

A mixed method approach examining the environmental impacts of plant-based food products and the use of eco-labels in the UK

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Food production currently represents 26% of global greenhouse gas emissions and is projected to continue to increase with current Western consumption patterns⁽¹⁾. Consumer concerns about the sustainability of food has led to increased popularity in plant-based diets and increased availability of foods suitable for vegetarians and vegans⁽²⁾. This has led some manufacturers to convey the environmental impacts of their products through different labelling techniques, and prompted calls for broader adoption of carbon-labels⁽³⁾. Therefore, the aims of this research were to: 1) determine and compare environmental impacts of omnivorous (conventional) and vegetarian or vegan (analogue) food products; and 2) assess current methods of informing consumers of these impacts.

Product data was acquired from the UK's top 3 online supermarkets in November 2020 using a combination of search terms. Products were categorised into 12 Public Health England or National Diet and Nutrition Survey categories. Data were screened for duplicates and a non-redundant database of product information was created that included nutrient information and ingredients. All data were double-checked and 5% of all entries were randomly selected and verified. Greenhouse gas emissions (GHGEs) data were applied to the top 3 ingredients (by weight, excluding water) of each product to estimate an approximate environmental impact of each product. GraphPad Prism v9.1.0 was used for statistical analysis.

Following deduplication, the dataset contained 1151 analogue and 590 conventional food products. Among the 12 product categories, the lowest GHGEs were found in the Pizzas and Yogurts and Yogurt Drinks categories, and the highest GHGEs were found in the Meat Products and Ready Meals categories. In comparing median GHGEs of analogue and conventional food products within product categories, higher GHGEs were found for conventional foods in the: Meat Products ($p < 0.0001$), Ready Meals ($p < 0.0001$), Puddings ($p = 0.0036$), and Milk and Milk drinks ($p < 0.0001$) categories. Perhaps surprisingly, for 8 food categories (Cheese, Soups, Pizzas, Cakes and Pastries, Biscuits, Yogurts and Fromage Frais, Confectionery, Ice Cream) no significant differences in median GHGEs were found. Only a few examples of eco-labelling of UK products were discovered, and the majority exhibited a GHGE value without context or meaning.

In conclusion, analogue foods, in some but not all product categories, had lower estimated environmental impacts than conventional foods. Eco-labelling was found only rarely. Calculating the full environmental impacts of food products beyond GHGE estimates is challenging. Broad adoption of eco-labelling for all food products would be advantageous but will require the efforts and openness of manufacturers. Future activities to educate consumers on sustainability and the environmental impacts of foods are crucial for eco-labelling to be successful.

References

1. Poore J & Nemecek T (2018) *Science* **360**, 987–992.
2. Mintel (2020) [Available at: <https://www.mintel.com/press-centre/food-and-drink/plant-based-push-uk-sales-of-meat-free-foods-shoot-up-40-between-2014-19>].
3. Vermeir I, Weijters B, De Houwer J *et al.* (2020) *Front Psychol* **11**, 1603.