electrophoretic technique of zymograms;  
Determination of humoral parameters (lysozyme, alternative complement pathway, peroxidase activity and total immunoglobulins);  
General Microbiology and Molecular Biology techniques, including identification and characterization of bacteria, DNA extraction methods, PCR, agarose gel electrophoresis and DGGE.

## **PUBLICATIONS**

### **Thesis**

2. PAULA CRISTINA ENES OLIVEIRA DA SILVA, **2008**.

“Utilization of dietary carbohydrates by European sea bass (*Dicentrarchus labrax* L.) and Gilthead Sea bream (*Sparus aurata* L.) juveniles”. PhD Thesis in Biology. Faculty of Sciences of University of Porto ([www.fc.up.pt](http://www.fc.up.pt)), Porto, Portugal.

1. PAULA CRISTINA ENES OLIVEIRA DA SILVA, **1997**.

“Utilização de uma dieta microalgal, de um efluente piscícola e de dois subprodutos da indústria alimentar na cultura de juvenis de amêijoia boa *Tapes decussatus* L.”. MSc Thesis in Applied Ecology. Faculty of Sciences of University of Porto ([www.fc.up.pt](http://www.fc.up.pt)), Porto, Portugal.

### **Book chapters**

1. OLIVA-TELES, A., **ENES, P.**, PERES, H., **2015**. Replacing fishmeal and fish oil in industrial aquafeeds for carnivorous species. In: Davies, A. (Ed.), Feed and feeding practices in aquaculture. Woodhead Publishing Series in Food Science, Technology and Nutrition, Elsevier Ltd., pp.203-222. doi: [10.1016/B978-0-08-100506-4.00008-8](https://doi.org/10.1016/B978-0-08-100506-4.00008-8).

### **Papers in international scientific periodicals with referees**

34. GUERREIRO, I., OLIVA-TELES, A., **ENES, P.**, **2017**. Prebiotics as functional ingredients: focus on Mediterranean fish aquaculture. **Reviews in Aquaculture**, 0:1-33. doi: [10.1111/raq.12201](https://doi.org/10.1111/raq.12201) (FISHERIES; impact factor 2016: 4.618; ranking 2/50; Quartile **Q1**).

33. COUTO, A., PERES, H., OLIVA-TELES, A., **ENES, P.**, **2017**. Nutritional value of whole cereal meals for European sea bass (*Dicentrarchus labrax*) juveniles. **Aquaculture**, 473:128-134. doi: [10.1016/j.aquaculture.2017.01.031](https://doi.org/10.1016/j.aquaculture.2017.01.031) (FISHERIES; impact factor 2016: 2.570; ranking 8/50; Quartile **Q1**).

32. GUERREIRO, I., SERRA, C.R., POUSÃO-FERREIRA, P., OLIVA-TELES, A., **ENES, P.**, **2017**. Prebiotics effect on growth performance, hepatic intermediary metabolism, gut microbiota and digestive enzymes of white sea bream (*Diplodus sargus*). **Aquaculture Nutrition**. doi: [10.1111/anu.12543](https://doi.org/10.1111/anu.12543) (FISHERIES; impact factor 2016: 1.665; ranking: 16/50; Quartile: **Q2**).

31. AZEREDO R., MACHADO M., KREUZ E., WUERTZ S., OLIVA-TELES A., **ENES P.**<sup>1</sup>, COSTAS B.<sup>1</sup>, **2017**. The European seabass (*Dicentrarchus labrax*) innate immunity and gut health are modulated by dietary plant-protein inclusion and prebiotic supplementation. **Fish & Shellfish**

**Immunology**, 60:78-87. doi: [10.1016/j.fsi.2016.11.019](https://doi.org/10.1016/j.fsi.2016.11.019) (FISHERIES; impact factor 2016: 3.148; ranking: 4/50; Quartile **Q1**).

<sup>1</sup>These authors contributed equally to this work.

30. GUERREIRO, I., COUTO, A., MACHADO, M., CASTRO, C., POUSÃO-FERREIRA, P., OLIVA-TELES, A., **ENES, P.**, 2016. Prebiotics effect on immune and hepatic oxidative status and gut morphology of white sea bream (*Diplodus sargus*). **Fish & Shellfish Immunology**, 50:168-174. doi: [10.1016/j.fsi.2016.01.023](https://doi.org/10.1016/j.fsi.2016.01.023) (FISHERIES; impact factor: 3.148; ranking: 4/50; Quartile **Q1**).

29. GUERREIRO, I., SERRA, C.R., **ENES, P.**, COUTO, A., SALVADOR, A., COSTAS, B., OLIVA-TELES, A., 2016. Effect of short chain fructooligosaccharides (scFOS) on immunological status and gut microbiota of gilthead sea bream (*Sparus aurata*) reared at two temperatures. **Fish & Shellfish Immunology**, 49:122-131. doi: [10.1016/j.fsi.2015.12.032](https://doi.org/10.1016/j.fsi.2015.12.032) (FISHERIES; impact factor: 3.148; ranking: 4/50; Quartile **Q1**).

28. COUTO, A., BARROSO, C., GUERREIRO, I., POUSÃO-FERREIRA, P., MATOS, E., PERES, H., OLIVA-TELES, A., **ENES, P.**, 2016. Carob seed germ meal in diets for meagre (*Argyrosomus regius*) juveniles: growth, digestive enzymes, intermediary metabolism, liver and gut histology. **Aquaculture**, 451:396-404. doi: [10.1016/j.aquaculture.2015.10.007](https://doi.org/10.1016/j.aquaculture.2015.10.007) (FISHERIES; impact factor: 2.570; ranking 8/50; Quartile **Q1**).

27. GUERREIRO, I., **ENES, P.**, RODILES, A., MERRIFIELD, D., OLIVA-TELES, A., 2016. Effects of rearing temperature and dietary short-chain fructooligosaccharides supplementation on allochthonous gut microbiota, digestive enzymes activities and intestine health of turbot (*Scophthalmus maximus* L.) juveniles. **Aquaculture Nutrition**, 22:631-642. doi: [10.1111/anu.12277](https://doi.org/10.1111/anu.12277) (FISHERIES; impact factor: 1.665; ranking: 16/50; Quartile **Q2**).

26. COUTO, A., PERES, H., OLIVA-TELES, A., **ENES, P.**, 2016. Screening of nutrient digestibility, glycaemic response and gut morphology alterations in gilthead sea bream (*Sparus aurata*) fed whole cereals meals. **Aquaculture**, 450:31-37. doi: [10.1016/j.aquaculture.2015.07.006](https://doi.org/10.1016/j.aquaculture.2015.07.006) (FISHERIES; impact factor: 2.570; ranking 8/50; Quartile **Q1**).

25. COUTINHO, F., PERES, H., CASTRO, C., PÉREZ-JIMÉNEZ, A., POUSÃO-FERREIRA, P., OLIVA-TELES, A., **ENES, P.**, 2015. Metabolic responses to dietary protein/carbohydrate ratios in Zebra Sea bream (*Diplodus cervinus*, Lowe, 1838) juveniles. **Fish Physiology and Biochemistry**, 42:343-352. doi: [10.1007/s10695-015-0142-x](https://doi.org/10.1007/s10695-015-0142-x) (FISHERIES; impact factor 1.442; ranking 22/52; Quartile **Q2**).

24. GUERREIRO, I., COUTO, A., PÉREZ-JIMÉNEZ, A., OLIVA-TELES, A., **ENES, P.**, 2015. Gut morphology and hepatic oxidative status of European sea bass (*Dicentrarchus labrax*) juveniles fed plant feedstuffs or fishmeal based diets supplemented with short-chain fructooligosaccharides and xylooligosaccharides. **British Journal of Nutrition**, 114:1975-1984. doi: [10.1017/S0007114515003773](https://doi.org/10.1017/S0007114515003773) (Nutrition and Dietetics; impact factor 3.311; ranking 23/80; Quartile **Q2**).

23. GUERREIRO, I., **ENES, P.**, OLIVA-TELES, A., 2015. Effects of short chain fructooligosaccharides (scFOS) and rearing temperature on growth performance and hepatic intermediary metabolism in gilthead sea bream (*Sparus aurata*) juveniles. **Fish Physiology and Biochemistry**, 41:1333-1344. doi: [10.1007/s10695-015-0089-y](https://doi.org/10.1007/s10695-015-0089-y) (FISHERIES; impact factor 1.442; ranking 22/52; Quartile **Q2**).

22. GUERREIRO, I., OLIVA-TELES, A., **ENES, P.**, 2015. Improved glucose and lipid metabolism in European sea bass (*Dicentrarchus labrax*) fed short-chain fructooligosaccharides and xylooligosaccharides. **Aquaculture**, 441:57-63. doi:10.1016/j.aquaculture.2015.02.015 (FISHERIES; impact factor 1.893; ranking 14/52; Quartile Q2).
21. **ENES, P.**, GARCÍA-MEILÁN, I., GUERREIRO, I., COUTO, A., POUSÃO-FERREIRA, P., GALLARDO, M.A., OLIVA-TELES, A., 2015. Utilization of dietary starch by juvenile white sea bream *Diplodus sargus* at different feeding frequencies. **Aquaculture Nutrition**, 21:926-934. doi: 10.1111/anu.12227 (FISHERIES; impact factor 1.511; ranking: 18/52; Quartile Q2).
20. GUERREIRO, I., **ENES, P.**, MERRIFIELD, D., DAVIES, S., OLIVA-TELES, A., 2015. Effects of short-chain fructooligosaccharides on growth performance and hepatic intermediary metabolism in turbot (*Scophthalmus maximus*) reared at winter and summer temperatures. **Aquaculture Nutrition**, 21:433-443. doi: 10.1111/anu.12175 (FISHERIES; impact factor 1.511; ranking: 18/52; Quartile Q2).
19. **ENES, P.**, POUSÃO-FERREIRA, P., SALMERÓN, C., CAPILLA, E., NAVARRO, I., GUTIÉRREZ, J., OLIVA-TELES, A., 2013. Effect of guar gum on glucose and lipid metabolism in white sea bream *Diplodus sargus*. **Fish Physiology and Biochemistry**, 39:159-169. doi: 10.1007/s10695-012-9687-0 (FISHERIES; impact factor 1.676; ranking: 17/50; Quartile Q2).
18. **ENES, P.**, PÉREZ-JIMÉNEZ, A., PERES, H., COUTO, A., POUSÃO-FERREIRA, P., OLIVA-TELES, A., 2012. Oxidative status and gut morphology of white sea bream, *Diplodus sargus* fed soluble non-starch polysaccharide supplemented diets. **Aquaculture**, 358-359:79-84. doi 10.1016/j.aquaculture.201206.020 (FISHERIES; impact factor 2.009; ranking: 11/50; Quartile Q1).
17. **ENES, P.**, PERES, H., POUSÃO-FERREIRA, P., SANCHEZ-GURMACHES, J., NAVARRO, I., GUTIÉRREZ, J., OLIVA-TELES, A., 2012. Glycemic and insulin responses in white sea bream (*Diplodus sargus*) after intraperitoneal administration of glucose. **Fish Physiology and Biochemistry**, 38:645-652. doi: 10.1007/s10695-011-9546-4 (FISHERIES; impact factor 1.545; ranking: 22/50; Quartile Q2).
16. COUTO, A., **ENES, P.**, PERES, H., OLIVA-TELES, A., 2012. Temperature and dietary starch level affected protein but not starch digestibility in gilthead sea bream juveniles. **Fish Physiology and Biochemistry**, 38:595-601. doi: 10.1007/s10695-011-9537-5 (FISHERIES; impact factor 1.545; ranking: 22/50; Quartile Q2).
15. **ENES, P.**, PERES, H., SANCHEZ-GURMACHES, J., NAVARRO, I., GUTIÉRREZ, J., OLIVA-TELES, A., 2011. Insulin and IGF-I response to a glucose load in European sea bass (*Dicentrarchus labrax*) juveniles. **Aquaculture**, 315:321-326. doi:10.1016/j.aquaculture.2011.02.042 (FISHERIES; impact factor 2.041; ranking: 11/50; Quartile Q1).
14. **ENES, P.**, PANSERAT, S., KAUSHIK, S., OLIVA-TELES, A., 2011. Dietary carbohydrate utilization by European sea bass (*Dicentrarchus labrax* L.) and gilthead sea bream (*Sparus aurata* L.) juveniles. **Reviews in Fisheries Science**, 19:201-215. doi: 10.1080/10641262.2011.579363 (FISHERIES; impact factor 1.946; ranking: 14/50; Quartile Q2).
13. **ENES, P.**, COUTO, A., PERES, H., OLIVA-TELES, A., 2011. Growth, feed utilization and glycaemic responses in European sea bass *Dicentrarchus labrax* juveniles fed carbohydrate of different complexities. **Journal of the World Aquaculture Society**, 42:873-879. doi:

[10.1111/j.1749-7345.2011.00525.x](https://doi.org/10.1111/j.1749-7345.2011.00525.x) (FISHERIES; impact factor 0.708; ranking: 40/50; Quartile Q4).

12. **ENES, P.**, SANCHEZ-GURMACHES, J., NAVARRO, I., GUTIÉRREZ, J., OLIVA-TELES, A., **2010**. Role of insulin and IGF-I on the regulation of glucose metabolism in European sea bass (*Dicentrarchus labrax*) fed with dietary starch. **Comparative Biochemistry and Physiology, Part A**, 157:346-353. doi:[10.1016/j.cbpa.2010.08.006](https://doi.org/10.1016/j.cbpa.2010.08.006) (ZOOLOGY; impact factor: 2.134; ranking: 21/145; Quartile Q1).

11. **ENES, P.**, PERES H., COUTO A., OLIVA-TELES A., **2010**. Growth performance and metabolic utilization of diets including starch, dextrin, maltose or glucose as carbohydrate source by gilthead sea bream (*Sparus aurata*) juveniles. **Fish Physiology and Biochemistry**, 36:903-910. doi: [10.1007/s10695-009-9366-y](https://doi.org/10.1007/s10695-009-9366-y) (FISHERIES; impact factor: 1.607; ranking: 12/46; Quartile Q2).

10. **ENES, P.**, PANSERAT, S. KAUSHIK, S., OLIVA-TELES, A., **2009**. Nutritional regulation of hepatic glucose metabolism in fish. **Fish Physiology and Biochemistry**, 35:519-539. doi: [10.1007/s10695-008-9259-5](https://doi.org/10.1007/s10695-008-9259-5) (FISHERIES; impact factor: 1.232; ranking: 20/42; Quartile Q2).

9. SANTOS, M.M., **ENES, P.**, REIS-HENRIQUES, M.A., KUBALLA, J., CASTRO, L.F.C., VIEIRA, M.N., **2009**. Organotin levels in seafood from Portuguese markets and the risk for consumers. **Chemosphere**, 75:661-666. doi: [10.1016/j.chemosphere.2008.12.066](https://doi.org/10.1016/j.chemosphere.2008.12.066) (ENVIRONMENTAL SCIENCES; impact factor: 3.253; ranking: 23/181; Quartile Q1).

8. **ENES, P.**, PANSERAT, S., KAUSHIK, S., OLIVA-TELES, A., **2008**. Hepatic glucokinase and glucose-6-phosphatase responses to dietary starch and glucose in gilthead sea bream (*Sparus aurata*) juveniles at different rearing temperatures. **Comparative Biochemistry and Physiology, Part A**, 149:80-86. doi:[10.1016/j.cbpa.2007.10.012](https://doi.org/10.1016/j.cbpa.2007.10.012) (ZOOLOGY; impact factor: 1.709; ranking: 27/125; Quartile Q1).

7. **ENES, P.**, PANSERAT, S., KAUSHIK, S., OLIVA-TELES, A., **2008**. Growth performance and metabolic utilization of diets with native and waxy maize starch by gilthead sea bream (*Sparus aurata*) juveniles. **Aquaculture**, 274:101-108. doi: [10.1016/j.aquaculture.2007.11.009](https://doi.org/10.1016/j.aquaculture.2007.11.009) (FISHERIES; impact factor: 1.678; ranking: 9/40; Quartile Q1).

6. **ENES, P.**, PANSERAT, S. KAUSHIK, S., OLIVA-TELES, A., **2008**. Rearing temperature enhances hepatic glucokinase but not glucose-6-phosphatase activities in European sea bass (*Dicentrarchus labrax*) and gilthead sea bream (*Sparus aurata*) juveniles fed with the same levels of glucose. **Comparative Biochemistry and Physiology, Part A**, 150:355-358. doi: [10.1016/j.cbpa.2008.04.596](https://doi.org/10.1016/j.cbpa.2008.04.596) (ZOOLOGY; impact factor: 1.709; ranking: 27/125; Quartile Q1).

5. MOREIRA, I. S., PERES, H., COUTO, A., **ENES, P.**, OLIVA-TELES, A., **2008**. Temperature and dietary carbohydrate level effects on performance and metabolic utilisation of diets in European sea bass (*Dicentrarchus labrax*) juveniles. **Aquaculture**, 274:153-160. doi: [10.1016/j.aquaculture.2007.11.016](https://doi.org/10.1016/j.aquaculture.2007.11.016) (FISHERIES; impact factor: 1.678; ranking: 9/40; Quartile Q1).

4. COUTO, A., **ENES, P.**, PERES, H., OLIVA-TELES, A., **2008**. Effect of water temperature and dietary carbohydrate level on growth performance and metabolic utilization of diets in gilthead sea bream (*Sparus aurata*) juveniles. **Comparative Biochemistry and Physiology, Part A**, 15:45-50. doi: [10.1016/j.cbpa.2008.05.013](https://doi.org/10.1016/j.cbpa.2008.05.013) (ZOOLOGY; impact factor: 1.709; ranking: 27/125; Quartile Q1).

3. **ENES, P.**, PANSERAT, S., KAUSHIK, S., OLIVA-TELES, A., **2006**. Effect of normal and waxy maize starch on growth, food utilization and hepatic glucose metabolism in European sea bass (*Dicentrarchus labrax*) juveniles. **Comparative Biochemistry and Physiology, Part A**, 143:89-96. doi: [10.1016/j.cbpa.2005.10.027](https://doi.org/10.1016/j.cbpa.2005.10.027) (ZOOLOGY; impact factor: 1.553; ranking: 25/115; Quartile **Q1**).

2. **ENES, P.**, PANSERAT, S., KAUSHIK, S., OLIVA-TELES, A., **2006**. A. Rapid metabolic adaptation in European sea bass (*Dicentrarchus labrax*) juveniles fed different carbohydrate sources after heat shock stress. **Comparative Biochemistry and Physiology, Part A**, 145:73-81. doi: [10.1016/j.cbpa.2006.05.002](https://doi.org/10.1016/j.cbpa.2006.05.002) (ZOOLOGY; impact factor: 1.553; ranking: 25/115; Quartile **Q1**).

1. **ENES, P.**, BORGES, M.-T., **2003**. Evaluation of microalgae and industrial cheese whey as diets for *Tapes decussatus* (L.) seed: effects on water quality, growth, survival, condition and filtration rate. **Aquaculture Research**, 34: 299-309. doi: [10.1046/j.1365-2109.2003.00818.x](https://doi.org/10.1046/j.1365-2109.2003.00818.x) (FISHERIES; impact factor: 0.766; ranking: 23/39; Quartile **Q3**).

#### **Scopus Citation Overview**

Sum of the Times Cited: 764

h-index: 13

Last Updated: 13/10/2017

### **PARTICIPATION IN RESEARCH & DEVELOPMENT PROJECTS**

#### **2016 - 2019**

##### **Principal Investigator**

Project: PTDC/CVT-WEL/5207/2014 - From zebrafish to meagre: use of macro- and microalgae as functional feeds. Financial entity: FCT (Fundação para a Ciência e a Tecnologia). Funding: 181.284,00€.

#### **2016 - 2019**

##### **Post-Doctoral Researcher- Full Member**

Project: PTDC/MAR-BIO/6233/2014 - Inclusion of microalgae in sea bass diets: boosting immunity through nutrition. Financial entity: FCT (Fundação para a Ciência e a Tecnologia). Funding: 169.488,00€

Project Coordinator: Dr. Ana Couto, CIIMAR, Matosinhos, Portugal.

#### **2016 - 2018**

##### **Post-Doctoral Researcher- Full Member**

Project: NORTE-01-0145-FEDER-000035 - INSEAFood - Innovation and valorization of seafeed products: meeting local challenges and opportunities. Financial entity: Programa Operacional Regional do Norte (NORTE2020), through Fundo Europeu de Desenvolvimento Regional (FEDER). Funding: 142.4983,38€

Project Coordinator: Dr. Luísa Valente, CIIMAR, Matosinhos, Portugal.

#### **2014**

##### **Principal Investigator**

Project: EXPL/MAR-BIO/0351/2013 - PROFISH – Screening for novel probiotics within the European sea bass (*Dicentrarchus labrax*) microbiota capable of improving plant feedstuffs utilization. Financial entity: FCT (Fundação para a Ciência e a Tecnologia). Funding: 40.410,00€.

#### **2013 - 2015**

**Post-Doctoral Researcher- Full Member - Coordinator of Task 4**

Project: NORTE-07-0124-FEDER-000038 - AQUAIMPROV - Sustainable aquaculture and animal welfare. Financial entity: Programa Operacional Regional do Norte (ON.2 - O Novo Norte). Funding: 763.156,49€.

Project Coordinator: Dr. Aires Oliva-Teles, CIIMAR, Matosinhos, Portugal.

**2013 - 2015****Post-Doctoral Researcher- Full Member**

Project: PTDC/MAR-BIO/4107/2012 - Effect on lipid metabolism of vegetable lipid interaction with carbohydrate in an important marine aquaculture fish species, European sea bass (*Dicentrarchus labrax*). Financial entity: FCT (Fundação para a Ciência e a Tecnologia). Funding: 146.856.00€.

Project Coordinator: Dr. Aires Oliva-Teles, CIIMAR, Matosinhos, Portugal.

**2013****Principal investigator**

Project: PP\_IJUP2012\_SOJA DE PORTUGAL 20 - Carob seed germ meal as a partial fish meal substitute in diets for meagre (*Argyrosomus regius*): growth, digestibility and health status. Financial entity: Soja de Portugal, Projetos IJUP Empresas. Funding: 4.000,00€.

**2005 - 2008****PhD Researcher- Full Member**

Project: POCI-CVT-57695-2004 - Dietary carbohydrate utilization by European sea bass (*Dicentrarchus labrax* L.) and gilthead sea bream (*Sparus aurata* L.) juveniles. Financial entity: FCT (Fundação para a Ciência e a Tecnologia). Funding: 83.337,00€.

Project Coordinator: Dr. Aires Oliva-Teles, Faculdade de Ciências, Universidade do Porto, Porto, Portugal.

**2000 - 2003****Research grant (BI) – Full Member**

Project: POCTI/MAR/15284/1999 - Interference of organotins with gastropod physiology associated to the imposex phenomenon. Financial entity: FCT (Fundação para a Ciência e a Tecnologia). Funding: 99.760,00€.

Project Coordinator: Dr. Maria Armanda Reis Henriques, Faculdade de Ciências, Universidade do Porto, Porto, Portugal.

**SUPERVISION EXPERIENCE****BSc students****2016 - 2017**

Pedro Campelos Ribeiro - Biology Graduated Student

Potential of novel probiotics screened within European sea bass (*Dicentrarchus labrax*) gut microbiota for improving plant feedstuffs utilization: effects on growth performance and nutrient digestibility. Faculty of Sciences of University of Porto ([www.fc.up.pt](http://www.fc.up.pt)), Porto, Portugal.

**2015 - 2016**

Pedro Rafael Martins Vaz - Biology Graduated Student

Potential of chromium oxide and prebiotics in modulating intestinal microbiota of gilthead seabream (*Sparus aurata*). Faculty of Sciences of University of Porto ([www.fc.up.pt](http://www.fc.up.pt)), Porto, Portugal.



**2015 - 2016**

Bruno Filipe Pereira de Sousa - Biology Graduated Student

Evaluating the impact of feeding habits on fish gut microbiota: community fingerprinting of important omnivorous and carnivorous aquaculture fish species. Faculty of Sciences of University of Porto ([www.fc.up.pt](http://www.fc.up.pt)), Porto, Portugal.

**2015 - 2016**

Rui Filipe Resende Pinto - Biology Graduated Student

Potential of novel probiotics isolated from fish gut microbiota in improving plant feedstuffs utilization in white sea bream (*Diplodus sargus*) juveniles". Faculty of Sciences of University of Porto ([www.fc.up.pt](http://www.fc.up.pt)), Porto, Portugal.

**2015 - 2016**

Vanessa Alexandra Teixeira de Sá Queirós - Biology Graduated Student

Potential of prebiotics in improving growth and gut morphology of gilthead seabream (*Sparus aurata*) juveniles fed plant feedstuffs-based diets". Faculty of Sciences of University of Porto ([www.fc.up.pt](http://www.fc.up.pt)), Porto, Portugal.

**2015 - 2016**

Rita Meireles de Castro - Biology Graduated Student

Potential use of "processed animal proteins" for meagre (*Argyrosomus regius*): effect on growth, digestive function and antioxidant status. Programme Blue Young Talent (BYT) CIIMAR ([www.ciimar.up.pt](http://www.ciimar.up.pt)), University of Porto, Portugal.

**2014 - 2015**

Cassandra de Almeida Peixoto - Biology Graduated Student

Potential of short-chain fructooligosaccharides (FOS), xylooligosaccharides (XOS) and galactooligosaccharides (GOS) in modulating intestinal microbiota and digestive enzymes in European sea bass (*Dicentrarchus labrax*) juveniles. Faculty of Sciences of University of Porto ([www.fc.up.pt](http://www.fc.up.pt)), Porto, Portugal.

**2012 - 2013**

Mayara de Moura Pereira - Zootechny Graduated Student

Protein sparing effect of dietary carbohydrates in pacu (*Piaractus mesopotamicus*). Faculty of Sciences of University of Porto ([www.fc.up.pt](http://www.fc.up.pt)), Porto, Portugal and Paulista State University (UNESP) ([www.unesp.br](http://www.unesp.br)) - Dracena, São Paulo, Brasil.

**2007 - 2008**

Pedro Araújo - Biology Graduated Student

Utilization of dietary carbohydrates with different molecular complexities in Gilthead sea bream. Faculty of Sciences of University of Porto ([www.fc.up.pt](http://www.fc.up.pt)), Porto, Portugal.

**2007**

Ivone Almeida - Biology Graduated Student

Utilization of dietary carbohydrates with different molecular complexities (starch, dextrin, maltose and glucose) by European sea bass and Gilthead sea bream juveniles.

Research internship in Biology (University of Aveiro, [www.ua.pt/](http://www.ua.pt/), Aveiro, Portugal) performed at Faculty of Sciences of University of Porto ([www.fc.up.pt](http://www.fc.up.pt)), Porto, Portugal.

**MSc students****2015 - 2016**

Tiago Manuel Marques Ventura Oliveira Luz - Master Student

Dissertation Project: Potential of novel probiotics isolated from fish gut microbiota for improving plant feedstuffs utilization and gut health in white seabream (*Diplodus sargus*) juveniles. Master's Degree in Biological Aquatic Resources, Faculty of Sciences of University of Porto ([www.fc.up.pt](http://www.fc.up.pt)), Porto, Portugal.

#### **2013 - 2014**

Carolina Isadora F. S. V. Barroso - Master Student

Carob seed germ meal as a partial fish meal substitute in diets for meagre (*Argyrosomus regius*): growth, digestibility and health status". Master's Degree in Biological Aquatic Resources, Faculty of Sciences of University of Porto ([www.fc.up.pt](http://www.fc.up.pt)), Porto, Portugal.

#### **PhD Students**

##### **2015 - 2016**

Francisco Oliveira de Magalhães Júnior - PhD in Animal Science

Potential of prebiotics in improving digestive function, gut morphology and gut microbiota of gilthead sea bream (*Sparus aurata*) juveniles fed plant-based diets. Faculty of Sciences of University of Porto ([www.fc.up.pt](http://www.fc.up.pt)), Porto, Portugal and State University of Santa Cruz ([www.uesc.br/en/](http://www.uesc.br/en/)), Department of Agricultural and Environmental Sciences, College of Veterinary Medicine, Ilhéus-Bahia, Brasil.

#### **Post-Doc Supervisor**

##### **2017 - 2020**

Inês Maria dos Santos Guerreiro

Research conducted at CIIMAR (Fish Nutrition and Immunobiology Group) and University of Barcelona, Spain (Department of Cell Biology, Physiology and Immunology, Faculty of Biology). Granted by Portuguese Science and Technology Foundation (FCT) (SFRH/BPD/114959/2016). Subject: Nutritional status effects on appetite regulation in gilthead seabream (*Sparus aurata*).

### **COMMUNICATIONS**

#### **Oral**

5. OLIVA-TELES, A., PERES, H., **ENES, P.**, COUTO, A., **2017**. Aquaculture: Making Green the Blue Revolution. Meeting with Science and Technology in Portugal 2017. Centro de Congressos de Lisboa, Portugal. 3-5th July 2017.

4. SANTOS, R.A., OLIVA-TELES, A., SAAVEDRA, M.J., **ENES, P.**, SERRA, C.R., **2017**. Fish commensals to control fish pathogens: *Bacillus* and their Natural Antimicrobial Compounds (NACs). 10th Meeting of Young Researchers of University of Porto - IJUP 2017. Porto, Portugal. 8-10th February 2017.

3. SERRA, C.S., GUERREIRO, I., ALMEIDA, A., SANTOS, R.A., TAVARES, F., OLIVA-TELES, A., **ENES, P.**, **2016**. Diversity of sporeformers associated with European sea bass (*Dicentrarchus labrax*) juveniles fed plant-based diets: towards selection of carbohydrate-active probiotics. Aquaculture Europe 2016. Edinburgh, Scotland. 20-23th September 2016.

2. GUERREIRO, I., OLIVA-TELES, A., **ENES, P.**, **2014**. Potential of short-chain fructooligosaccharides (SCFOS) and xylooligosaccharides (XOS) in modulating glucose and lipid metabolism in European sea bass (*Dicentrarchus labrax*). Aquaculture Europe 2014. Donostia - San Sebastián, Spain. 14-17th October 2014.

1. BARROSO, C., COSTAS, B., PERES, H., MATOS, E., COUTO, A., OLIVA-TELES, A., **ENES, P.**, 2014. Carob seed germ meal as a partial fish meal substitute in diets for meagre (*Argyrosomus regius*): growth and health status. 7th Meeting of Young Researchers of University of Porto - IJUP 2014. Porto, Portugal.

## Posters

17. SERRA, C.R., OLIVA-TELES, A., **ENES, P.**, TAVARES, T., 2017. Gut microbiota dynamics in carnivorous European sea bass (*Dicentrarchus labrax*) fed plant-based diets. FEMS 2017 - 7th Congress of European Microbiologists. Valencia, Spain. 9-13th July 2017.

16. LUZ, T., COUTO, A., SERRA, C.S., OLIVA-TELES, A., **ENES, P.**, 2016. Potential of novel probiotics isolated from fish gut microbiota for improving plant feedstuffs utilization and gut homeostasis in white sea bream (*Diplodus sargus*) juveniles. Aquaculture Europe 2016. Edinburgh, Scotland. 20-23th September 2016.

15. SERRA, C.S., GIL, F., OLIVA-TELES, A., **ENES, P.**, TAVARES, F., 2016. Gut microbiota dynamics in European sea bass (*Dicentrarchus labrax*) juveniles fed plant-based diets. Aquaculture Europe 2016. Edinburgh, Scotland. 20-23th September 2016.

14. SANTOS, R.A., COUTO, A., LAVRADOR, A.S., OLIVA-TELES, A., **ENES, P.**, SERRA, C.S., 2016. Snack for fish: sporeformers and their natural antimicrobial compounds as a knowledgeable approach to control fish diseases. Aquaculture Europe 2016. Edinburgh, Scotland. 20-23th September 2016.

13. JORGE, S., **ENES, P.**, SERRA, C.R., OLIVA-TELES, A., COUTO, A., 2016. Effect of microalgae in *Sparus aurata* (Gilthead seabream) diets. Aquaculture Europe 2016. Edinburgh, Scotland. 20-23th September 2016.

12. SANTOS, R.A., COUTO, A., OLIVA-TELES, A., SAAVEDRA, M.J., **ENES, P.**, SERRA, C.S., 2016. Fish gut sporeformers to control fish pathogens. IMMR - International Meeting on Marine Research. Peniche, Portugal. 14-15th July 2016.

11. ALMEIDA, E., SERRA, C., ALBUQUERQUE, P., GUERREIRO, I., OLIVA-TELES, A., **ENES, P.**, TAVARES, F., 2015. Species specific DNA-markers for culture-independent detection and quantification of *Bacillus licheniformis* in fish gut. FEMS 2015 - 6th Congress of European Microbiologists. Maastricht, The Netherlands. 7-11th June 2015.

10. GUERREIRO, I., MACHADO, M., CASTRO, C., COSTAS, B., OLIVA-TELES, A., **ENES, P.**, 2015. Effects of prebiotics on hepatic oxidative status and immune response of white seabream (*Diplodus sargus*). Aquaculture Europe 2015. Rotterdam, Netherlands. 20-23th October 2015.

9. BARROSO, C., COUTO, A., **ENES, P.**, DÍAZ-ROSALES, P., AFONSO, A., MATOS, E., PERES, H., OLIVA-TELES, A., BENJAMÍN COSTAS, B., 2015. Blood cells and gut immune parameters of meagre (*Argyrosomus regius*) are unaffected by high dietary carob seed germ meal. IV National Meeting Postgraduate in Biological Sciences. Aveiro, Portugal. 30 March - 2 April 2015.

8. SERRA, C.R., GUERREIRO, I., ALMEIDA, E., TAVARES, F., OLIVA-TELES, A., **ENES, P.**, 2014. Screening for *Bacillus* spp. from European sea bass (*Dicentrarchus labrax*) gut microbiota

capable of improving plant feedstuffs utilization. Aquaculture Europe 2014. Donostia - San Sebastián, Spain. 14-17th October 2014.

7. **ENES, P.**, PÉREZ-JIMÉNEZ, A., GUERREIRO, I., OLIVA-TELES, A., **2014**. Hepatic oxidative status of European sea bass (*Dicentrarchus labrax*) fed plant or fish meal based diets supplemented with short-chain fructooligosaccharides (SCFOS) and xylooligosaccharides (XOS). Aquaculture Europe 2014. Donostia - San Sebastián, Spain. 14-17th October 2014.

6. COSTAS, B., AZEREDO, R., MACHADO, M., OLIVA-TELES, A., **ENES, P.**, **2014**. Interactive effects of dietary prebiotics and fish meal replacement by plant ingredients on innate immune status of European sea bass *Dicentrarchus labrax*. Aquaculture Europe 2014. Donostia - San Sebastián, Spain. 14-17th October 2014.

5. BARROSO, C., **ENES, P.**, DÍAZ-ROSALES, P., PERES, H., OLIVA-TELES, A., COSTAS, B., **2014**. Partial fish meal replacement by carob seed germ meal influences meagre *Argyrosomus regius* immune parameters. Aquaculture Europe 2014. Donostia - San Sebastián, Spain. 14-17th October 2014.

4. COUTO, A., **ENES, P.**, PERES, H., OLIVA-TELES, A., **2010**. Growth performance of gilthead sea bream (*Sparus aurata*) fed diets containing whole cereal meals. Aquaculture Europe 2010. Porto, Portugal. 5- 8th October 2010.

3. COUTO, A., **ENES, P.**, PERES, H., OLIVA-TELES, A., **2010**. Growth performance of European sea bass (*Dicentrarchus labrax*) fed diets containing whole cereal meals. Aquaculture Europe 2010. Porto, Portugal. 5-8th October 2010.

2. **ENES, P.**, PANSEERAT, S., KAUSHIK, S., OLIVA-TELES, A., **2006**. Rapid metabolic adaptation in gilthead sea bream (*Sparus aurata*) juveniles fed different carbohydrate sources after heat shock stress. XII International Symposium on Fish Nutrition and Feeding. Biarritz, France. 28 May - 1 June 2006.

1. SANTOS, M.M., TEM HALLERS-TJABBES, C.C., CASTRO, E., **ENES P.**, VIEIRA, N., **2000**. Imposex in the dogwhelk *Nucella lapillus*, a bioindicator for TBT contamination: re-survey along the Portuguese coast to assess the effectiveness of present regulation. Biomarkers 2001 - Biomarkers of Environmental contamination. Póvoa de Varzim, Portugal. 24-26th September 2000.

## **TECHNOLOGY TRANSFER ACTIVITIES**

### **Patents**

ProZyme - Next Generation Probiotics for Aquaculture. European Patent Application being prepared by PATENTREE - patents.pt.

### **Licensing agreements**

Licence Agreement with EPICORE, a major USA manufacturer and supplier of animal feed microbial supplements, was signed in order to evaluate the possibility of turning 3 bacteria isolates with anti-pathogenic activity, into a commercial product for use in worldwide aquaculture.

## **TECHNOLOGY COMMERCIALIZATION CONTESTS**

### **COHITEC Program 2017: Turning Science into Business**

**14 March - 11 July 2017**

Contact Hours: 100 (Porto Business School)

**Seminars Attended:** Patents & Landscape; Cold Calling & Market Research; Legal & Financing; Business Plan; Financials; War Stories; Business Development.

COTEC Portugal - Associação Empresarial para a Inovação.

## **PEER-REVIEW ASSIGNMENTS**

### **Journals**

Aquaculture (3), Aquaculture Research (6), Aquaculture Nutrition (7), Comparative Biochemistry and Physiology (5), Fish Physiology and Biochemistry (12), Journal of the World Aquaculture Society (6), Turkish Journal of Fisheries and Aquatic Sciences (1), Animal Feed Science (1) and British Journal of Nutrition (2) (43 papers revised).

## **ADVANCED COURSES**

2014: "Protection of animals used for experimental and/or other scientific purposes" Federation of European Laboratory Animal Science Associations (FELASA) **category C** (coordinating researcher) obtained by Direção Geral de Alimentação e Veterinária (DGAV).

2013 (20 - 24 May): "Laboratory Animal in Science Course - Aquatic Organisms (CAL-AQUA)". Course program accordingly to DGAV and FELASA guidelines for Laboratory Animal Sciences courses, category B.

2012 (18 - 21 June): COST-FAProteomics Action (FA1002) entitled "Gel based protein separation by two-dimensional gel electrophoresis and protein characterization by MALDI-TOF/TOF mass spectrometry". Performed at CIIMAR and Institute of Molecular Pathology and Immunology of the University of Porto, Portugal (IPATIMUP).

## **ADDITIONAL INFORMATION**

### **Master's thesis panel member**

2012: "Apparent digestibility coefficient of feed ingredients for juvenile meagre (*Argyrosomus regius*, Asso 1801)". Faculty of Sciences, University of Porto, Portugal.

2011: "Effects of protein/carbohydrate ratio and temperature on growth performance, metabolism and oxidative status of Senegalese sole juveniles". Faculty of Sciences, University of Porto, Portugal.

### **BSc student panel member**

2014: “Effects of dietary interaction between vegetable oils and carbohydrates on gilthead sea bream (*Sparus aurata*) growth performance”. Institute of Biomedical Sciences Abel Salazar, University of Porto. Portugal.

#### **Jury for attribution of research grants**

September 2017: “ZEBRALGRE - From zebrafish to meagre: use of macro- and microalgae as functional feeds” supported by the Fundação para a Ciência e a Tecnologia and co-financed by Fundo Europeu de Desenvolvimento Regional (FEDER), from COMPETE 2020-Programa Operacional Competitividade e Internacionalização (POCI).

April 2016: Structured Program of R&D&I INNOVMAR - Innovation and Sustainability in the Management and Exploitation of Marine Resources (NORTE-01-0145-FEDER-000035)”, within the Research Line “INSEAFOOD Innovation and valorization of seafood products: meeting local challenges and opportunities” within the R&D Institution CIIMAR, supported by the Northern Regional Operational Programme (NORTE2020), through the European Regional Development Fund (ERDF).

March 2009: “OPTISOLE – Investigação e desenvolvimento na produção de juvenis de linguado: incremento da resistência a patologias e do crescimento” supported by Operational Programme Competitiveness Factors, co-financed through the European Regional Development Fund (ERDF).

**Maternity leave since 27<sup>th</sup> October of 2010 until 25<sup>th</sup> March of 2011.**