# **Research Brief/ Terms of Reference**

# The environmental sustainability and health implications of plant-based animal protein alternatives

## Background

The increasing production and consumption of animal protein at the global scale has triggered environmental concerns about land and water requirements, pollution and greenhouse gas emissions, as well as a call to shift towards more plant-based diets. Plant-based alternatives to animal-based foods are not a new phenomenon. Crops including soy (used to make tofu), peas and wheat are being used to create different alternatives, generally relying on purified plant protein. Other sources such as fungi (mycoprotein) and pulses (chickpeas, kidney beans, lentils) also exist.

However, a new generation of plant-based alternatives are emerging, appearing to appeal towards more mainstream omnivores. As such, novel alternatives, including cultured meat, plant-based alternatives to dairy and fish, insects and algae are receiving increasing attention.

Animal protein alternatives differ widely in their composition, an increasing number of these products are highly processed and could be classified as ultra-processed. They often contain manufactured ingredients either extracted or derived from food constituents such as modified starches, protein concentrates, vegetable gums, flavours and colours, used to enhance the product’s sensory qualities or culinary preparations[[1]](#footnote-2). While generally lower in calories, fat and saturated fat, these alternatives can contain higher amounts of carbohydrates, sugars, dietary fibre, sodium and lack important micronutrients (vitamin B12, iron, zinc, vitamin A) that are otherwise present in animal products[[2]](#footnote-3). For instance, plant-based mince can have up to six times more sodium than its animal counterpart, whereas plant-based sausage can have as much as 66% less than its animal counterpart[[3]](#footnote-4).

Some research on the environmental impacts of these products does exist[[4]](#footnote-5)[[5]](#footnote-6). For example, Beyond Meat-commissioned Life Cycle Assessment, finds that the Beyond Burger generates 90% less greenhouse gas emissions, requires 46% less energy, 99% less water, and 93% less land use than a burger made from U.S. beef[[6]](#footnote-7). However, questions regarding other aspects of the environmental sustainability (such as biodiversity, energy use etc.) and the production methods of the primary ingredients of these animal protein alternatives warrant closer attention. Consumers also have legitimate concerns about the safety and health impact of new food ingredients, especially laboratory-grown and synthetic proteins, and thus we need to understand the wider implications.

*Dietary shift*

Figures show that people in the UK are eating less meat (with many as 30% of 50–64-year-olds compared to just 16% of 18–24-year-olds[[7]](#footnote-8)) and 14% of Brits consider themselves flexitarian[[8]](#footnote-9). This growing interest in lower-meat diets could lead to an increased consumption of more ultra-processed protein alternatives[[9]](#footnote-10). While there is little doubt that wholefoods – un- or minimally processed fruit, vegetables, legumes and grains – have a lower environmental impact in terms of land and water requirements, greenhouse gas emissions, acidification and eutrophication[[10]](#footnote-11) than meat or dairy products, many people substitute animal protein with meat and dairy replacements. While flexitarian, pescatarian, vegan and vegetarian diets have the potential to be more sustainable[[11]](#footnote-12) the true benefits of these diets depend on the overall diet and types of food consumed.

### 1.1 WWF-UK

WWF-UK is the UK affiliate of the WWF Network, the global environment organisation founded in 1961. Our aim is to deliver a future in which people and nature thrive, addressing global threats to people and nature such as climate change, the peril to endangered species and habitats, and the unsustainable consumption of the world’s natural resources. We do this by influencing how governments, businesses and people think, learn and act in relation to the world around us, and by working with rural communities and smallholders and fishers to improve their livelihoods and the environment upon which we all depend. WWF uses its practical experience, knowledge and credibility to create long-term solutions for the planet’s environment. More specifically, WWF-UK works with food service and retail companies to help shift their business models and encourage the offering of more nutritious and sustainable menus and products.

### 1.2. Sodexo

Sodexo is the world’s leading quality of life services company. Since its founding, Sodexo’s commitment to Corporate Responsibility has been central to its fundamentals, underpinning its development as a responsible company. These commitments are reflected in the Sodexo group’s mission: to improve quality of life for employees and all those it serves throughout the world and to contribute to the economic, social and environmental development of the communities, regions and countries where it operates. In 2020 Sodexo and WWF have embarked on the next phase of their long-standing collaboration on the joint objectives of Sodexo’s Better Tomorrow 2025 strategy and WWF strategy, where WWF-UK will help Sodexo to reach its carbon target, transition Sodexo’s food offer towards more sustainable meals, through the development and implementation of Sodexo’s Sustainable Eating Strategy.

## Project objectives

WWF-UK and Sodexo seek to commission independent research on the environmental and health impacts of plant-based animal protein alternatives. The results of this research will help WWF and Sodexo advance our understanding of the health implications and environmental sustainability of animal protein alternatives and provide us with the evidence to develop a more strategic position on different plant-based alternatives to drive the adoption of healthy, sustainable diets. The outputs may also provide the basis for new communication materials. Other beneficiaries of this research could include:

* Civil Society Organisations: to support agenda setting and development of appropriate messages
* Consumers: to provide better information in support of decision making
* Manufacturers and food suppliers (retail and foodservice): to provide knowledge about impact of products to support claims or change process/offer
* Academia: to support agenda setting for further research

Some questions driving this research include:

*Environmental impact:*

* How do the environmental impacts (GHGe, water use, land use, biodiversity, energy demand etc.) of plant-based alternatives (meat, dairy, fish, cell-based, insects, microbial proteins) compare with conventional animal-based products from different production methods (i.e., grass-fed, grain-feed, conventional, organic, agroecological systems)?
* How much pure plant protein (soy, wheat, pea etc) is being used in these products? Where and in what production methods are these crops typically being sourced from, in what quantities and are they certified by a credible standard (e.g., RTRS, ProTerra)?
* What are the impacts of secondary ingredients (e.g., palm, coconut, rapeseed oil)? Where are these typically being sourced from, in what quantities and are they certified by a credible standard (e.g., RSPO)?
* What are the environmental impacts of trends to blend/hybrid animal-based products with plant-based meat alternatives (e.g., Waitrose pork, chickpea & spinach sausages (55%/45%)[[12]](#footnote-13); Waitrose Harissa Chicken meatballs with chickpeas and cauliflower (60%/40%)[[13]](#footnote-14)?

*Health impact:*

* How much of these products are consumers current eating (e.g. is it possible to differentiate between minimally processed protein alternatives and the ultra-processed protein alternatives)?
* What are the health implications of these more processed plant-based alternatives and the manufactured ingredients (purified plant proteins, modified starches, gums, flavours, colours etc.)?
* What evidence is currently available on the nutrient density (iron, vitamin B12, zinc etc.) of different plant-based alternatives?
* What is the average period that a new plant-based protein alternative is tested for allergens and what is the process?

## Project management and deliverables

A report (approximately 10-15 pages) and an interim and final slide deck including visuals in the form of tables and graphs, providing the latest scientific evidence on the environmental and health impacts of various plant-based alternatives (meat and dairy alternatives) proteins drawing upon existing peer-reviewed and grey literature. The reports need to be properly referenced (Oxford/footnote or Harvard/author-date style) and include a complete reference list. The relevant studies’ evidence may be uploaded into the HESTIA global database of food environmental impacts (see section 6 for more information).

The consultant or consortium will be responsible for the tasks and deliverables included in Table 1 below.

**Table 1 Summary table of project deliverables and proposed dates**

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| --- | --- | --- |
| **Deliverable** | **Description** | **Date\*** |
| Contract awarded | Proposals reviewed and consultant/consortium chosen and notified. | Mid-March 2021 |
| Inception meeting/call with WWF-UK | An initial virtual inception meeting will be held to agree details of the project and practical considerations such as project milestones and communication. | April 2021 |
| Project management | Communication with WWF-UK will be regular and include email, Zoom and telephone communications as required. At a minimum, a bi-weekly verbal update will be anticipated. | n/a |
| Scope research, methodology, report structure and interim slide deck | Debrief and review of scope, methodology and report structure. | Mid/End April 2021 |
| First draft report | First draft report finalised with outcomes of initial research and identification of key recommendations and next steps based on gaps in literature. | May 2021 |
| Final report and slide deck | Finalisation of report on environmental and health implications of plant-based alternatives. | June 2021 |

\*These are initial deadlines; however, we will work with the successful consultant to establish the exact timeframe to assess what is realistic.

### 3.1 Methodology

Development of the report should draw upon existing peer-reviewed, grey literature and could involve contacting companies for more information.

The parameters of which this work should sit within should be around planetary boundaries, this will thus also align with other work by WWF on [Planet-based diets](https://planetbaseddiets.panda.org/), and sit within National Dietary Guidelines.

## Proposals and consultant selection

Proposals should be maximum 5 pages in length and include:

* Your approach and proposed method to address the Project Objectives and Outputs.
* A project plan detailing proposed scope and timeframes for deliverable.
* Details of relevant experience.
* A fee proposal including total days and day rates for each member of staff who will work on the project, and any non-staff/travel/ancillary costs, including any applicable charity discounts
* Names and CVs of all staff who will work on the project, and proposed roles (can be beyond the 5 pages).
* Indication of acceptance of WWF-UK’s standard terms and conditions (attached and available on request), or submission of your own for review by our legal team.

Interested parties should send their letter of intent with the relevant documents as detailed above to the contact below by email not later than February 19, 2021 at 23.00 GMT. Applications received after that will not be considered.

WWF will consider proposals and appoint the successful third party through a mix of qualitative and quantitative assessment, to include:

* Quality of the submission and adherence to the brief
* Relevant organisational experience, expertise and skills of staff
* Cost and overall resource inputs
* Quality and effectiveness of the proposed methodology and ability to deliver the brief

**Deadline for submission:** February 19, 2021

**Delivery of finalised contents package:** 30 June 2021

## Contact

Please send a copy of your proposal for this research to:

Email: [procurement@wwf.org.uk](mailto:procurement@wwf.org.uk)

## Additional Information

**HESTIA project**

WWF and researchers at Oxford Martin School are developing a global database of food environmental impacts. It will consolidate existing data on the impacts of different food products, production methods and geographies, store this information in a highly structured and standardised way, and deliver it to producers, consumers, researchers and policy makers to help them understand the impact of food products.

1. Monteiro C.A. et al (2019). Ultra-processed foods, diet quality, and health using the NOVA classification system. Rome, FAO [↑](#footnote-ref-2)
2. Bohrer B.M. (2019) An investigation of the formulation and nutritional composition of modern meat analogue products. *Food Science and Human Wellness* 8:320-329. [↑](#footnote-ref-3)
3. Curtain & Grafenauer (2019) Plant-based meat substitutes in the Flexitarian Age: An Audit of products on supermarket shelves. *Nutrients*, 11:2603 [↑](#footnote-ref-4)
4. Blonk et al. (2008) Environmental effects of protein-rich food products in the Netherlands Consequences of animal protein substitutes. [↑](#footnote-ref-5)
5. Blonk et al. (2017) Milieueffecten van vlees en vleesvervangers (in Dutch: Environmental effects of meat and meat subsitutes). [↑](#footnote-ref-6)
6. Heller & Keoleian (2018) Beyond Meat’s Beyond Burger Life Cycle Assessment. [↑](#footnote-ref-7)
7. Eating Better (2020). Available at : <https://www.eating-better.org/blog/growing-public-support-for-less-better-meat-public-survey-uk> [↑](#footnote-ref-8)
8. YouGov: 73% of Brits are carnivores, 14% flexitarian (mixed diets, mainly vegetarian), 3% vegetarian, 3% pescatarian, and only 1% vegan [↑](#footnote-ref-9)
9. Soil Association (2020). Ultra-processed foods. Available at: <https://www.soilassociation.org/media/21669/ultra-processed-foods_soil-association-report.pdf> [↑](#footnote-ref-10)
10. Poore and Nemecek (2018) Reducing food’s environmental impacts through producers and consumers. *Science* 360:987-992. [↑](#footnote-ref-11)
11. [WWFUK Livewell](https://www.wwf.org.uk/eatingfor2degrees), [EAT Lancet](https://eatforum.org/eat-lancet-commission/), [Bending the curve](https://drive.google.com/file/d/1pVpYTNQKAE_izp8tsVK3tQ4fNWPgoQIz/view): the restorative power of planet-based diets [↑](#footnote-ref-12)
12. Waitrose Pork, chickpea & spinach sausages: <https://www.waitrose.com/ecom/products/waitrose-6-pork--chickpea-and-spinach-sausages/623265-645165-645166> [↑](#footnote-ref-13)
13. Waitrose Harissa chicken meatballs: <https://www.waitrose.com/ecom/products/waitrose-12-harissa-chicken-meatballs/412394-645071-645072> [↑](#footnote-ref-14)