

# PROMOTING THE CONNECTION BETWEEN FISHERMEN AND CONSUMERS, REGARDING THE SUSTAINABILITY OF THE EXPLOITATION OF MEAGRE (*ARGYROSOMUS REGIUS*): NUTRICIONAL QUALITY AND FOOD SAFETY IN TAGUS ESTUARY

André Jorge<sup>1,2</sup>, Bernardo Quintella<sup>3</sup>, Marco Gomes da Silva<sup>2</sup> and M. João Lança<sup>1,4</sup>

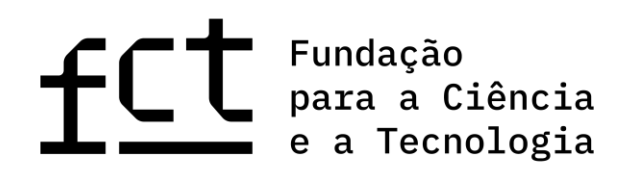
<sup>1</sup> MED – Mediterranean Institute for Agriculture, Environment and Development & CHANGE – Global Change and Sustainability Institute, Institute for Advanced Studies and Research, Universidade de Évora, Pólo da Mitra, Universidade de Évora, Pólo da Mitra, Ap. 94, 7006-554 Évora, Portugal.

<sup>2</sup> LAQV, REQUIMTE, Departamento de Química, Faculdade de Ciências e Tecnologia, Universidade Nova de Lisboa, 2829-516 Caparica, Portugal

<sup>3</sup> MARE - Marine and Environmental Sciences Centre / ARNET - Aquatic Research Network, Institute for Research and Advanced Training (IIFA), Faculdade de Ciências, Universidade de Lisboa, 1749-016 Lisboa, Portugal

<sup>4</sup> Departamento de Zootecnia, Escola de Ciências e Tecnologia, Universidade de Évora, Pólo da Mitra, Ap. 94, 7006-554 Évora, Portugal

✉ af.jorge@campus.fct.unl.pt



## Introduction

Meagre (*Argyrosomus regius*) is a sciaenid fish, with distribution along the Northeast and Central-West Atlantic, from the coast of Sweden to the Gulf of Guinea and in the Mediterranean and Black Sea<sup>[1]</sup>. Due to its large flesh percentage in total weight and higher growth rates, it makes meagre one of the most probably high value species to be considered for aquaculture production.

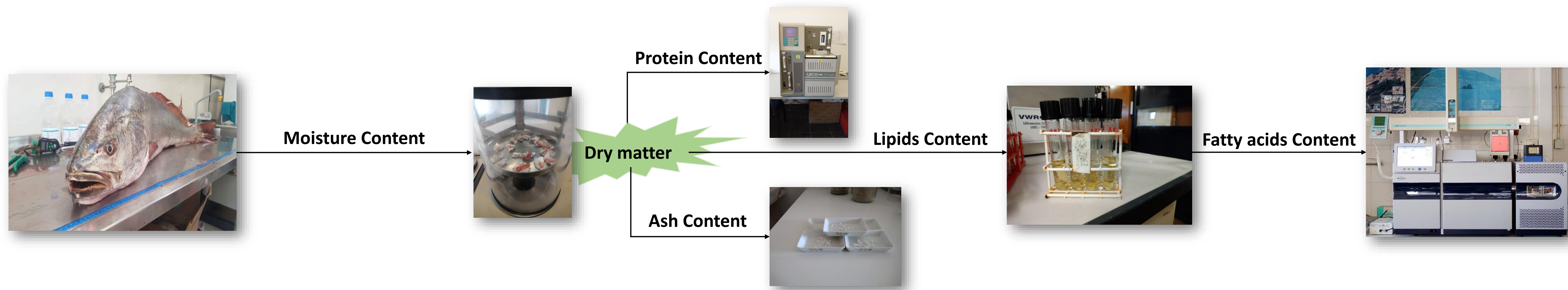
In Portugal, the meagre is targeted by both commercial and recreational fisheries. During the last decade, the Tagus estuary and the adjacent coastal zone represent between 60 to 70% of the Portuguese meagre landings with a total annual volume around 132 t<sup>[2]</sup>. The most recent report from INE shows of 297 t of wild meagre landings in Portugal, with a mid-price of 9,37 €/kg<sup>[3]</sup>.

The proportion in last decade of meagre on fish markets are majority from aquaculture production (approx. 80 %), but in coastal zones close to spawning locations the percentage of wild meagre are higher than aquaculture origin. Besides that, wild meagre who reach markets are bigger than the meagre from aquaculture (1-2 Kg for aquaculture and >2 Kg to wild catch), therefore presents different characteristics. To our knowledge, research papers with nutritional parameters in wild meagre are scarce, and from Tagus river and/or adjacent coastal zones is just one.

The Tagus estuary it's one of the largest estuaries in Europe with an area of 320 Km<sup>2</sup> (beaches, intertidal mudflats, salt marshes, urbanization and crop fields)<sup>[4]</sup>, with different anthropogenic sources of pollutants such as untreated urban sewage discharges, industry effluents (from chemical, petrochemical, metallurgic, shipyards, and concrete manufacturing), agriculture (leaching of fertilizers and pesticides)<sup>[5]</sup>, and commercial and ludic activities (small fisheries, port activities, recreational boats and other water vehicles)<sup>[6]</sup>, which might make seafood from Tagus river and estuary potential contaminated. Therefore, it's important to evaluate a nutritional parameters and understand if the edible part of meagre is contaminated.

## Methodology

Sampling occurred in June-July 2020 in Tagus estuary and surrounding marine areas. A total of 20 Meagre individuals were caught. Tissue samples were analysed for moisture, protein, ash and lipid content and fatty acid profile.



## Results

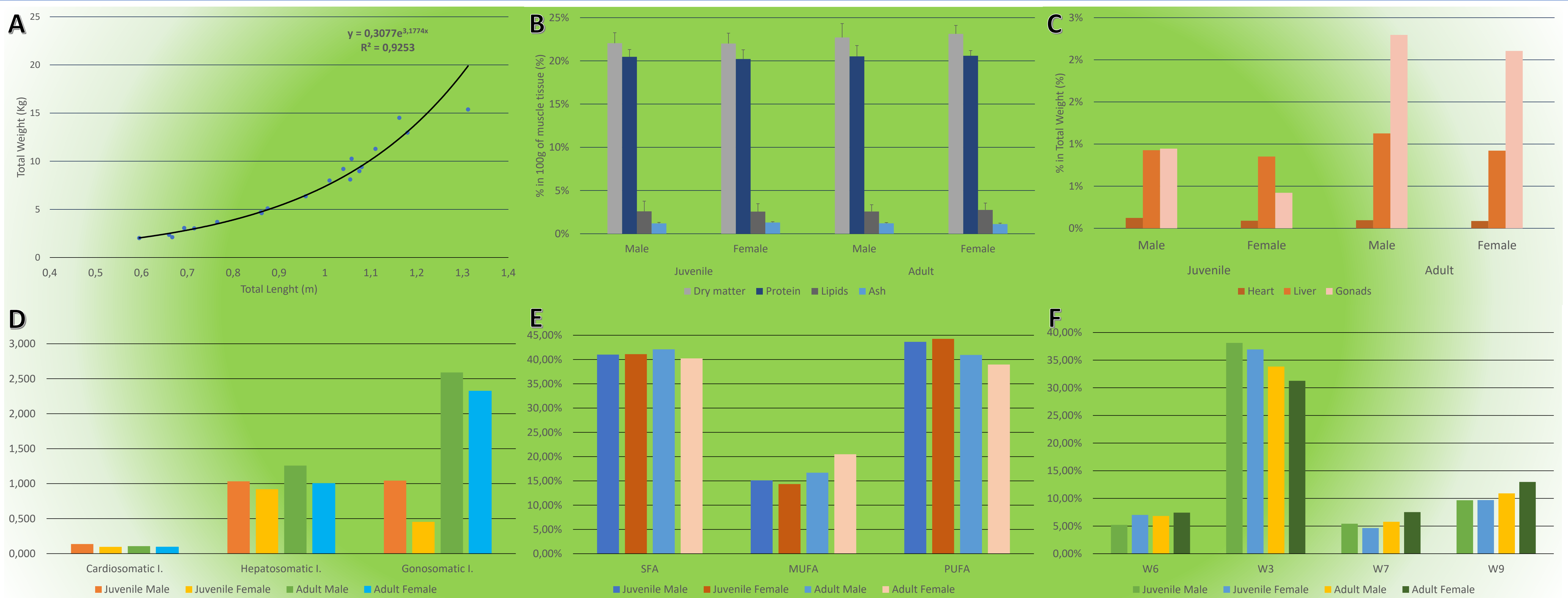


Figure A. Total weight vs. Total Length (Condition Factor); B. Composition of dry matter from the muscle; C. Percentage of 3 types of organs in Total Weight; D. Index of 3 organs from wild meagre; E. Percentage of 3 major class of fatty acids in muscle tissue from wild meagre; F. Percentage of omega families in muscle tissue from wild meagre;

## Discussion & Conclusion

To better understand the nutritional parameters of wild meagre capture in Tagus estuary or near coastal zones, 5 individuals from different stages of growth and gender were analyzed. In this study the condition factor is 3.177 very close to isometric growth for meagre in wild state. The cardiosomatic index through the sample are very similar, nevertheless male individuals in both stages show higher values than females and a small decrease from juveniles to adult individuals. The hepatosomatic index male individuals show higher values than females and small increase from juveniles to adult individuals. The individuals were captured during the reproduction season and the values of gonadosomatic index is higher than out of season. Nevertheless, to this study the males also maintain higher values than female individuals, but from juvenile to adult occur a significant increase in value: for male 2.5x and for female 4x times.

Regarding moisture content the four groups present similar results, nevertheless adults individuals present less moisture content than juveniles (77% vs. 78%), these results are like others-The gender isn't a significant factor. The content of protein, ash and lipids are very similar among all individuals (approximately 20%, 1.2% and 2.5%, respectively)-Seafood is a good source of LC-PUFA, and meagre as fish is not exception. Meagre presents high proportion of PUFA, specifically omega 6 fatty acids being approximately 40% and 35% of total profile, respectively. That makes wild meagre a good candidate as source of omega 6 fatty acids for human diet. In this study it was possible to observe a decreasing of PUFA proportion from juvenile to adults that concurred with a decreasing of omega 6 proportion. The SFA proportion remain relatively stable along the samples. Regarding MUFA our results revealed an increase occurs from juvenile to adult, and both omega 7 and omega 9 fatty acids contribute to this increase, being acid oleic is the fatty acids that most contribute to this difference.

## Future work

We are developing methodology to detect and quantify pollutant in fish matrix, including meagre. We also know that Tagus river and the estuary more specifically, have high concentrations of POP (persistent organic pollutants), antibiotics, hormones and heavy metals in sediments, water and other seafood species. Therefore, we believe that meagre caught in this area has higher probability of being contaminated.

## References

1. Quémer L. (2002) - Le maigre commun (*Argyrosomus regius*): Biologie, pêche, marché et potentiel aquacole. IFREMER, Plouzané, France.
2. Mota, A. (2018) - Pescarias de Corvina-legítima na região do Estuário do Tejo: caracterização das componentes lúdica e comercial. Dissertação de Mestrado, Faculdade de Ciências, Lisboa, Universidade de Lisboa.
3. Instituto Nacional de Estatística - Estatísticas da Pesca : 2022. Lisboa : INE, 2023. Disponível na www: <url:https://www.ine.pt/xurl/pub/66322600>. ISSN 0377-225-X. ISBN 978-989-25-0643-2.
4. Tavares, A.O., Santos, P.P., Freire, P., Fortunato, A.B., Rilo, A., Sá, L., 2015. Flooding hazard in the Tagus estuarine area: the challenge of scale in vulnerability assessment. Environ. Sci. Pol. 51, 238–255. <https://doi.org/10.1016/j.envsci.2015.04.010>.
5. Duarte, B., Silva, G., Costa, J.L., Medeiros, J.P., Azeda, C., Sá, E., Metelo, I., Costa, M.J., Caçador, I., 2014. Heavy metal distribution and partitioning in the vicinity of the discharge areas of Lisbon drainage basins (Tagus Estuary, Portugal). J. Sea Res. 93, 101–111.
6. Chainho, P., Silva, G., Costa, J.L., Costa, M.J., 2014. The Tagus estuary: problems and opportunities of the new River Basin Management Plans. In: The Tagus: History of an Ignored River. Foundation of the New Water Culture, pp. 145–171 (ISBN: 978-84-938966-4-5).

## Acknowledgements

André Jorge would like to thank to Fundação para a Ciência e Tecnologia (FCT) for a PhD scholarship UI/BD/153381/2022.

This work was funding by National Funds through FCT - Foundation for Science and Technology under the Project PTDC/BIA-BMA/030517/2017 and the Portuguese Science Foundation through the strategy plan for MED (Mediterranean Institute for Agriculture, Environment and Development), via project UIDB/05183/2020, for MARE (Marine and Environmental Sciences Centre), via project UIDB/04292/2020, UID/50006/2020, and under the project LA/P/0069/2020 granted to the Associate Laboratory ARNET; and for LAQV-REQUIMTE, via project UIDB/50006/2020 and UIDP/50006/2020. This research was also anchored by the RESOLUTION LAB, an infrastructure at NOVA School of Science and Technology.