



# Whitaker Institute Policy Brief Series

## Policy Brief No.: 61

July 2020

Cluster: SEMRU

Theme: Business, Innovation & Economic Development

### Further Reading:

Tsakiridis, A., O'Donoghue, C., Hynes, S., & Kilcline, K. (2020). A comparison of environmental and economic sustainability across seafood and livestock product value chains. *Marine Policy*, 117.

<https://doi.org/10.1016/j.marpol.2020.103968>

### Contact:

[andreas.tsakiridis@ucdconnect.ie](mailto:andreas.tsakiridis@ucdconnect.ie)

Read More About: Read more about the Socio-Economic Marine Research Unit [here](#).

**Acknowledgement:** This work was carried out with the support of the Marine Institute and it is funded by the Marine Research Sub-Programme PBA/SE/16/01 Valuing and Understanding the Dynamics of Ireland's Ocean Economy

*The content and views included in this policy brief are based on independent, peer-reviewed research and do not necessarily reflect the position of the Whitaker Institute.*

Sign up to the Policy Brief Series [Here](#)

## A comparison of environmental and economic sustainability across seafood and livestock product value chains

Ireland has set ambitious economic growth targets for the agri-food sector up to 2025 and beyond, with sustainability being an important consideration in the national development strategies (*Food Wise 2025* and *Harnessing our Ocean Wealth - An Integrated Marine Plan*). Although Ireland has achieved a prominent position in global agri-food trade as one of the biggest net exporters of beef, sheep meat, and dairy products, seafood has the potential to make a further contribution to exports and job creation by increasing aquaculture production. However, any expansion in the agri-food sectors must be carried out in accordance to environmental regulations, and Ireland's commitments to achieve a 30% reduction in emissions compared to 2005 levels by 2030 and carbon neutrality in the agriculture and land use sector by 2050. This study quantifies and compares the economic and environmental impacts across seafood (sea fisheries and aquaculture) and terrestrial livestock products (beef and veal, sheep, pig, poultry, dairy), by using an environmentally extended input-output model of the Irish economy and national data.

### Research Findings

The economic impact of food products was assessed by calculating the output multipliers of food value chains, whilst the carbon footprint (global warming potential) was adopted as a metric to quantify the effect of the major greenhouse gas (GHG) emissions from value chains on climate. Aquaculture is found to have the highest output multiplier (2.68) across the examined value chains. For each €1 of output produced by the aquaculture sector, €1.68 of output is generated in other sectors of the economy. Output multipliers are also high in the beef and veal (2.58) and pig meat value chains (2.40), whereas sea fisheries and poultry meat value chains have the lowest output multipliers (1.75 and 1.81 respectively). Poultry meat is found to have the lowest carbon footprint amongst all food products, whereas beef (and veal) and sheep meat have the highest carbon footprints, irrespective of the choice of functional unit used to express emissions (kt CO<sub>2e</sub> per €m of output, t CO<sub>2e</sub> per tonne of protein, t CO<sub>2e</sub> per kcal energy). Aquaculture and sea fisheries products have low to medium carbon footprints compared to pastoral livestock products. The environmental impact of energy use dominates in the sea fisheries and aquaculture, representing 74% and 72% of total emissions respectively.

### Policy Implications

The economic benefits of aquaculture along with its relatively low carbon footprint suggest that additional benefits from an expansion of Ireland's aquaculture sector can be gained. However, aquaculture is energy intensive, and therefore production requires the efficient use of energy and resources, and the employment of low carbon technologies that strengthen aquaculture's sustainability. The substitution from beef to dairy that has been visible since the abolishment of milk quotas in 2015, is expected to lead to an overall reduction in the GHG emissions per € of output. It should be noted though that the environmental impacts of food products may vary, if researchers account for differences in farming systems, production technology adopted and types of products within the food sector.