INNOVATIVE BLOCKCHAIN TRACEABILITY TECHNOLOGY AND STAKEHOLDERS' ENGAGEMENT STRATEGY FOR BOOSTING SUSTAINABLE SEAFOOD VISIBILITY, SOCIAL ACCEPTANCE AND CONSUMPTION IN EUROPE

BENEFITS ASSOCIATED WITH ALGARVE OCTOPUS CONSUMPTION

LAYMAN'S REPORT

Based on WP6: Life Cycle Analysis, Impact and Market Uptake

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1. INTRODUCTION

This study was performed in the frame of the European SEA2SEE project (https://sea2see.eu/) aimed to increase consumer confidence and acceptance of sustainably fished or farmed seafood in Europe. Total transparency and traceability of fishery and aquaculture products in the EU is not fulfilled, and even certain European markets are characterized by a high level of unsustainable fishing and farming practices. For that, an innovative blockchain traceability model and implementation of strategies to raise awareness of the benefits of seafood was developed in the SEA2SEE project.

In this report we focused on Octopus vulgaris from two regions of the Algarve fishing areas: Barlavento/Windward (Alvor harbour) and Sotavento/Leeward (Fuzeta harbour). It intends to translate in layman's language the scientific outcomes of Algarve octopus evaluated in this project, regarding their impact on human health. The favorable influence on health maintenance and promotion can be estimated in terms of nutrients content (improved nutritional status), quality of protein and fatty acids and absence of contaminants (reduced hazards).

Proper communication of benefits achievable through consumption of these products to society will support the empowerment of industries that work with these quality standards and the EU citizens towards sustainable, transparent and healthy choices.

Octopus is a cephalopod mollusk widely consumed throughout the world and a marine resource of considerable economic and nutritional value. Its meat is appreciated for its texture, flavor, and high protein content. In recent years, interest in seafood as a source of functional nutrients has grown, while at the same time, concerns about its sustainability and potential risks to human health have increased.

The objective of this report is to offer a balanced assessment of the nutritional benefits and potential risks associated with consumption of octopus from Algarve, presented in clear and accessible language. According to EFSA, risk-benefit analysis consists in a complex method for weighing up the risks, in terms of the incidence and severity, associated with exposure to a substance versus the likely benefits. Therefore, a very preliminary assessment of risks and benefits of exposure of Algarve octopus' consumption is presented below.

2. BENEFITS OF OCTOPUS CONSUMPTION

2.1. Nutritional Value

Octopus is a food rich in high-quality protein, with low fat and calorie content. Raw Algarve octopus provides approximately 17 g of protein and less than 1 g of fat per 100 g of meat, making it a healthy option within balanced or low-calorie diets. Moreover, this protein source has high quality with higher biological value than casein.

The percentage of essential amino acids, those that our organism cannot synthesize, so they need to be incorporated through diet, is high, near 40 %. This value is higher than the recommended values of ideal protein intake for adults, children and very close to that for children. This excellent amino acid profile contributes to the maintenance and repair of muscle tissue, making it useful in sports and recovery diets.

2.2. Vitamin and Mineral Content

Octopus is a significant source of essential micronutrients, especially magnesium, copper, selenium, and phosphorus, important for bone health and cellular function. Selenium and copper, for their part, act as antioxidants, helping to protect cells against oxidative damage. It is also notable for its high vitamin B12 content, necessary for red blood cell formation and the proper functioning of the nervous system.

2.3. Healthy Fatty Acids

Although its fat content is low, polyunsaturated fatty acids (PUFAs) are the most abundant fatty acids in the Algarve octopus. Among these, omega-3 fatty acids (EPA and DHA), known for their cardioprotective effects, are the most common. Lipid quality indices show that octopus's consumption can help to reduce inflammation and hypertension, improve endothelial function, and maintain healthy cholesterol levels.

2.4. Additional Benefits

Moderate consumption of octopus has been associated with a protective effect, beneficial for heart and brain function, improved cardiovascular health and a reduced risk of neurodegenerative diseases. The organoleptic attributes of Algarve octopus—texture, flavor,

aroma, and others—are rated as excellent by a panel of expert and amateur tasters. This is due to the quality of the product, the fishing method, and the good practices throughout the value chain which provide significant added value.

3. RISKS ASSOCIATED WITH OCTOPUS CONSUMPTION

3.1. Heavy Metal Contamination

One of the main risks of consuming seafood is the potential bioaccumulation of heavy metals, such as mercury, cadmium, and lead. These contaminants can affect the nervous and renal systems in humans. In most of the octopus' samples from the Algarve analyzed, no heavy metals were detected; in very few individuals, extremely low doses were quantified, always at very lower levels than those legislated or recommended.

3.2. Other chemicals and unwanted compounds

Octopus could contain other non-frequent contaminants, as dioxins and PCBs and others that are mostly not legislated, such as inorganic arsenic and marine biotoxins. Also, some undesirable compounds that can originate when the cold chain is broken or handling and hygiene practices do not meet quality criteria in the captured specimens. In no case were toxic levels detected in relation to those compounds, either they were below the detection limit, or the values were extremely low.

3.3. Microbiological Risks

Consuming raw or undercooked octopus can pose risks due to the presence of microorganisms, such as Escherichia coli or Vibrio spp. The presence of microbiological contaminants in uncooked octopus was studied, including both those regulated and those that are less frequent. However, no microbiological risks have been detected in Algarve octopus.

3.4. Cholesterol Content

Although low in total fat, octopus contains a moderate amount of cholesterol (less than 50 mg/100 g). Therefore, people with hypercholesterolemia or cardiovascular disease should consume octopus using healthy cooking methods (such as boiling or grilling, avoiding frying).

4. ENVIRONMENTAL CONSIDERATIONS AND SUSTAINABILITY

The growing demand for octopus has generated concern about fishing pressure on wild populations. Small-scale artisanal fishing in Algarve-Portugal has important socioeconomic implications. Octopus are caught using passive fishing gear that are not harmful to the environment, such as traps and pots. Octopus fishery management in the Algarve is innovative and inclusive, since it is carried out in conjunction with the fishermen, promoting the sustainability of the resource and the fishing communities. Then, choosing certified or locally sourced and sustainable products helps reduce environmental impact and promotes responsible fishing.

5. CONCLUSIONS

Octopus is a nutritious food, low in fat and rich in protein, which can be part of a healthy and balanced diet. Its cardiovascular, neurological, and antioxidant benefits recommend its consumption. It can be considered a beneficial food for human health, provided it is consumed responsibly, both from a nutritional and environmental perspective.

Some associated risks that should be considered can arise from improper handling. Therefore, it is recommended to purchase octopus from a controlled source and support sustainable fishing to protect marine ecosystems.