Proteins Impact Framework

Progress report

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1. WHY IS THE PROTEINS IMPACT FRAMEWORK NEEDED?

The sustainability, health and business impact of different protein types are among the most hotly debated topics on the food and agribusiness company sustainability agenda in 2020. Recent years have seen the publication of a range of analyses, either focusing on certain aspects of protein nutrition and sustainability or presenting broad assessments of the food system.

However, to date, the organizations producing such frameworks have not tailored them for business. As such, our members determined that a framework for a holistic, protein-specific assessment of impacts covering environmental, societal, health and business issues would be useful to aid their decision-making and product development.

The overall objective of this Framework is to support businesses to make balanced assessments of the sustainability and health impacts of different animal and plant protein products and production methods.

THE SUSTAINABLE PROTEINS FRAMEWORK V1.0

We will adapt this preliminary version of the Framework over time and in response to company use and feedback. This first version of the Framework focuses on simplicity, given its experimental nature.

The graphic below shows the overall structure of the Framework, organized into the following four impact areas:

IMPACT AREAS

Environmental – production process impacts on the local and global environment;

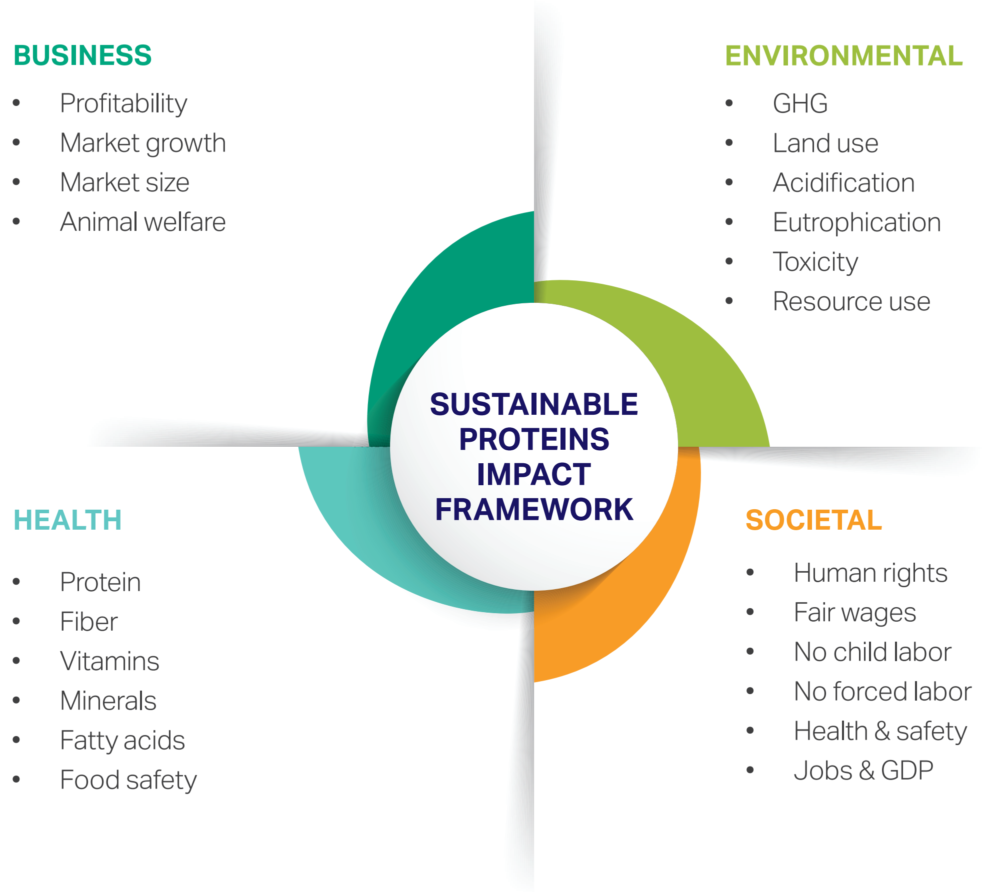
Societal – production process impacts on workers, local communities and the global community;

Health – product consumption impacts on human health; and

Business – product production and sale impacts on the businesses involved.

Each impact area includes a list of indicators for application and use by businesses. We have selected these indicators by gathering information from literature reviews and expert interviews, by testing indicators with member companies, and by running a broader consultation on indicators.

Figure 1: Overall structure of the Proteins Impact Framework, with example indicators



HOW TO USE THE FRAMEWORK

We have identified three scenarios for the Framework's use to aid company decision-making. We provide step-by-step guidance for each scenario in the report:

Scenario A – Detailed assessment

In this scenario, a company may wish to conduct a detailed assessment using comprehensive data already available across the majority of the Framework indicators and/or has the resources to gather this data to a high degree of accuracy.

Scenario B – Hotspot analysis

In this scenario, a company may not have access to detailed data for the majority of Framework indicators and only have limited resources for further investigation. The overall objective of the analysis may be to conduct a preliminary assessment and then guide the focus points for a detailed assessment as outlined in scenario A.

Scenario C – Sector-wide analysis

This is a scenario where a group of companies or an industry coalition is assessing different products within their sector on a pre-competitive basis. Rather than using the Framework to aid individual company decision-making, the impact areas and associated indicators can act as a guide and reference for a general analysis of the sustainability of different protein products and production methods.

NEXT STEPS AND RECOMMENDATIONS

We propose the following next steps for the use and further development of the Framework:

1. Inviting companies to test the Framework and provide feedback

While we had limited opportunities to hold a pilot program during the Framework development, we are confident that a broader trial of the Framework and the provision of feedback for a wider range of product types and production methods would be beneficial. We will seek to stress-test the Framework with our member companies to further improve it.

2. Using the Framework to inform our future work on proteins

Our Food & Agriculture work will apply the Framework approach. In particular, the FReSH project will apply it to its continued work on proteins. This will include:

- The Food & Agriculture Roadmap, which is identifying actions and targets to guide companies to food system transformation, with a focus on dietary shifts; transforming agriculture; equitable distribution of value; food loss and waste;
- The continued use of the Protein Pathways white paper proposing a global protein sustainability improvement roadmap;
- An ambitious partnership project working to accelerate sustainable and healthy meat production and consumption. This will involve the application and further development of the Proteins Impact Framework for specific meat products;
- Scaling up our work on healthy and sustainable plant proteins, including the Plant Protein Roadmap to 2020; and
- Engaging in policy dialogues, in particular the European Eco-Design Directive discussions and Product Environmental Footprint Guide.

3. Promoting further research into consistent societal indicator data for different protein products and production methods

This could be the subject of collaborative research on a selected set of key societal indicators in order to develop consistent and comparable datasets between protein types and production methods.

4. Producing version 2.0 in the future

Depending on the uptake of the Framework and feedback provided, we may develop an updated version in the future. This could include broader geographic scopes (including products with ingredients from multiple countries) and incorporate ongoing developments in research and data availability. We may also look to further develop the Framework into a functional impact measurement tool.

2 Why is the Framework needed?

② Why is the Framework needed?

During a series of workshops in 2018 on animal and plant proteins, our Food and Nature Program member companies stated their interest in developing a framework to assess the sustainability, health and business impacts of different protein products and production methods.

Recent years have seen the publication of a range of analyses either focusing on certain aspects of protein nutrition and sustainability or presenting broad assessments of the food system. However, to date, the organizations producing such frameworks have not tailored them for business. As such, our members determined that a framework for a holistic, protein-specific assessment of impacts covering environmental, societal, health and business issues would be useful to aid their decision-making.

3 How we developed the Framework

3 How we developed the Framework

We developed the Sustainable Proteins Framework through the following process:

Literature review – A desk review of existing research, analysis and sustainability frameworks in the private and public sectors.

Member interviews – Semi-structured interviews with our members to establish and agree upon the key objectives and overall structure of the Framework.

Key expert and stakeholder interviews – Semi-structured interviews with key experts, scientists and stakeholders to advise on appropriate sources to develop the indicators.

Workshop consultations – Multistakeholder consultations in Europe and the US (the geographic scope of v1.0 of this Framework) to receive overall feedback on the Framework, along with the indicators.

Framework drafting – Based on the processes above, our members drafted and reviewed the Framework and accompanying guidance.

4 Overview of the Framework & indicators

④ Overview of the Framework & indicators

The overall objective of this Framework is to support businesses to make balanced assessments of the sustainability and health impacts of different protein products and production methods.

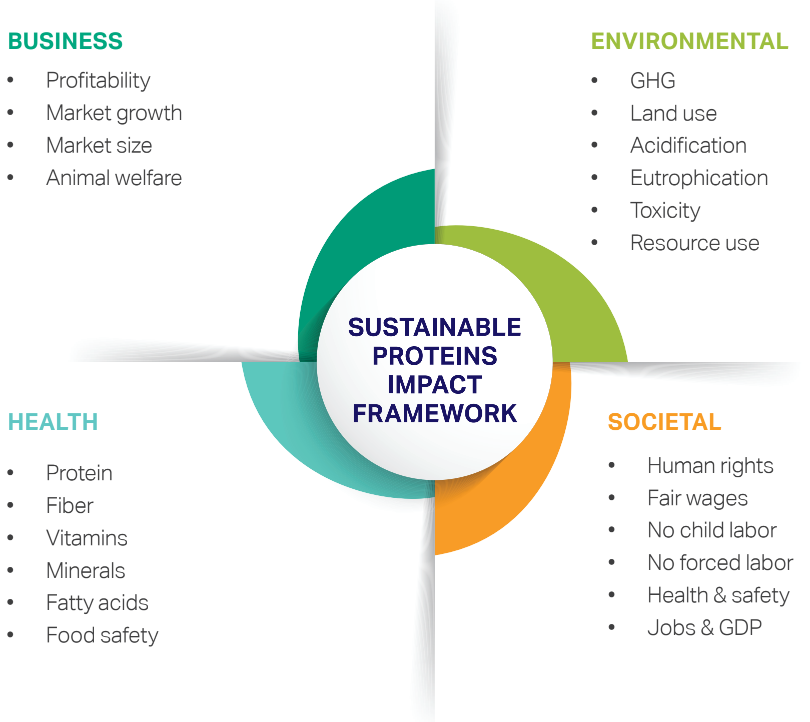
KEY POINTS TO CONSIDER WHEN REVIEWING AND USING THE FRAMEWORK

- **This is a preliminary version of the Framework**. We intend to adapt this Framework over time and in response to company use and feedback. This first version focuses on simplicity, given its experimental nature. There is therefore significant scope for us to improve and refine it.
- **The Framework is primarily for internal company use**. It is possible to adapt the indicators and sources of data to suit the needs of each company user. Companies may wish to publish and present the results of their analysis as they see fit – for example, as part of a life cycle assessment (LCA) – but its primary purpose is for internal use and decision-making. Beyond this, we hope that the Framework may also be a useful reference for broader discussions and work by collaborative groups on the topic of proteins and sustainability.
- **It is applicable to both animal and plant-based products.** Companies can apply the Framework to both animal and plant-based proteins.
- **Supply chain scope.** Version 1.0 of the Framework is applicable to products across the food supply chain.
- **Geographic scope.** The geographic scope of v1.0 of the Framework is European and North American markets, focusing on the core sourcing regions of FReSH members to narrow down the diversity of issues to reflect during the piloting process. Future versions of the Framework may incorporate an expanded geographic scope.

THE SUSTAINABLE PROTEINS FRAMEWORK V1.0

Figure 1 below shows the overall structure of the Framework. See table 1 for full details.

Figure 1: Overall structure of the Proteins Impact Framework, with example indicators



INDICATOR DESCRIPTIONS

Table 1 below shows the Framework indicators organized by impact area (environmental, societal, health and business), their definition and sources for further guidance and data.

The impact areas are as follows:

ENVIRONMENTAL – production process impacts on the local and global environment

We have selected these indicators based on the recommendations in the European Commission Joint Research Centres Product Environmental Footprint Guide and from the Food and Agriculture Organization of the United Nations (FAO) Livestock Environmental Assessment Performance Partnership. LCA databases and the broader scientific literature provide the data sources for all indicators. We have based the indicators presented here on the recommended indicators included within these frameworks. Companies can select those that are most relevant to their context.

We have adjusted environmental indicators measured on a per unit mass basis (e.g., 1 kg) for their protein content per kg[1] to reflect the fact that 1 kg of one product may contain significantly less protein than 1 kg of another product and hence a direct mass comparison would not be accurate.

SOCIETAL – production process impacts on workers, local communities and the global community

We have adapted these indicators from the WBCSD 2016 Social Life Cycle Metrics for Chemical Products guidelines, specifically for the context of food and agribusiness. The majority of these will rely on internal company data. However, if this is not available, it is possible to make high-level geographic comparisons using third-party socio-economic data sources for products or ingredients sourced from different countries. Companies can then investigate these further depending on where they find the greatest differences between them. These third-party sources include social life cycle assessment databases, international intergovernmental organizations, foundations, think tanks and consultancies. These indicators also relate to risk-based assessments, which may be based on internal company data or third-party information.

HEALTH – product consumption impacts on human health

We have derived the majority of the indicators below from the composite indicators of the Nutrient Rich Food Index (NRF), which closely follow regulatory guidelines in the United States as formulated by the US Food and Drug and Administration and are widely accepted in Europe.[2] The intent of these scores is to capture the multiple nutritional attributes of a given product in relation to its calorific content. We provide the individual composite indicators to allow for detailed nutritional comparisons between protein products and, in cases where there are data limitations and it is not possible to collect all indicators, to establish an overall NRF score. We also include the overall NRF score as this provides the synthesis of these scores and allows for the overall nutritional assessment of a given product. The data for these indicators may either be available in scientific literature (key links provided) or derived from internal company data. We have selected two NRF

versions – 9.3 and 15.3. NRF 9.3 is correlated with the US healthy eating index and used as a functional unit for LCAs. NRF 15.3 provides additional nutrients to consider that are important when comparing plant-based and animal proteins. We have derived the recommended daily amounts (RDAs) from US guidance, though they may need adjustment in some instances in a European context.

We provide small number of additional indicators for protein digestibility and food safety where data may be available from scientific literature or from the company internally.

BUSINESS – product production and sale impacts on the businesses involved

We intend for these indicators to reflect the relative business merits of different protein products and production methods. We also include animal welfare here as a growing area of consumer interest and reputational consideration for businesses. We have derived the majority of the business indicators from internal company data, with the exception of animal welfare risk.

How did we compile the indicators?

We selected the indicators below via the following process:

- **Information gathered from literature review and expert interviews.** The starting point was to review existing sustainability frameworks in the agriculture and food industry and scientific literature and to consult our members and key experts on the priority issues they felt this Framework should cover.
- **Testing indicators with member companies.** We also worked with member companies to examine the applicability of indicators to products in their supply chain. This helped us decide if an indicator made sense and if there was sufficient data available.
- **Broader consultation on indicators.** We then consulted on the indicators with a broader set of external stakeholders[3] to receive feedback and refine the list accordingly.

Table 1: Sustainable Protein Framework indicators, descriptions and performance guidance

Indicator	Description	Potential data-sources and further guidance
Environmental indicators[4]		
1. GHG emissions intensity from production	Kg CO_2 equivalent emitted during production of 1 kg of the product in question Then adjusted for protein content per kg – for example if a product has emissions of 1 kg CO_2e/1 kg, and 200g of protein per 1 kg, the emissions per protein gram is 500g	• An impact assessment model that is widely used in IPCC assessments is the Bern model, which uses global warming potential (GWP) over a 100-year time horizon https://gmd.copernicus.org/articles/11/1887/2018/ (public) • The Global Feed Lifecycle Assessment Institute has developed an LCA database and tool that, together with the underlying UN FAO Livestock Environmental Assessment Performance Partnership (LEAP)-based methodology, aims to be the reference for assessing and benchmarking feed industry impact and improvement in LCA calculations http://globalfeedlca.org/gfli-database/gfli-database-tool/ (paywall) • Recommended LCA databases contained in table 4 of the FAO LEAP environmental performance of animal feeds supply chains http://www.fao.org/3/a-i6433e.pdf (public, though some databases mentioned have a paywall) • Vellinga et al. (2013), Methodology used in FeedPrint: a tool quantifying greenhouse gas emissions of feed production and utilization. Note this also incorporated into the Global Feed Lifecycle Assessment Institute Tool mentioned above. https://library.wur.nl/WebQuery/wurpubs/438366 (public)
2. GHG emissions associated with land-use change (LUC)	Kg CO_2 equivalent emitted from LUC associated with the production of 1 kg of the product in question Then adjusted for protein content per 1 kg	• An impact assessment model that is widely used in IPCC assessments is the Bern model, which uses global warming potential (GWP) over a 100-year time horizon https://gmd.copernicus.org/articles/11/1887/2018/ (public) • The FAO LEAP recommends estimating land-use change using the ENVIFOOD Protocol adapting the PAS 2050-1:2012 (BSI, 2012) https://www.academia.edu/27995035/ENVIFOOD_Protocol_-_Environmental_Assessment_of_Food_And_Drink_Protocol, https://shop.bsigroup.com/en/forms/PASs/PAS-2050-1/ (paywall) • Agri-footprint Direct Land Use Change Assessment Tool (https://www.agri-footprint.com/direct-land-use-change/) (paywall) • Persson et al. (2014), A method for calculating a land-use change carbon footprint (LUC-CFP) for agricultural commodities – applications to Brazilian beef and soy, Indonesian palm oil, Global Change Biology 20 (11) https://www.researchgate.net/publication/262422628_A_method_for_calculating_a_land-use_change_carbon_footprint_LUC-CFP_for_agricultural_commodities_-_applications_to_Brazilian_beef_and_soy_Indonesian_palm_oil (public) • Vellinga et al. (2013), Methodology used in FeedPrint: a tool quantifying greenhouse gas emissions of feed production and utilization https://library.wur.nl/WebQuery/wurpubs/438366 (public)
3. Fossil energy demand	MegaJoule (low heating value or LHV) associated with the production of 1 kg of the product in question Then adjusted for protein content per 1 kg	• In several impact assessment methods, such as ReCiPe and Guinée et al. (2002), fossil energy use is either a separate impact category or part of a larger category such as abiotic depletion https://www.rivm.nl/en/life-cycle-assessment-lca/downloads (public) https://www.springer.com/gp/book/9781402002281 (paywall) • The Global Feed Lifecycle Assessment Institute has developed an LCA database and tool that, together with the underlying UN FAO Livestock Environmental Assessment Performance Partnership (LEAP)-based methodology, aims to be the reference for assessing and benchmarking feed industry impact and improvement in LCA calculations http://globalfeedlca.org/gfli-database/gfli-database-tool/ (paywall) • Recommended LCA databases contained in table 4 of the FAO LEAP environmental performance of animal feeds supply chains http://www.fao.org/3/a-i6433e.pdf (public, though some databases mentioned have a paywall)

Indicator	Description	Potential data-sources and further guidance
Environmental indicators[4]		
4. Land occupation	Square meter (m^2) per year associated with the production of 1 kg of the product in question[5] Then adjusted for protein content per 1 kg	• The Global Feed Lifecycle Assessment Institute has developed an LCA database and tool that, together with the underlying UN FAO Livestock Environmental Assessment Performance Partnership (LEAP)-based methodology, aims to be the reference for assessing and benchmarking feed industry impact and improvement in LCA calculations http://globalfeedlca.org/gfli-database/gfli-database-tool/ (paywall) • Recommended LCA databases contained in table 4 of the FAO LEAP environmental performance of animal feeds supply chains http://www.fao.org/3/a-i6433e.pdf (public, though some databases mentioned have a paywall)
5. Acidification	Accumulated exceedance (AE) – mol H+ eq associated with the production of 1 kg of the product in question Then adjusted for protein content per 1 kg	• Accumulated exceedance model https://eplca.jrc.ec.europa.eu/EUFRP/showLCIAMethod.xhtml;jsessionid=9F24EEE9400484EAD975E74ED0B427F0?uuid=f6cbd466-253f-4145-a4bb-8dae7d266e89&stock=default (public) • The Global Feed Lifecycle Assessment Institute has developed an LCA database and tool that, together with the underlying UN FAO Livestock Environmental Assessment Performance Partnership (LEAP)-based methodology, aims to be the reference for assessing and benchmarking feed industry impact and improvement in LCA calculations http://globalfeedlca.org/gfli-database/gfli-database-tool/ (paywall) • Recommended LCA databases contained in table 4 of the FAO LEAP environmental performance of animal feeds supply chains http://www.fao.org/3/a-i6433e.pdf (public, though some databases mentioned have a paywall)
6. Eutrophication - terrestrial	Accumulated exceedance (AE) – mol N eq associated with the production of 1 kg of the product in question Then adjusted for protein content per 1 kg	• Accumulated exceedance model https://eplca.jrc.ec.europa.eu/EUFRP/showLCIAMethod.xhtml;jsessionid=9F24EEE9400484EAD975E74ED0B427F0?uuid=f6cbd466-253f-4145-a4bb-8dae7d266e89&stock=default (public) • The Global Feed Lifecycle Assessment Institute has developed an LCA database and tool that, together with the underlying UN FAO Livestock Environmental Assessment Performance Partnership (LEAP)-based methodology, aims to be the reference for assessing and benchmarking feed industry impact and improvement in LCA calculations http://globalfeedlca.org/gfli-database/gfli-database-tool/ (paywall) • Recommended LCA databases contained in table 4 of the FAO LEAP environmental performance of animal feeds supply chains http://www.fao.org/3/a-i6433e.pdf (public, though some databases mentioned have a paywall) • Nutrient flows and associated environmental impacts in livestock supply chains http://www.fao.org/3/CA1328EN/ca1328en.pdf (public, though some databases mentioned have a paywall)
7. Eutrophication - aquatic	Kg P eq associated with the production of 1 kg of the product in question Then adjusted for protein content per 1 kg	• EUTREND model (Struijs et al., 2009) as implemented in ReCiPe https://www.rivm.nl/en/life-cycle-assessment-lca/downloads (public) • The Global Feed Lifecycle Assessment Institute has developed an LCA database and tool that, together with the underlying UN FAO Livestock Environmental Assessment Performance Partnership (LEAP)-based methodology, aims to be the reference for assessing and benchmarking feed industry impact and improvement in LCA calculations http://globalfeedlca.org/gfli-database/gfli-database-tool/ (paywall) • Recommended LCA databases contained in table 4 of the FAO LEAP environmental performance of animal feeds supply chains http://www.fao.org/3/a-i6433e.pdf (public, though some databases mentioned have a paywall)

Indicator	Description	Potential data-sources and further guidance
Environmental indicators[4]		
8. Ozone depletion (OD)	Kg CFC -11 equivalent associated with the production of 1 kg of the product in question	• The Global Feed Lifecycle Assessment Institute has developed an LCA database and tool that, together with the underlying UN FAO Livestock Environmental Assessment Performance Partnership (LEAP)-based methodology, aims to be the reference for assessing and benchmarking feed industry impact and improvement in LCA calculations http://globalfeedlca.org/gfli-database/gfli-database-tool/ (paywall) • Recommended LCA databases contained in table 4 of the FAO LEAP environmental performance of animal feeds supply chains http://www.fao.org/3/a-i6433e.pdf (public, though some databases mentioned have a paywall)
9. Human toxicity – cancer effects	Comparative toxic unit for humans (CTUh) associated with the production of 1 kg of the product in question Then adjusted for protein content per 1 kg	• The Global Feed Lifecycle Assessment Institute has developed an LCA database and tool that, together with the underlying UN FAO Livestock Environmental Assessment Performance Partnership (LEAP)-based methodology, aims to be the reference for assessing and benchmarking feed industry impact and improvement in LCA calculations http://globalfeedlca.org/gfli-database/gfli-database-tool/ (paywall) • Recommended LCA databases contained in table 4 of the FAO LEAP environmental performance of animal feeds supply chains http://www.fao.org/3/a-i6433e.pdf (public, though some databases mentioned have a paywall) • The USEtox Model https://usetox.org/ Note that this was originally developed for the chemicals sector, therefore data availability for the food system is relatively limited. (paywall)
10. Human toxicity – non-cancer effects	Comparative toxic unit for humans (CTUh) associated with the production of 1 kg of the product in question Then adjusted for protein content per 1 kg	• The Global Feed Lifecycle Assessment Institute has developed an LCA database and tool that, together with the underlying UN FAO Livestock Environmental Assessment Performance Partnership (LEAP)-based methodology, aims to be the reference for assessing and benchmarking feed industry impact and improvement in LCA calculations http://globalfeedlca.org/gfli-database/gfli-database-tool/ (paywall) • Recommended LCA databases contained in table 4 of the FAO LEAP environmental performance of animal feeds supply chains http://www.fao.org/3/a-i6433e.pdf (public, though some databases mentioned have a paywall) • The USEtox Model https://usetox.org/ Note that this was originally developed for the chemicals sector, therefore data availability for the food system is relatively limited. (paywall)
11. Particulate matter/ respiratory inorganics	Kg PM 2.5 equivalent associated with the production of 1 kg of the product in question Then adjusted for protein content per 1 kg	• The RiskPoll Model https://escholarship.org/uc/item/1xv927gv • The Global Feed Lifecycle Assessment Institute has developed an LCA database and tool that, together with the underlying UN FAO Livestock Environmental Assessment Performance Partnership (LEAP)-based methodology, aims to be the reference for assessing and benchmarking feed industry impact and improvement in LCA calculations http://globalfeedlca.org/gfli-database/gfli-database-tool/ (paywall) • Recommended LCA databases contained in table 4 of the FAO LEAP environmental performance of animal feeds supply chains http://www.fao.org/3/a-i6433e.pdf (public, though some databases mentioned have a paywall)

Indicator	Description	Potential data-sources and further guidance
Environmental indicators[4]		
12. Ionizing radiation – human health effects	Kilobecquerel (kBq) of U 235 eq associated with the production of 1 kg of the product in question Then adjusted for protein content per 1 kg	• The Global Feed Lifecycle Assessment Institute has developed an LCA database and tool that, together with the underlying UN FAO Livestock Environmental Assessment Performance Partnership (LEAP)-based methodology, aims to be the reference for assessing and benchmarking feed industry impact and improvement in LCA calculations http://globalfeedlca.org/gfli-database/gfli-database-tool/ (paywall) • Recommended LCA databases contained in table 4 of the FAO LEAP environmental performance of animal feeds supply chains http://www.fao.org/3/a-i6433e.pdf (public, though some databases mentioned have a paywall)
13. Resource depletion – water	Based on user deprivation potential (deprivation-weighted water consumption) kg world eq. deprived, associated with the production of 1 kg of the product in question Then adjusted for protein content per 1 kg	• Available WAter REmaining (AWARE) model, United Nations Environment Programme, 2016 http://www.wulca-waterlca.org/aware.html (public) • The Swiss Ecoscarcity model, which uses m3 water use related to local water scarcity http://esu-services.ch/projects/ubp06/ • The Global Feed Lifecycle Assessment Institute has developed an LCA database and tool that, together with the underlying UN FAO Livestock Environmental Assessment Performance Partnership (LEAP)-based methodology, aims to be the reference for assessing and benchmarking feed industry impact and improvement in LCA calculations http://globalfeedlca.org/gfli-database/gfli-database-tool/ (paywall) • Recommended LCA databases contained in table 4 of the FAO LEAP environmental performance of animal feeds supply chains http://www.fao.org/3/a-i6433e.pdf (public, though some databases mentioned have a paywall) • Food and Agriculture Organization of the United Nations (FAO) (2019), Water use in livestock production systems and supply chains – Guidelines for assessment (Version 1). Livestock Environmental Assessment and Performance (LEAP) Partnership. Rome. http://www.fao.org/3/ca5685en/ca5685en.pdf
14. Resource use – minerals and metals	Abiotic resource depletion Kg of antimony (Sb) equivalents associated with the production of 1 kg of the product in question Then adjusted for protein content per 1 kg	• The Global Feed Lifecycle Assessment Institute has developed an LCA database and tool that, together with the underlying UN FAO Livestock Environmental Assessment Performance Partnership (LEAP)-based methodology, aims to be the reference for assessing and benchmarking feed industry impact and improvement in LCA calculations http://globalfeedlca.org/gfli-database/gfli-database-tool/ (paywall) • Recommended LCA databases contained in table 4 of the FAO LEAP environmental performance of animal feeds supply chains http://www.fao.org/3/a-i6433e.pdf (public, though some databases mentioned have a paywall)
15. Land transformation	Changes in soil organic matter associated with the production of 1 kg of the product in question Then adjusted for protein content per 1 kg	• The Global Feed Lifecycle Assessment Institute has developed an LCA database and tool that, together with the underlying UN FAO Livestock Environmental Assessment Performance Partnership (LEAP)-based methodology, aims to be the reference for assessing and benchmarking feed industry impact and improvement in LCA calculations http://globalfeedlca.org/gfli-database/gfli-database-tool/ (paywall) • Recommended LCA databases contained in table 4 of the FAO LEAP environmental performance of animal feeds supply chains http://www.fao.org/3/a-i6433e.pdf (public, though some databases mentioned have a paywall)

Indicator	Description	Potential data-sources and further guidance
Societal indicators		
1. Access to basic needs for human right dignity (health care, clean water & sanitation, healthy food, shelter)	The extent to which workers have access to basic services (including basic drinking water, sanitation, hygiene, food and education)	• Recommended LCA databases for social and socio-economic risks can be found in table 12 of the Guidelines for Social Life Cycle Assessment, Draft 3 https://slcaguidelines.konveio.com/guidelines-social-life-cycle-assessment-v3-draft (public) • FAO, Food Security Indicators http://www.fao.org/economic/ess/ess-fs/ess-fadata/en/#.XqqhjNNKg1I (public) • World Bank, General country data http://data.worldbank.org/country?display=graph (public) • UNICEF WHO, Progress on drinking water and sanitation – 2017 update https://www.unicef.org/publications/index_96611.html (public)
2. Fair wages	Assessment of whether the average hourly earnings of employees and farm workers are considered fair in the context of the country of operation	• Fair wage guide: http://fairwageguide.org/ (public) • Recommended LCA databases for social and socio-economic risks can be found in table 12 of the Guidelines for Social Life Cycle Assessment, Draft 3 https://slcaguidelines.konveio.com/guidelines-social-life-cycle-assessment-v3-draft (public) • International Labour Organization (ILO), Decent work country profiles http://www.ilo.org/integration/themes/mdw/lang--en/index.htm (public)
3. No child labor	Risk assessment of likelihood of child labor in the supply chain[6]	• Recommended LCA databases for social and socio-economic risks can be found in table 12 of the Guidelines for Social Life Cycle Assessment, Draft 3 https://slcaguidelines.konveio.com/guidelines-social-life-cycle-assessment-v3-draft (public) • Understanding Children Work Project (ILO, World Bank, UNICEF) http://www.ucw-project.org/country-reports.aspx (public) • UNICEF database on child labor https://data.unicef.org/resources/dataset/percentage-children-aged-5-14-years-engaged-child-labour-sex-place-residence-household-wealth-quintile/ (public) • Human Rights Watch, section on child labor https://www.hrw.org/topic/childrens-rights (public) • ILO on child labor https://www.ilo.org/global/topics/dw4sd/themes/child-labour/lang--en/index.htm (public)
4. Freedom of association	Assessment of whether companies and facilities in the product supply chain have a policy that allows freedom of association and collective bargaining, and have not taken disciplinary actions against workers organizing themselves collectively	• Recommended LCA databases for social and socio-economic risks can be found in table 12 of the Guidelines for Social Life Cycle Assessment, Draft 3 https://slcaguidelines.konveio.com/guidelines-social-life-cycle-assessment-v3-draft (public) • ILO on freedom of association and collective bargaining https://www.ilo.org/global/topics/dw4sd/themes/freedom-of-association/lang--en/index.htm (public) • International Trade Union Confederation (ITUC) Global Rights Index 2018 https://www.ituc-csi.org/ituc-global-rights-index-2018-20299 (public) • PRé Sustainability Handbook on Social Impact Investment 2018 https://product-social-impact-assessment.com/ (public)

Indicator	Description	Potential data-sources and further guidance
Societal indicators		
5. No forced labor, human trafficking and slavery	Risk assessment of likelihood of presence of forced labor, human trafficking and slavery in the supply chain of the product in question	• Recommended LCA databases for social and socio-economic risks can be found in table 12 of the Guidelines for Social Life Cycle Assessment, Draft 3 https://slcaguidelines.konveio.com/guidelines-social-life-cycle-assessment-v3-draft (public) • The Global Slavery Index 2018 – Walk Free Foundation https://www.globalslaveryindex.org/2018/findings/highlights/ (public) • ILO on forced labor https://www.ilo.org/global/topics/dw4sd/themes/forced-labour/lang--en/index.htm (public)
6. Health and safety of local communities	Confirmation that companies in the supply chain have induced no harm and have implemented appropriate measures to prevent and mitigate adverse impacts	• Recommended LCA databases for social and socio-economic risks can be found in table 12 of the Guidelines for Social Life Cycle Assessment, Draft 3 https://slcaguidelines.konveio.com/guidelines-social-life-cycle-assessment-v3-draft (public) • Measurement Tools for a Community Health Improvement Process https://www.ncbi.nlm.nih.gov/books/NBK233011/ (public) • PRé Sustainability Handbook on Social Impact Investment 2018 https://product-social-impact-assessment.com/ (public)
7. Safety management system for workers	Provision of evidence to confirm that companies in the product supply chain comply with applicable health and safety standards or, in the absence of applicable standards, local laws relating to health and safety	• Recommended LCA databases for social and socio-economic risks can be found in table 12 of the Guidelines for Social Life Cycle Assessment, Draft 3 https://slcaguidelines.konveio.com/guidelines-social-life-cycle-assessment-v3-draft (public) • ILOSTATS country data http://www.ilo.org/safework/countries/lang--en/index.htm (public) • PRé Sustainability Handbook on Social Impact Investment 2018 https://product-social-impact-assessment.com/ (public)
8. Workers' occupational health risks	Number of fatalities and lost time injury rate, expressed as the number of lost-time accidents with at least one day out of work per million working hours for companies in the product supply chain	• Recommended LCA databases for social and socio-economic risks can be found in table 12 of the Guidelines for Social Life Cycle Assessment, Draft 3 https://slcaguidelines.konveio.com/guidelines-social-life-cycle-assessment-v3-draft (public) • Global trends according to estimated number of occupational accidents and fatal work-related diseases at region and country level https://osha.europa.eu/en/about-eu-osha/press-room (public) • ILOSTATS country data http://www.ilo.org/safework/countries/lang--en/index.htm (public)
9. Job creation	The absolute number of direct jobs created in the current year along the key life cycle stages of the product value chain Jobs created = hiring + other arrivals minus layoffs minus resignation minus end of contracts minus retirements and other departures Jobs created all along the value chain = sum of all jobs created at each stage of the production process	• PRé Sustainability Handbook on Social Impact Investment 2018 https://product-social-impact-assessment.com/ (public) • Employment in agriculture https://ourworldindata.org/employment-in-agriculture (public) • Recommended LCA databases for social and socio-economic risks can be found in table 12 of the Guidelines for Social Life Cycle Assessment, Draft 3 https://slcaguidelines.konveio.com/guidelines-social-life-cycle-assessment-v3-draft (public)

Indicator	Description	Potential data-sources and further guidance
Societal indicators		
10. Skills, knowledge and employability	Assessment of the extent to which companies in the supply chain actively contribute to skill development of their staff and sub-contractors	• Skills for employment knowledge sharing platform https://www.skillsforemployment.org/KSP/en/index.htm (public) • PRé Sustainability Handbook on Social Impact Investment 2018 https://product-social-impact-assessment.com/ (public) • ILO Skills and employability https://www.ilo.org/global/topics/dw4sd/themes/skills/lang--en/index.htm (public) • Recommended LCA databases for social and socio-economic risks can be found in table 12 of the Guidelines for Social Life Cycle Assessment, Draft 3 https://slcaguidelines.konveio.com/guidelines-social-life-cycle-assessment-v3-draft (public)
11. Sector/ sub-sector contribution to national GDP/ total sector revenue in 2020	The total contribution of the sector or sub-sector (e.g., the beef or soy industry) to national GDP as a percentage, or alternatively the total national revenue from the sector in 2020 This indicates how significant the sector is for the economy it operates in	• Food and Agriculture Organization of the United Nations, FAOSTAT http://www.fao.org/faostat/en/#data • Apply a structured risk assessment to the production system, e.g., EFSA https://www.efsa.europa.eu/en/press/news/120125 • United States Department of Agriculture, National Agricultural Statistics Service, Quick Stats https://quickstats.nass.usda.gov/ • United States Department of Agriculture, Economics, Statistics and Market Information System https://usda.library.cornell.edu/
Health indicators		
1. Protein	A nutrient-rich (NR) indicator within NRF 9.3 and NRF 15.3 Content of protein in a 100-kcal edible portion, then divided by the recommended daily value (RDV) for protein – which is 50 g – and multiplied by 100 to provide a percentage score A higher percentage score is positive from a nutritional health standpoint	• Drewnowski & Fulgoni (2014), Nutrient density: principles and evaluation tools, The American Journal of Clinical Nutrition, Volume 99, Issue 5, May 2014, Pages 1223S–1228S https://academic.oup.com/ajcn/article/99/5/1223S/4577490 (public) • Drewnowski et al. (2019), A proposed nutrient density score that includes food groups and nutrients to better align with dietary guidance, Nutr Rev. 2019 Jun; 77(6): 404–416 https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6489166/ (public)
2. Fiber	A nutrient-rich (NR) indicator within NRF 9.3 and NRF 15.3 Content of fiber in a 100-kcal edible portion, then divided by the recommended daily value (RDV) for fiber – which is 25 g – and multiplied by 100 to provide a percentage score A higher percentage score is positive from a nutritional health standpoint	• Drewnowski & Fulgoni (2014), Nutrient density: principles and evaluation tools, The American Journal of Clinical Nutrition, Volume 99, Issue 5, May 2014, Pages 1223S–1228S https://academic.oup.com/ajcn/article/99/5/1223S/4577490 (public) • Drewnowski et al. (2019), A proposed nutrient density score that includes food groups and nutrients to better align with dietary guidance, Nutr Rev. 2019 Jun; 77(6): 404–416 https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6489166/ (public)

Indicator	Description	Potential data-sources and further guidance
Health indicators		
3. Vitamin A	A nutrient-rich (NR) indicator within NRF 9.3 and NRF 15.3 Content of vitamin A in 100-kcal edible portion, then divided by the recommended daily value (RDV) for vitamin A – which is 5,000 International Units (IU) – and multiplied by 100 to provide a percentage score A higher percentage score is positive from a nutritional health standpoint	• Drewnowski & Fulgoni (2014), Nutrient density: principles and evaluation tools, The American Journal of Clinical Nutrition, Volume 99, Issue 5, May 2014, Pages 1223S–1228S https://academic.oup.com/ajcn/article/99/5/1223S/4577490 (public) • Drewnowski et al. (2019), A proposed nutrient density score that includes food groups and nutrients to better align with dietary guidance, Nutr Rev. 2019 Jun; 77(6): 404–416 https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6489166/ (public)
4. Vitamin C	A nutrient-rich (NR) indicator within NRF 9.3 and NRF 15.3 Content of vitamin C in a 100-kcal edible portion, then divided by the recommended daily value (RDV) for vitamin C – which is 60 mg – and multiplied by 100 to provide a percentage score A higher percentage score is positive from a nutritional health standpoint	• Drewnowski & Fulgoni (2014), Nutrient density: principles and evaluation tools, The American Journal of Clinical Nutrition, Volume 99, Issue 5, May 2014, Pages 1223S–1228S https://academic.oup.com/ajcn/article/99/5/1223S/4577490 (public) • Drewnowski et al. (2019), A proposed nutrient density score that includes food groups and nutrients to better align with dietary guidance, Nutr Rev. 2019 Jun; 77(6): 404–416 https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6489166/ (public)
5. Vitamin E	A nutrient-rich (NR) indicator within NRF 9.3 and NRF 15.3 Content of vitamin E in 100-kcal edible portion, then divided by the recommended daily values (RDV) for vitamin E – which is 30 (20) IU (mg) – and multiplied by 100 to provide a percentage score A higher percentage score is positive from a nutritional health standpoint	• Drewnowski & Fulgoni (2014), Nutrient density: principles and evaluation tools, The American Journal of Clinical Nutrition, Volume 99, Issue 5, May 2014, Pages 1223S–1228S https://academic.oup.com/ajcn/article/99/5/1223S/4577490 (public) • Drewnowski et al. (2019), A proposed nutrient density score that includes food groups and nutrients to better align with dietary guidance, Nutr Rev. 2019 Jun; 77(6): 404–416 https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6489166/ (public)
6. Calcium	A nutrient-rich (NR) indicator within NRF 9.3 and NRF 15.3 Content of calcium in a 100-kcal edible portion, then divided by the recommended daily value (RDV) for calcium – which is 1,000 mg – and multiplied by 100 to provide a percentage score A higher percentage score is positive from a nutritional health standpoint	• Drewnowski & Fulgoni (2014), Nutrient density: principles and evaluation tools, The American Journal of Clinical Nutrition, Volume 99, Issue 5, May 2014, Pages 1223S–1228S https://academic.oup.com/ajcn/article/99/5/1223S/4577490 (public) • Drewnowski et al. (2019), A proposed nutrient density score that includes food groups and nutrients to better align with dietary guidance, Nutr Rev. 2019 Jun; 77(6): 404–416 https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6489166/ (public)
7. Iron	A nutrient-rich (NR) indicator within NRF 9.3 and NRF 15.3 Content of iron in a 100-kcal edible portion, then divided by the recommended daily value (RDV) for iron – which is 18 mg – and multiplied by 100 to provide a percentage score A higher percentage score is positive from a nutritional health standpoint	• Drewnowski & Fulgoni (2014), Nutrient density: principles and evaluation tools, The American Journal of Clinical Nutrition, Volume 99, Issue 5, May 2014, Pages 1223S–1228S https://academic.oup.com/ajcn/article/99/5/1223S/4577490 (public) • Drewnowski et al. (2019), A proposed nutrient density score that includes food groups and nutrients to better align with dietary guidance, Nutr Rev. 2019 Jun; 77(6): 404–416 https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6489166/ (public)

Indicator	Description	Potential data-sources and further guidance
Health indicators		
8. Potassium	A nutrient-rich (NR) indicator within NRF 9.3 and NRF 15.3 Content of potassium in a 100-kcal edible portion, then divided by the recommended daily value (RDV) for potassium – which is 3,500 mg – and multiplied by 100 to provide a percentage score A higher percentage score is positive from a nutritional health standpoint	• Drewnowski & Fulgoni (2014), Nutrient density: principles and evaluation tools, The American Journal of Clinical Nutrition, Volume 99, Issue 5, May 2014, Pages 1223S–1228S https://academic.oup.com/ajcn/article/99/5/1223S/4577490 (public) • Drewnowski et al. (2019), A proposed nutrient density score that includes food groups and nutrients to better align with dietary guidance, Nutr Rev. 2019 Jun; 77(6): 404–416 https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6489166/ (public)
9. Magnesium	A nutrient-rich (NR) indicator within NRF 9.3 and NRF 15.3 Content of magnesium in a 100-kcal edible portion, then divided by the recommended daily value (RDV) for magnesium – which is 400 mg – and multiplied by 100 to provide a percentage score A higher percentage score is positive from a nutritional health standpoint	• Drewnowski & Fulgoni (2014), Nutrient density: principles and evaluation tools, The American Journal of Clinical Nutrition, Volume 99, Issue 5, May 2014, Pages 1223S–1228S https://academic.oup.com/ajcn/article/99/5/1223S/4577490 (public) • Drewnowski et al. (2019), A proposed nutrient density score that includes food groups and nutrients to better align with dietary guidance, Nutr Rev. 2019 Jun; 77(6): 404–416 https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6489166/ (public)
10. Saturated fat	A nutrient to limit (LIM) indicator within NRF 9.3 and NRF 15.3 Content of saturated fat in a 100-kcal edible portion, then divided by the maximum daily value (MDV) for saturated fat – which is 20 g – and multiplied by 100 to provide a percentage score A higher percentage score negative from a nutritional health standpoint	• Drewnowski & Fulgoni (2014), Nutrient density: principles and evaluation tools, The American Journal of Clinical Nutrition, Volume 99, Issue 5, May 2014, Pages 1223S–1228S https://academic.oup.com/ajcn/article/99/5/1223S/4577490 (public) • Drewnowski et al. (2019), A proposed nutrient density score that includes food groups and nutrients to better align with dietary guidance, Nutr Rev. 2019 Jun; 77(6): 404–416 https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6489166/ (public)
11. Sugar	A nutrient to limit (LIM) indicator within NRF 9.3 and NRF 15.3 Content of added sugar in a 100-kcal edible portion, then divided by the maximum daily value (MDV) for sugar which is – 50 g – and multiplied by 100 to provide a percentage score A higher percentage score negative from a nutritional health standpoint	• Drewnowski & Fulgoni (2014), Nutrient density: principles and evaluation tools, The American Journal of Clinical Nutrition, Volume 99, Issue 5, May 2014, Pages 1223S–1228S https://academic.oup.com/ajcn/article/99/5/1223S/4577490 (public) • Drewnowski et al. (2019), A proposed nutrient density score that includes food groups and nutrients to better align with dietary guidance, Nutr Rev. 2019 Jun; 77(6): 404–416 https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6489166/ (public)
12. Sodium	A nutrient to limit (LIM) indicator within NRF 9.3 and NRF 15.3 Content of sodium in a 100-kcal edible portion, divided by the maximum daily value (MDV) for sodium – which is 2,400 mg – and multiplied by 100 to provide a percentage score A higher percentage score negative from a nutritional health standpoint	• Drewnowski & Fulgoni (2014), Nutrient density: principles and evaluation tools, The American Journal of Clinical Nutrition, Volume 99, Issue 5, May 2014, Pages 1223S–1228S https://academic.oup.com/ajcn/article/99/5/1223S/4577490 (public) • Drewnowski et al. (2019), A proposed nutrient density score that includes food groups and nutrients to better align with dietary guidance, Nutr Rev. 2019 Jun; 77(6): 404–416 https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6489166/ (public)

Indicator	Description	Potential data-sources and further guidance
Health indicators		
13. Nutrient rich foods index (NRF 9.3)	Using the scores above, subtract the sum of the LIM indicator percentage scores from the sum of NR9 indicator percentage scores to derive the NRF 9.3 score The higher score is positive from a nutritional health standpoint	• Drewnowski & Fulgoni (2014), Nutrient density: principles and evaluation tools, The American Journal of Clinical Nutrition, Volume 99, Issue 5, May 2014, Pages 1223S–1228S https://academic.oup.com/ajcn/article/99/5/1223S/4577490 (public) • Drewnowski et al. (2019), A proposed nutrient density score that includes food groups and nutrients to better align with dietary guidance, Nutr Rev. 2019 Jun; 77(6): 404–416 https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6489166/ (public)
14. Polyunsaturated fatty acids (PUFA)	While monosaturated fatty acids (MUFA) are usually a nutrient-rich (NR) indicator within NRF 15.3, we have selected polyunsaturated fatty acids (PUFA) here as intake of PUFA is below recommendations in many parts of the world[7] and PUFA, more than MUFA, are associated with the prevention of future disease.[8] Content of PUFA in a 100 kcal edible portion, divided by the recommended daily value (RDV) for PUFA – which is 13.3 g – and multiplied by 100 to provide a percentage score A higher percentage score is positive from a nutritional health standpoint	• U.S. Department of Health and Human Services website, Nutrient Recommendations https://ods.od.nih.gov/Health_Information/Dietary_Reference_Intakes.aspx (public) • FAO (2010), Fats and fatty acids in human nutrition: Report of an expert consultation, FAO and Food and Nutrition Paper 91.
15. Vitamin D	A nutrient-rich (NR) indicator within NRF 15.3 Content of vitamin D in a 100-kcal edible portion, then divided by the recommended daily value (RDV) for vitamin D – which is 600 IU – and multiplied by 100 to provide a percentage score A higher percentage score is positive from a nutritional health standpoint	• U.S. Department of Health and Human Services website, Nutrient Recommendations https://ods.od.nih.gov/Health_Information/Dietary_Reference_Intakes.aspx (public) • Fulgoni et al. (2009), Development and Validation of the Nutrient-Rich Foods Index: A Tool to Measure Nutritional Quality of Foods, The Journal of Nutrition, Volume 139, Issue 8, August 2009, Pages 1549–1554 https://academic.oup.com/jn/article/139/8/1549/4670510 (public)
16. Vitamin B1	A nutrient-rich (NR) indicator within NRF 15.3 Content of vitamin B1 in a 100-kcal edible portion, then divided by the recommended daily value (RDV) for vitamin B1 – which is 1.2 mg – and multiplied by 100 to provide a percentage score A higher percentage score is positive from a nutritional health standpoint	• U.S. Department of Health and Human Services website, Nutrient Recommendations https://ods.od.nih.gov/Health_Information/Dietary_Reference_Intakes.aspx (public) • Fulgoni et al. (2009), Development and Validation of the Nutrient-Rich Foods Index: A Tool to Measure Nutritional Quality of Foods, The Journal of Nutrition, Volume 139, Issue 8, August 2009, Pages 1549–1554 https://academic.oup.com/jn/article/139/8/1549/4670510 (public)
17. Vitamin B2	A nutrient-rich (NR) indicator within NRF 15.3 Content of vitamin B2 in a 100-kcal edible portion, then divided by the recommended daily value (RDV) for vitamin B2 – which is 1.3 mg – and multiplied by 100 to provide a percentage score A higher percentage score is positive from a nutritional health standpoint	• U.S. Department of Health and Human Services website, Nutrient Recommendations https://ods.od.nih.gov/Health_Information/Dietary_Reference_Intakes.aspx (public) • Fulgoni et al. (2009), Development and Validation of the Nutrient-Rich Foods Index: A Tool to Measure Nutritional Quality of Foods, The Journal of Nutrition, Volume 139, Issue 8, August 2009, Pages 1549–1554 https://academic.oup.com/jn/article/139/8/1549/4670510

Indicator	Description	Potential data-sources and further guidance
Health indicators		
18. Vitamin B12	A nutrient-rich (NR) indicator within NRF 15.3 Content of folate in a 100-kcal edible portion, then divided by the recommended daily value (RDV) for folate – which is 400 mcg – and multiplied by 100 to provide a percentage score A higher percentage score is positive from a nutritional health standpoint	• U.S. Department of Health and Human Services website, Nutrient Recommendations https://ods.od.nih.gov/Health_Information/Dietary_Reference_Intakes.aspx (public) • Fulgoni et al. (2009), Development and Validation of the Nutrient-Rich Foods Index: A Tool to Measure Nutritional Quality of Foods, The Journal of Nutrition, Volume 139, Issue 8, August 2009, Pages 1549–1554 https://academic.oup.com/jn/article/139/8/1549/4670510 (public)
19. Polyunsaturated fatty acids (PUFA)	While monosaturated fatty acids (MUFA) are usually a nutrient-rich (NR) indicator within NRF 15.3, we have selected polyunsaturated fatty acids (PUFA) here as intake of PUFA is below recommendations in many parts of the world and PUFA, more than MUFA, are associated with the prevention of future disease. Content of PUFA in a 100 kcal edible portion, divided by the recommended daily value (RDV) for PUFA – which is 13.3 g – and multiplied by 100 to provide a percentage score A higher percentage score is positive from a nutritional health standpoint	• U.S. Department of Health and Human Services website, Nutrient Recommendations https://ods.od.nih.gov/Health_Information/Dietary_Reference_Intakes.aspx (public) • FAO (2010), Fats and fatty acids in human nutrition: Report of an expert consultation, FAO and Food and Nutrition Paper 91.
20. Zinc	A nutrient-rich (NR) indicator within NRF 15.3 Content of zinc in a 100-kcal edible portion, then divided by the recommended daily value (RDV) for zinc – which is 11 mg – and multiplied by 100 to provide a percentage score A higher percentage score is positive from a nutritional health standpoint	• U.S. Department of Health and Human Services website, Nutrient Recommendations https://ods.od.nih.gov/Health_Information/Dietary_Reference_Intakes.aspx (public) • Fulgoni et al. (2009), Development and Validation of the Nutrient-Rich Foods Index: A Tool to Measure Nutritional Quality of Foods, The Journal of Nutrition, Volume 139, Issue 8, August 2009, Pages 1549–1554 https://academic.oup.com/jn/article/139/8/1549/4670510 (public)
21. Nutrient Rich Foods Index (NRF 15.3)	NRF version 15.3 calculates nutrient density based on the content of NRF version 9.3, plus monosaturated fat, vitamin D, vitamin B1, vitamin B2, vitamin B12, folate and zinc. It has the same nutrients limits as NRF 9.3 (saturated fats, sodium and sugar). Using the scores above, subtract the sum of the LIM indicator percentage scores from the sum of NR15 indicator percentage scores to derive the NRF 15.3 score The higher score is positive from a nutritional health standpoint	• Fulgoni et al. (2009), Development and Validation of the Nutrient-Rich Foods Index: A Tool to Measure Nutritional Quality of Foods, The Journal of Nutrition, Volume 139, Issue 8, August 2009, Pages 1549–1554 https://academic.oup.com/jn/article/139/8/1549/4670510 (public) • WWF & Knorr, Future 50 Foods https://www.wwf.org.uk/sites/default/files/2019-02/Knorr_Future_50_Report_FINAL_Online.pdf (public)
22. The Protein Digestibility Corrected Amino Acid Score (Protein quality)	The Protein Digestibility Corrected Amino Acid Score (PDCAAS) of the product in question This is a method of evaluating the quality of protein based on both the amino acid requirements of humans and their ability to digest it	• Schaafsma, G. (2000), The Protein Digestibility–Corrected Amino Acid Score, The Journal of Nutrition, Volume 130, Issue 7, July 2000, Pages 1865S–1867S https://academic.oup.com/jn/article/130/7/1865S/4686203 (public) • FAO/WHO (1991), Protein quality evaluation: report of the Joint FAO/WHO Expert Consultation. FAO Food and Nutrition Paper 51 (public)

Indicator	Description	Potential data-sources and further guidance
Health indicators		
23. Food safety risk	Food safety intrinsically linked to physical, chemical and/or microbiological hazards that can occur at any point in the food chain from farm to consumption.[9] Compare levels of risk between products using either external databases or internal company data.	• U.S. Department of Health and Human Services website, Nutrient Recommendations https://ods.od.nih.gov/Health_Information/Dietary_Reference_Intakes.aspx (public) • Fulgoni et al. (2009), Development and Validation of the Nutrient-Rich Foods Index: A Tool to Measure Nutritional Quality of Foods, The Journal of Nutrition, Volume 139, Issue 8, August 2009, Pages 1549–1554 https://academic.oup.com/jn/article/139/8/1549/4670510 (public)
Business indicators		
1. Current profitability	The percentage profit margin on sales of the end product for the business in question	This is reliant on internal company data.
2. Future profitability	The projected change in profit margin on sales of the end product for the business over the next 5 years	This is reliant on internal company data.
3. Direction of growth/reduction in addressable market size during last 5 years	The percentage increase or decrease in the size of the addressable market size over the past 5 years	This is reliant on internal company data.
4. Total addressable market size in 2020	The total potential customers for the end product, multiplied by the average annual revenue expected from these customers in 2020[10]	This is reliant on internal company data.
5. Potential total addressable market size in 2030	The total potential customers for the end product, multiplied by the average annual revenue expected from these customers in 2030[11]	This is reliant on internal company data.
6. Supply chain resilience	This is a qualitative, case by case assessment of the resilience of the supply chain to shock using internal company data and analysis or using third party research. Base this on an assessment of how the product supply chain has performed in the face of recent shocks such as the COVID-19 pandemic.	This is reliant on internal company data.
7. Animal welfare risk[12]	This is the qualitative level of risk that a production process impairs directly or indirectly on animal welfare. Assess this using a locally relevant risk assessment framework that incorporates the Five Freedoms[13] or a bespoke framework used by the company in question that incorporates them.	• The World Organisation for Animal Health description of the Five Freedoms https://www.oie.int/en/animal-welfare/animal-welfare-at-a-glance/ • Sustainability Accounting Standards Board (2018), Meat, Poultry & Dairy Sustainability Accounting Standard https://www.sasb.org/wp-content/uploads/2018/11/Meat_Poultry_Dairy_Standard_2018.pdf • World Animal Protection, Animal Protection Index, for high-level country-to-country comparisons of general risk levels of animal welfare risk if products come from different geographies. https://api.worldanimalprotection.org/indicators

5 Overview of the Framework & indicators

⑤ How to use the Framework

Below we provide guidance on how you can use the Framework in three different scenarios, depending on your company's resources and data availability. All are example scenarios for further development based on the aims of the study and needs of the stakeholders involved, and assume an existing understanding and technical capacity to apply and adopt life cycle assessment standards, methodologies and tools.

SCENARIO A – DETAILED ASSESSMENT

In this scenario, a company may have the objective to conduct a detailed assessment using comprehensive data already available across the majority of the Framework indicators and has the resources to gather this data to a high degree of accuracy.

THE PROCESS

Figure 2 provides a simple summary of how to use the Framework in this scenario, with a narrative of each step provided below.

Figure 2: Summary of how to use the Framework

Step 1 – Select products or production methods to assess or compare

The products or production methods to assess or compare through the Framework can be either:

- **Current products/ production methods** – to help an ongoing assessment or evaluation of their sustainability and health performance. This could also inform the future development of or investment in these products or production methods.
- **Future potential products/ production methods** – a company may wish to use the Framework as part of their assessment of the sustainability and health performance of potential future products or production methods.

During this step, define the geography of the sourcing area, along with the grade and technical process used to produce the product in question

Step 2 – Identify data sources

Once you have selected the products, identify a data source for each indicator. These will likely be a combination of:

- **Paid-for LCA and SCLA databases** – your company may already invest in access to commercially available LCA and SCLA databases, such as those identified in the indicator table (table 1).
- **Internal company data** – the results of internal data gathering and reporting, likely confidential in nature.
- **Third party non-public data** – data and analysis produced by scientific partners, consultants or collaborative groups the company is part of, but is not publicly available.
- **Publicly available data** – data and analysis available from public databases, academic research papers or industry reports.

If data is not available for the prescribed measurement unit for an indicator, you may adapt the measurement unit as needed. In some cases, it may be necessary to change the indicator itself according to the available data. If there is no data available at all, mark the indicator as "data not available "and leave it out of the analysis.

It is common that data for the precise product or production method may not be available, but data for a more generalized category may be. For example, in the case of Soy Isolate, publicly available data may only be at the level of soy bean production or for a different geographical location. Depending on the specific products or production methods compared, this more general category may still prove useful for analysis to understand the relative difference in impact, as assessed on a case-by-case basis.

It is also likely that for some indicators there is no expected difference in performance. If so, class them as "non-applicable". This is likely to be more common when comparing production methods for the same product – for example data on market sizes may not differ despite the production method used.

Once you have identified all the data sources, it is necessary to review them. There may be indicators with more than one potential source of data for an indicator. Evaluate the relative credibility, relevance and coverage of each data source to select which data set to use in these cases. If you wish to use assessment results for public disclosure, there are standards to adhere to, such as the ISO Standard 14040-14044 for LCAs.

Step 3 – Collect data

Following agreement on the data sources for each indicator, collect data against each production method or product type and enter it into a centralized datasheet (such as a shared online document).

Step 4 – Identify key patterns and trends in the data

Assess the data gathered across the four impact areas to identify key differences and similarities in the data between the productions or production methods you are assessing. This may show, for example, that while one project performs very well in terms of its environmental impact, its health impacts are negative when compared to the other product assessed.

Step 5 – Use the Framework to inform decision-making

For areas where the differences are greatest, it may be useful to examine the extent to which you could mitigate negative impacts and the likely feasibility and resources required to do so. This could help you understand the analysis and where key issues remain that lack effective mitigation.

Based on these results, you can then use the data from this exercise to inform decision-making for the product and production process in question, taking into account your company's sustainability and commercial strategy.

SCENARIO B – HOT-SPOT ANALYSIS

In this example, a company may not have access to detailed data for the majority of Framework indicators and only limited resources for further investigation. The overall objective of the analysis might be to conduct a preliminary assessment to guide the focus points for a detailed assessment as outlined in scenario A. In this case, the company will need to focus its analysis on a sub-set of indicators where data is already available. **Take steps 1-3 to collect data; the key differences start at step 4.**

THE PROCESS

Step 4 – Analyze the data

The next step is to convert the raw data into comparative percentages, based on whichever value is higher. For example, if two products have the following data values for GHG emissions intensity:

- Product X: 200 grams CO_2e per gram of protein produced
- Product Y: 100 grams CO_2e per gram of protein produced

Then assess product Y to score 50% lower than product X. As per the guidance in tables 2 and 3, a lower GHG emissions intensity indicates higher sustainability performance. Then use the categories below to determine their comparative sustainability performance ratings.

If quantitative data is not available, you can determine these ratings using a qualitative assessment of the evidence available. For example, for animal welfare you may score this based on a qualitative assessment of risks derived from research in the literature and knowledge within your company.

Note also that for indicator categories where there are orders of magnitude of uncertainty (such as toxicity) this type of comparison may not be useful and you should use specific technical guidance instead (for instance USEtox guidance in the case of toxicity).

Step 5 – Present findings in a hot-spot diagram

Take the findings from step 4 and use them to create two versions of the diagram as shown in Appendix I, one for each product/production method you are comparing. This is composed of the indicators you have selected from the list and where reliable data is available.

Step 6 – Use the Framework to inform further investigation

It is important to recognize that given the limited indicators involved in this approach, this should just be the starting point for prioritizing which issues to investigate further and potentially

Table 2: Where higher figures indicate higher sustainability or health performance

Percentage difference	Relative performance rating
More than 50% higher	Much higher
10-50% higher	Higher
0-10%	Neutral
10-50% lower	Lower
More than 50% lower	Much lower

Table 3: Where higher figures indicate lower sustainability or health performance

Percentage difference	Relative sustainability performance rating
More than 50% higher	Much lower
10-50% higher	Lower
0-10%	Neutral
10-50% lower	Higher
More than 50% lower	Much higher

Table 4: Prioritizing hot spots to investigate further

Percentage difference	Priority for further investigation
More than 50% difference	Highest
10-50% difference	Higher
0-10% difference	Lower

broaden the analysis. You may wish to begin with the hot spots, meaning the indicators with the highest levels of difference in sustainability and health performance, and prioritize as follows in table 4.

This further investigation could take the following forms:

- **Examining internal datasets** Your company may have access to more detailed internal data on this issue which you could investigate further.
- **Examining the factors driving the greatest differences in data and investigate these further** Ensure that the key factors driving data patterns are applicable to your operations – for example whether assumptions about irrigation methods in water use datasets are relevant.
- **Identifying indicators that would benefit the most from primary data collection** There may be indicators where the data available do

not provide a useful degree of accuracy and the only option to gather accurate data is to conduct primary research.

- **Purchasing access to more detailed LCA databases**
  This may provide a broader range of detailed data to use.
- **Reviewing scientific literature in greater depth**
  Conduct a more in-depth review of the scientific literature, which may involve consultation with third party scientists and technical experts.
- **Commissioning bespoke research into the issue at hand in the context of your own supply chain**
  If the issues at hand are critical to your business decision-making, you may wish to invest in bespoke research either carried out by your own technical teams or in collaboration with research groups and technical consultants.

SCENARIO C – SECTOR-WIDE ANALYSIS

This is a scenario where a group of companies or an industry coalition assesses different products within their sector on a pre-competitive basis. Rather than using the Framework to aid individual company decision-making, the impact areas and list of indicators can act as a guide and reference for a general analysis of the sustainability of different protein products and production methods. In this case, use only the LCA, SCLA and other academic and industry data sources specified in the list, rather than company-specific data sources. As noted in the next steps below, this is one of the ways we will be using the Framework to inform future work on sustainable proteins.

6 Next steps and recommendations

We propose the following next steps for the use and further development of the Framework.

INVITING COMPANIES TO TEST THE FRAMEWORK AND PROVIDE FEEDBACK

While we had limited opportunities to hold a pilot program during Framework development, we are confident that a broader trial of the Framework and the provision of feedback for a wider range of product types and production methods would be beneficial. We will seek to stress-test the Framework with our member companies to further improve it.

USING THE FRAMEWORK TO INFORM OUR FUTURE WORK ON PROTEIN

Our Food & Agriculture program area will apply the Framework approach, in particular FReSH in its continued work on proteins. This will include:

- The Food & Agriculture Roadmap, which is identifying actions and targets to guide companies to food system transformation, with a focus on dietary shifts; transforming agriculture; equitable distribution of value; food loss and waste;
- The continued use of the Protein Pathways white paper proposing a global protein sustainability improvement roadmap;
- An ambitious partnership working to accelerate sustainable and healthy meat production and consumption that will involve the application and further development of the Proteins Impact Framework for specific meat products;
- Scaling up our work on healthy and sustainable plant proteins, including the Plant Protein Roadmap to 2020; and
- Using the Framework as a reference for us to engage in policy dialogues, in particular the European Eco-Design Directive discussions and Product Environmental Footprint Guide.

PROMOTING FURTHER RESEARCH INTO CONSISTENT SOCIETAL INDICATOR DATA FOR DIFFERENT PROTEIN PRODUCTS AND PRODUCTION METHODS

This could be the subject of collaborative research on a selected set of key societal indicators to develop consistent and comparable datasets between protein types and production methods.

PRODUCING VERSION 2.0 OF THE FRAMEWORK IN THE FUTURE

Depending on the uptake of the Framework and feedback provided, we may develop an updated version in the future. This could include broader geographic scopes (including products with ingredients from multiple countries) and incorporate ongoing developments in research and data availability. We may also look to further develop the Framework into a functional impact measurement tool.

Appendix 1 – Illustration of a hotspot analysis under Scenario B

AN ILLUSTRATION OF HOW TO BEST USE THE FRAMEWORK: PRODUCT A AND B

To illustrate how you can use Framework results, we provide a comparison of two hypothetical products – "A" and "B" – to show how to visualize results, along with a brief assessment of how you can use these results to inform decision-making. We have not applied any weighting between impact area indicators as their importance will differ according to their individual context.

Overall, it appears that Product A performs more favorably across the impact areas, with the clearest difference in performance under the environmental and business impact areas. From this initial analysis, you could base decision-making between future investment in these products on trade-offs between much higher environmental and business performance with lower health performance and slightly lower societal performance

Figure 3: Product A

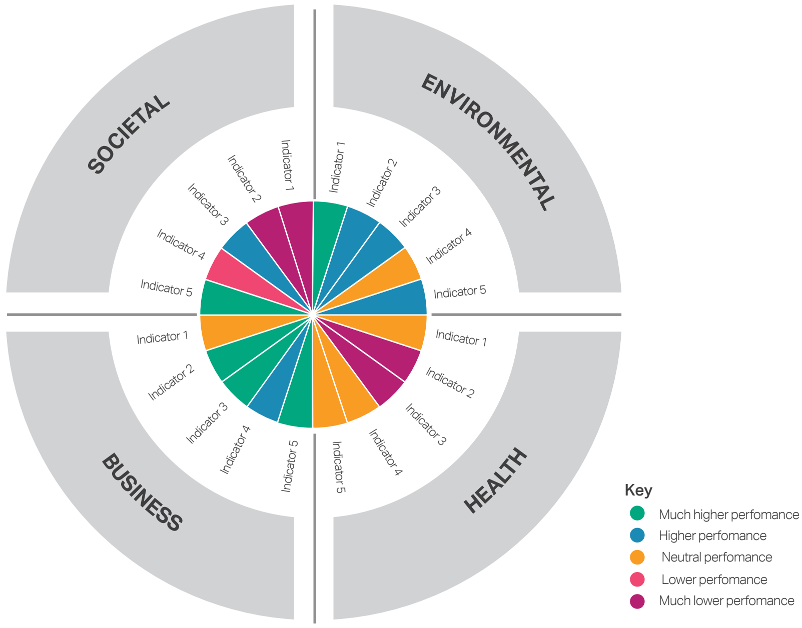
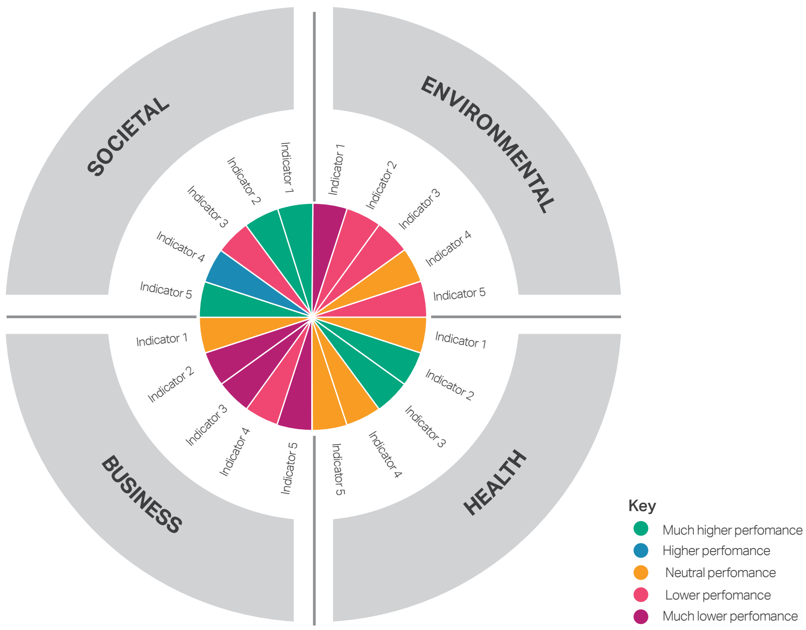


Figure 4: Product B



Appendix 2 – Glossary

Acidification - Change in an environment's natural chemical balance caused by an increase in the concentration of acidic elements.[14]

Amino acids - The building blocks that make up proteins. The human body can produce some amino acids, whereas only the diet can make others available.[15]

Ecotoxicity - An environmental footprint impact category that addresses the toxic impacts on an ecosystem, which damage individual species and change the structure and function of the ecosystem. Ecotoxicity is a result of a variety of different toxicological mechanisms caused by the release of substances with a direct effect on the health of the ecosystem.[16]

Eutrophication - Nutrients (mainly nitrogen and phosphorus) from sewage outfalls and fertilized farmland accelerate the growth of algae and other vegetation in water. The degradation of organic material consumes oxygen, resulting in oxygen deficiency and, in some cases, fish death. Eutrophication translates the quantity of substances emitted into a common measure expressed as the oxygen required for the degradation of dead biomass.[17]

Land occupation - Impact category related to use (occupation) of land area by activities, such as agriculture, roads, housing and mining.[18]

Land-use change (LUC) - Change in human use or management of land within the product system assessed.[19]

Gross domestic product (GDP) - Measures the total gross value added from all institutional units residing in the economy, at producer prices, plus taxes on imports, less subsidies on imports, plus non-deductible VAT (production approach to GDP). As such, GDP measures the total value created in the production of goods and services by all resident units during the accounting period.[20]

Global warming potential (GWP) - Characterization factor describing the radiative forcing impact of one mass-based unit of a given GHG relative to that of carbon dioxide over a given period of time.[21]

Greenhouse gas (GHG) - Those gaseous constituents of the atmosphere, both natural and anthropogenic, that absorb and emit radiation at specific wavelengths within the spectrum of terrestrial radiation emitted by the Earth's surface, the atmosphere itself, and by clouds. This property causes the greenhouse effect. Water vapor (H_2O), carbon dioxide (CO_2), nitrous oxide (N_2O), methane (CH_4) and ozone (O_3) are the primary GHGs in the Earth's atmosphere. Moreover, there are a number of entirely human-made GHGs in the atmosphere, such as the halocarbons and other chlorine- and bromine-containing substances, dealt with under the Montreal Protocol. Beside CO_2, N_2O and CH_4, the Kyoto Protocol deals with the GHGs sulphur hexafluoride (SF_6), hydrofluorocarbons (HFCs) and perfluorocarbons (PFCs).[22]

Human toxicity – cancer - Impact category that accounts for the adverse health effects on human beings caused by the intake of toxic substances through inhalation of air, food/water ingestion, penetration through the skin insofar as they are related to cancer.[23]

Human toxicity – non cancer
Impact category that accounts for the adverse health effects on human beings caused by the intake of toxic substances through inhalation of air, food/water ingestion, penetration through the skin insofar as they are related to non-cancer effects not caused by particulate matter/respiratory inorganics or ionizing radiation.[24]

Ionizing radiation, human health - Impact category that accounts for the adverse health effects on human health caused by radioactive releases.[25]

FReSH (Food Reform for Sustainability and Health) is a WBCSD project developing a set of business solutions to deliver healthy and sustainable diets for all.

Food safety - All measures to ensure that food will not cause harm to the consumer when it is prepared and/or eaten according to its intended use.[26]

Life cycle assessment - Compilation and evaluation of the inputs, outputs and the potential environmental impacts of a product system throughout its life cycle.[27]

Protein Digestibility Corrected Amino Acid Score (PDCAAS) - Determined by comparing the amino acid profile of the food in question against a reference pattern of essential amino acids. It is a method of measuring the protein quality based on the amino acid profile and human's ability to be able to digest it.[28]

Ozone depletion - Impact category that accounts for the degradation of stratospheric ozone due to emissions of ozone-depleting substances, for example long-lived chlorine and bromine containing gases (e.g., chlorofluorocarbons, hydrochlorofluorocarbon, halons).[29]

Particulate matter (PM) - Impact category that accounts for the adverse health effects on human health caused by emissions of particulate matter and its precursors (NOx, SOx, NH_3).[30]

Production process - Covers all activities that go into the making, transporting, using and disposing of that product. This includes the extraction of raw materials, through design and formulation, processing, manufacturing, packaging, distribution, use, re-use, recycling and, ultimately, waste disposal.[31]

Protein content - This the amount of protein in different food types; typically measured in grams of protein per 100 grams of the food portion.[32]

Endnotes

[1] For example, see the British Nutrition Foundation website at https://www.nutrition.org.uk/nutritionscience/nutrients-food-and-ingredients/protein.html?start=4.

[2] Fulgoni et al. (2009), Development and Validation of the Nutrient-Rich Foods Index: A Tool to Measure Nutritional Quality of Foods. The Journal of Nutrition, Volume 139, Issue 8. Available online at https://academic.oup.com/jn/article/139/8/1549/4670510. The European-based SUSFANS and SHARP initiatives also use the NRF.

[3] See acknowledgements section for information on these consultation events.

[4] Each of these indicators is continually undergoing further improvement and improved data sources will be available over time.

[5] According to the Food and Agriculture Organization of the United Nations (UN FAO) Livestock Environmental Assessment Performance Partnership (LEAP), "When crop yields are expressed per unit of land, the gross area shall be used as a reference point so that unutilized parts, internal ditches, waterways and internal infrastructure are also considered. The difference between net land and gross land occupation can range from 5 percent to 25 percent. When fallow land is an essential part of the production system, it shall be incorporated into the calculation."

[6] The term "child labor" is often defined as work that deprives children of their childhood, their potential and their dignity, and that is harmful to physical and mental development. It refers to work that is mentally, physically, socially or morally dangerous and harmful to children; and/or interferes with their schooling by depriving them of the opportunity to attend school; obliging them to leave school prematurely; or requiring them to attempt to combine school attendance with excessively long and heavy work.

[7] Micha, R., et al. (2014), Global, regional, and national consumption levels of dietary fats and oils in 1990 and 2010: a systematic analysis including 266 country-specific nutrition surveys, BMJ, 2014. 348: p. g2272.

[8] Mozaffarian, D., R. Micha & S. Wallace (2010), Effects on coronary heart disease of increasing polyunsaturated fat in place of saturated fat: a systematic review and meta-analysis of randomized controlled trials, PLoS Med. 7(3): p. e1000252.

[9] The European Food Information Council (EUFIC) (2013), HACCP and GHP: Standards in Food Industry. Available online: https://www.eufic.org/en/food-safety/article/food-industry-standards-focus-on-haccp.

[10] You could substitute this with the total expected revenue if the company is already selling all products compared using the Framework and if it has already well-analyzed them.

[11] You could substitute this with the total expected revenue in 2030 if the company is already selling all products compared using the Framework and there is enough data available to predict revenue growth.

[12] When an animal is in a good welfare state it is healthy, well fed and cared for, has means of adequate shelter, and is able to exhibit its normal behavioral patterns (UK Animal Welfare Committee). Available online: https://www.fve.org/cms/wp-content/uploads/058_AWIndicatorsPaper_finaldraft18sept2018_GA_adopted.pdf.

[13] The five freedoms describe society's expectations for the conditions animals should experience when under human control, namely: freedom from hunger, malnutrition and thirst; freedom from fear and distress; freedom from heat stress or physical discomfort; freedom from pain, injury and disease; and freedom to express normal patterns of behavior. From the World Organisation for Animal Health: https://www.oie.int/en/animal-welfare/animal-welfare-at-a-glance/.

[14] European Environment Agency (1999), EEA Glossary. Available online: https://www.eea.europa.eu/help/glossary/eea-glossary/acidification.

[15] British Nutrition Foundation (n.d.), Glossary. Available online: https://www.nutrition.org.uk/healthyliving/resources/glossary.html.

[16] European Commission (2013), Product Environmental Footprint Guide. Available online: https://ec.europa.eu/environment/eussd/pdf/footprint/PEF%20methodology%20final%20draft.pdf.

[17] European Commission (2013), Product Environmental Footprint Guide. Available online: https://ec.europa.eu/environment/eussd/pdf/footprint/PEF%20methodology%20final%20draft.pdf.

[18] European Commission (2013), Product Environmental Footprint Guide. Available online: https://ec.europa.eu/environment/eussd/pdf/footprint/PEF%20methodology%20final%20draft.pdf.

[19] International Organization for Standardization (ISO) (2013), Greenhouse gases — Carbon footprint of products — Requirements and guidelines for quantification and communication. Available online: https://www.iso.org/obp/ui/#iso:std:iso:ts:14067:ed-1:v1:en.

[20] Food and Agriculture Organization of the United Nations (FAO) (2020), The FAOSTAT Macro Indicators database. Available online: http://www.fao.org/faostat/en/#data/MK/metadata.

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[22] Intergovernmental Panel on Climate Change (IPCC) (2018), IPCC SR1.5 Glossary. Available online: https://www.ipcc.ch/site/assets/uploads/2018/11/sr15_glossary.pdf.

[23] European Commission (2013), Product Environmental Footprint Guide. Available online: https://ec.europa.eu/environment/eussd/pdf/footprint/PEF%20methodology%20final%20draft.pdf.

[24] European Commission (2013), Product Environmental Footprint Guide. Available online: https://ec.europa.eu/environment/eussd/pdf/footprint/PEF%20methodology%20final%20draft.pdf.

[25] European Commission (2013), Product Environmental Footprint Guide. Available online: https://ec.europa.eu/environment/eussd/pdf/footprint/PEF%20methodology%20final%20draft.pdf.

[26] World Health Organization (WHO) (2007), Five keys to safer food manual. Available online: https://www.who.int/foodsafety/publications/consumer/manual_keys.pdf?ua=1.

[27] International Organization for Standardization (ISO) (2006), Environmental management — Life cycle assessment — Principles and framework. Available online: https://www.iso.org/standard/37456.html.

[28] Schaafsma, G. (2000), The Protein Digestibility–Corrected Amino Acid Score, The Journal of Nutrition, Volume 130, Issue 7, July 2000, Pages 1865S–1867S. Available online at: https://academic.oup.com/jn/article/130/7/1865S/4686203.

[29] European Commission (2013), Product Environmental Footprint Guide. Available online: https://ec.europa.eu/environment/eussd/pdf/footprint/PEF%20methodology%20final%20draft.pdf.

[30] European Commission (2013), Product Environmental Footprint Guide. Available online: https://ec.europa.eu/environment/eussd/pdf/footprint/PEF%20methodology%20final%20draft.pdf.

[31] European Environment Agency (1997), Life Cycle Assessment (LCA). Available online: https://www.eea.europa.eu/ds_resolveuid/80B643FV59.

[32] For examples, see the British Nutrition Foundation website at https://www.nutrition.org.uk/nutritionscience/nutrients-food-and-ingredients/protein.html?start=4.

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DISCLAIMER

This report has been developed in the name of WBCSD. Like other WBCSD publications, it is the result of a collaborative effort by members of the secretariat and senior executives from member companies. A wide range of members reviewed drafts, thereby ensuring that the document broadly represents the perspective of the WBCSD membership. Input and feedback from stakeholders listed above was incorporated in a balanced way. This does not mean, however, that every member company or stakeholder agrees with every word.

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WBCSD is a global, CEO-led organization of over 200 leading businesses working together to accelerate the transition to a sustainable world. We help make our member companies more successful and sustainable by focusing on the maximum positive impact for shareholders, the environment and societies.

Our member companies come from all business sectors and all major economies, representing a combined revenue of more than USD $8.5 trillion and 19 million employees. Our global network of almost 70 national business councils gives our members unparalleled reach across the globe. Since 1995, WBCSD has been uniquely positioned to work with member companies along and across value chains to deliver impactful business solutions to the most challenging sustainability issues.

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