CHARITY ENTREPRENEURSHIP

Advocating for 60:40 plant:animal Protein Sales Ratios by 2040

AUGUST 2025

RECOMMENDED

Advocating for 60:40 plant:animal Protein Sales Ratios by 2040

Ambitious Impact Research Report

August, 2025

Advocating for 60:40 plant:animal Protein Sales Ratios by 2040

August, 2025

Contributions: *The primary author for this report was Margaret Hegwood (Research Fellow), supported by Vicky Cox (Senior Research Manager). Max Weylandt (Research Fellow) also provided feedback on the analyses used to support the conclusions in this report.*

Ambitious Impact (AIM) *exists to enable more effective charities to exist worldwide. We strive to achieve this goal through our extensive research process and Incubator Program. We give talented potential entrepreneurs two months of cost-covered, intensive training designed by founders for founders. Our talented researchers and entrepreneurs identify evidence-based, high-impact interventions and help founders find a co-founder to launch the idea and reach scale.*

Note to readers: *Our research is geared toward AIM decision-makers and program participants. We attempt to find the best ideas for our incubation programs through these reports. Given our commitment to focusing on recommended ideas, reports on those not recommended for incubation can often be less polished.*

For questions *about the research, please contact Morgan Fairless at* morgan@charityentrepreneurship.com.

Citation: Hegwood, M. & Cox, V. (2025). Advocating for 60:40 plant:animal Protein Sales Ratios by 2040. Ambitious Impact. https://doi.org/10.5281/zenodo.16314128

Advocating for 60:40 plant:animal Protein Sales Ratios by 2040 / Summary

Description

This intervention aims to improve climate change and animal welfare outcomes by encouraging supermarkets in high-income countries to commit to selling a higher percentage of total protein sales from plant-based sources. Increasing plant-based protein sales while keeping protein volume sold constant would simultaneously reduce emissions and reduce the number of animals farmed to meet consumer demand for protein. The proposed charity would advocate for protein sales ratio commitments (i.e., ensuring that a certain percentage of protein sales are from plants) by a target year by conducting corporate campaigns and providing technical assistance to supermarkets to encourage consumer purchasing of plant-based protein.

Counterfactual impact

Cost-effectiveness analysis: We modeled the cost-effectiveness of a charity advocating for increased plant-based protein sales ratios in our top target country based on our geographic assessment, Australia, aiming to shift the national protein ratio to 60:40 (plant-to-animal) by 2040. Our analysis suggests the intervention could be highly cost-effective, costing $0.21 per tonne CO_2 equivalents averted and saving 153 Suffering-Adjusted Days (SADs) per dollar. Cost estimates include fixed and variable expenses for staffing, corporate campaigns, and randomized controlled trials, while impact estimates are based on national consumption and emissions data across seven major animal products.

Scale this charity could reach: Supermarkets account for a majority (>90%) of food sales in high-income countries (USDA, 2025). If the majority of supermarkets in Australia commit to a 60:40 plant-to-animal protein ratio, the intervention could avert 53 million tonnes of CO2 emissions and 1.7 billion SADs by the year 2040.

Potential for success

Robustness of evidence: 13 supermarkets in the Netherlands with a total market share greater than 90% have committed to shifting toward plant-based protein sales, but early data suggests progress is slow—these retailers increased plant-based shares by just 1.3 percentage points in a year, leaving them off track to meet 2030 targets. Supermarkets outside of the Netherlands are also starting to make commitments. Evidence shows that interventions like price parity, promotions, and changes to the food environment can boost plant-based sales. However, it is unlikely that these interventions will be sufficient to reach these sales ratio targets, so a new charity will need to identify new interventions. Despite these uncertainties, the harms of animal farming—including severe animal suffering and high greenhouse gas emissions—are well documented. Replacing animal products with plant-based alternatives remains a promising, low-risk intervention, though its long-term effectiveness at displacing meat consumption requires further study.

Theory of Change: We modeled a theory of change for a charity that advocates for supermarkets to make plant-based protein sales ratio commitments. The theory of change assumes that a shift in the supply and marketing of protein products—enabled through retailer commitments—can lead to large-scale reductions in demand for animal products. This, in turn, improves farmed animal welfare, mitigates emissions, and shifts norms about protein consumption.

Neglectedness

Neglectedness: Results from our geographic assessment suggest that existing work advocating for protein sales ratios is predominantly being done in a handful of high-income countries in Europe. Other countries—including high-income countries with high animal production consumption within and outside of Europe—have no organizations working on this issue.

Geographic assessment: We narrowed down a list of 47 potential countries where this intervention was cost-effective using proxies related to political and social openness to plant-based foods to assess tractability and per capita animal product consumption to assess scale. Our geographic assessment identified ten Tier A target countries for this work: Australia, Norway, Austria, Estonia, France, Brazil, Iceland, Luxembourg, Taiwan, and Canada. Our weighted factor model ranked Australia as the top location.

Relevance

Strategic value to AIM: The intervention aligns closely with Ambitious Impact's priorities across animal welfare and climate. It complements other food system initiatives but fills a neglected niche focused on retailer-level decision-making and systems-level change.

Fit for the CEIP: This idea could appeal strongly to entrepreneurial incubatees interested in food systems change, especially those with backgrounds in retail, advocacy, or policy. While specialist skills in corporate engagement or food systems modeling would be nice to have, they are not required. Risks to incubatees appear low and manageable.

Other

Expert views: Experts from Madre Brava, Green Protein Alliance, and ProVeg have voiced support for interventions that engage supermarkets in shifting product offerings, especially those that build on existing public commitments. Some expressed concern that supermarket pledges could become hollow without clear baselines or third-party monitoring. A few stakeholders noted the importance of aligning with broader trends in alt-protein innovation and public procurement.

Implementation factors: A charity focused on plant-based protein sales ratios would engage supermarkets through advocacy, data-driven campaigns, and partnerships to shift their product mix toward plant-based options. The main implementation concern for a new charity working in this space is tractability.

There are two core tractability concerns with this intervention 1) Can campaigns secure commitments and 2) Can supermarkets deliver behavioral changes and meet their commitments?

1. Based on case studies from Europe we think this is possible, but we are unsure how easy it will be to obtain similar commitments outside of Europe.
2. We think that the evidence for this is weak, but there is some case study evidence and some observational evidence that supermarkers can support behavioral change. A new charity will have to support supermarkets to deliver the best known interventions, and help them to identify new interventions to ensure that they meet their commitments.

We are not super confident in either step and think they are difficult to achieve, but highly worth it if achieved.

Advocating for 60:40 plant:animal Protein Sales Ratios by 2040 / Crucial considerations

Current animal:plant protein sales ratios

The counterfactual benefits of supermarket animal:plant (A:P) protein sales ratio commitments depend heavily on current A:P ratios in supermarkets. Currently, data on A:P ratios at the country level is available in terms of volume (e.g. g/capita/day) (Drewnowski & Hooker, 2025; FAOSTAT, 2025) and value (e.g., $/tonne) (FAOSTAT, 2025). In high-income countries, "the mean dietary A:P protein [by volume] ratio is around 65:35, with two thirds of the protein coming from meat, eggs, and dairy." (Drewnowski & Hooker, 2025

Substitution vs addition of animal protein

Consumers could substitute animal protein with plant protein or eat plant protein in addition to the meat they already consume. Studies suggest that some level of addition is likely in the short term, but we are uncertain about this trend in the long term. To help avoid this issue, we recommend that the charity advocate for improved plant-based protein sales ratios with constant protein volume.

Success of current campaigns to shift consumer behavior

Current case study evidence suggests this idea is tractable in environmentally progressive, high-income countries (e.g., Netherlands, Germany, United Kingdom (UK)). ProVeg, Wakker Dier, and Green Protein Alliance advocacy campaigns in the Netherlands helped to secure commitments from 90% of Dutch supermarkets. In their first year, Dutch supermarkets increased plant-based protein ratios from 40.9 to 42.2% on average across participating Dutch supermarkets (Protein Tracker, 2025, p. 6). However, long-term success is less certain because supermarkets are not on-track to meet existing commitments. This is likely because of the challenges with shifting consumer behavior to purchase more plant-based protein. It will be important for the charity to determine what interventions are most effective in improving plant-based protein sales in supermarkets.

There is need for innovation. It is likely that the interventions that we know work to increase plant-based product sales (introducing new products, shelf placement, price parity, changes to recipes, hybrid products, banning animal product promotions, plant-based product promotions) will be insufficient to reach the required protein ratios. A new charity will need to find interventions that supermarkets can implement to further shift consumption towards plant-based products.

Understanding the 1.3% increase in plant-based protein sales in the Netherlands

The reported 1.3% increase[1] in plant-based protein sales in the Netherlands between 2023 and 2024 is not an isolated attribution to store intervention, so it would include natural market demand increases. This 1.3% increase was calculated using Green Protein Alliance's Protein Tracker which only monitors store-level data, not broader trends (Green Protein Alliance & ProVeg Netherlands, 2025).

[1] Note that these estimates do not include data from Albert Heijn which is the biggest supermarket in the Netherlands. It chose not to have its data evaluated by the Protein Tracker but did report on sales individually. Albert Heijn conducted its own analysis, which shows a slight decline in sales of plant-based protein. Using a methodology that is similar—but not identical—to the one used by the Protein Tracker, Albert Heijn reported a decrease from 44.5% to 44.2% plant-based protein.

Analysis by Wakker Dier suggests that sales of animal products in Dutch supermarkets have fallen by 16.4% since 2020, with a 2.3% decrease between 2022 and 2023 (Wakker Dier, 2024). Note that some supermarkets made their protein ratio commitments in 2022 and others in 2023. Wakker Dier attributes this change to the introduction of new products, price parity and shelf placement interventions, and an end to fresh meat promotions, all of which are recommended tools to help supermarkets reach their protein ratio commitments, and so could be the result of these commitments instead of market trends. But if meat sales were already falling since 2020, before commitments were made in 2022, then this likely isn't the whole picture.

However, if we look at per capita meat consumption in the Netherlands over the same period, we can see that it was increasing between 2020-2022 (see Figure 1) and may have stabilised from 2023: "The total consumption of meat and meat products (based on carcass weight) per capita in the Netherlands in 2023 is almost the same as in 2022. In that year the consumption reached 75.1 kilograms, in 2023 it reached 75.3 kilograms" (Wageningen University, 2024). We are unsure how to parse this with the information that meat sales are falling in supermarkets.

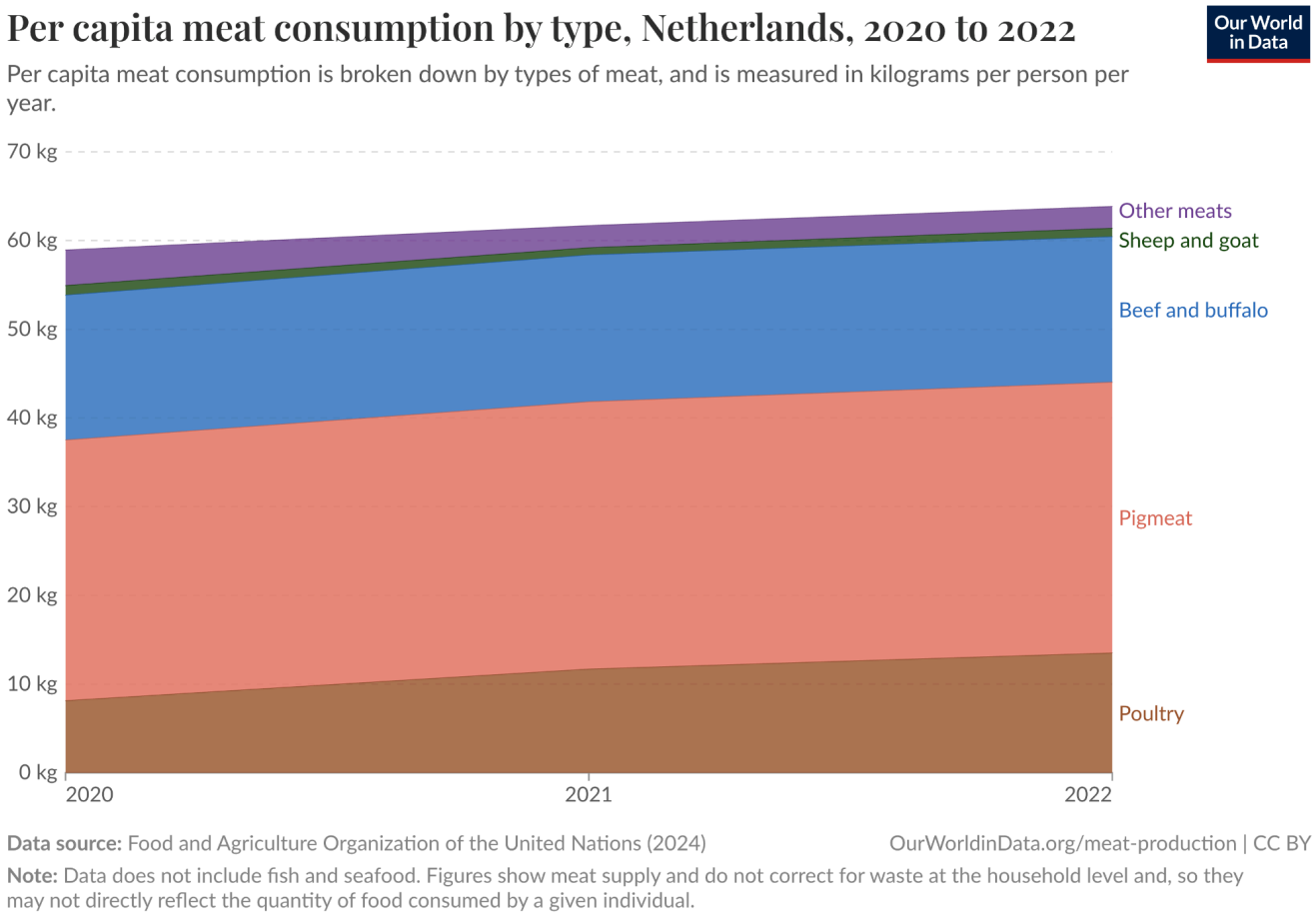

Figure 1: Per capita meat consumption in the Netherlands, 2020-2022 (Food and Agriculture Organization of the United Nations (2024) – processed by Our World in Data)

In case a 1.3% annual increase in plant-based sales is the best that can be achieved by this intervention, we have also modeled a lower-bound CEA (See "1.3% annual increase CEA" tab) where we assume there will only be a 1.3% increase in plant-based sales each year until the target deadline (2040). Although this looks much less cost-effective, averting only 12 SADs/$ and costing $2.65 to avert a tonne of CO2, this still meets our cost-effectiveness bars of 8 SADs/$ and $33/tCO2e averted. That is, this intervention still looks cost-effective in pessimistic modelling scenarios.

Table of contents

1 Background

Ambitious Impact (AIM) incubates non-profits improving human and animal wellbeing. As part of our 2025 research, we explored ideas benefitting both climate and animal welfare as a cause area. Food systems, particularly animal agriculture, are responsible for major environmental and animal welfare impacts. Shifting supermarket protein sales toward plant-based options is a promising strategy to reduce environmental impacts and animal suffering in the food system.

1.1 Context

Ambitious Impact (AIM) exists to increase the number and quality of effective nonprofits working to improve human and animal wellbeing. AIM connects talented individuals with high-impact ideas. We give potential entrepreneurs intensive training and ongoing support to launch ideas to scale. Our research team focuses on finding impactful opportunities.

As part of our 2025 research agenda, we reviewed climate co-benefits as a cause area. In that context, we researched working with large food retailers to achieve plant-based protein sales commitments. This report provides an overview of our findings.

1.2 Introduction to the idea and problem

Food systems as a climate change and animal welfare cause area

Globally, food systems are responsible for major environmental impacts. Food systems account for 33% of anthropogenic greenhouse emissions (Crippa et al., 2021), use 70% of the world's available fresh water, and use 50% of the world's habitable land (Ritchie, 2019). Food systems are also the leading cause of deforestation worldwide (Ritchie, 2024), including in the biodiversity-rich tropical

forests of Brazil and Indonesia. As a result, agriculture is also the leading cause of habitat loss for wild species (Ritchie, 2021b).

Animal production is responsible for the majority of the environmental impacts of the food system (Poore & Nemecek, 2018). Leading researchers and international organizations estimate that livestock production is responsible for 12.0 to 19.7% of global anthropogenic emissions or roughly 36 to 60% of total food system emissions (Blaustein-Rejto & Gambino, 2023). Beef is the most resource- and emissions-intensive livestock product with 99.48 kilograms CO2 eq generated per kilogram of beef produced on average (Poore & Nemecek, 2018; Ritchie, Rosado, and Roser, 2022). Most deforestation is driven by the need for land to graze animals and/or grow feed (e.g., soybeans) for livestock (Ritchie, 2024).

Animal production also results in the immense suffering of billions of farm animals annually. Roughly 85.44 billion land animals are slaughtered annually for meat (Ritchie, Rosado, & Roser, 2023). As many as 78 to 171 billion fish and crustaceans are also killed for human consumption (Mood et al., 2023; Tenniswood, 2023). The high demand for animal products necessitates that a majority of farm animals are raised in intensified systems (i.e., factory farms), which result in severe welfare harms for farm animals and increased zoonotic disease risks (Hayek, 2022).

Despite the substantial environmental and animal welfare impacts of food systems, the demand for animal products continues to increase. Relative to 2020, demand for animal products is expected to increase by 38% by 2050 (Koosis, 2024). As a result, identifying opportunities that reduce the negative impacts of animal production and/or reduce demand for animal products is a key priority to improve both environmental and farm animal wellbeing in the coming decades.

Strategies to reduce food systems emissions and improve animal welfare: Shifting to plant-based diets

Plant-based diets are widely considered a key opportunity to reduce the current food system's negative environmental and animal welfare impacts (Foley et al., 2011; Willett et al., 2019). Global shifts to plant-based diets could reduce agricultural land use by 75% because the land used to grow crops for animal feed would no longer be needed (Ritchie, 2021c). Vegan and low-meat diets (0 to <50 g person^{-1}d^{-1}) produce 69.7% and 42.8% fewer CO2 emissions on average than high-meat diets (>100 g person^{-1} d^{-1}) respectively (Scarborough et al., 2023). Plant-based substitutes for animal products, such as plant-based milk (e.g., soy milk, oat milk) and meat analogs (e.g., Beyond Burger, Impossible Meat) have substantially fewer environmental impacts across multiple metrics (e.g., emissions, water use, and land use) (Good Food Institute, n.d.a; Ritchie, 2022).

Shifting protein sales ratios in supermarkets to favor plants

Commitments from supermarkets to increase plant-based protein sales ratios could help to reduce food systems environmental and animal welfare impacts.
Supermarkets play a central role in shaping food purchasing patterns through product placement, pricing, promotion, and availability. Plant-based protein ratios refer to the proportion of a supermarket's total protein sales (by volume) that comes from plant-based sources (e.g., beans, tofu, lentils, soy products, plant-based meats) rather than animal sources (e.g., beef, chicken, dairy, eggs). By increasing the proportion of protein from plants while maintaining a constant protein volume sold, supermarkets can help to reduce the amount of animal products sold (WWF, 2024, p. 5). In turn, this reduces the climate and animal welfare impacts of food systems. Supermarkets can make protein commitments, which are voluntary pledges by retailers to achieve a specific plant-to-animal protein sales ratio by a set date, similar to commitments on sugar reduction or food waste.

2 Theories of change

We modeled a theory of change for a charity that advocates for supermarkets to make plant-based protein sales ratio commitments. These commitments are expected to influence consumer purchasing behavior and reduce animal product consumption. As a result, there are systemic reductions in livestock demand, GHG emissions, and farmed animal suffering.

2.1 Barriers

The main barriers we have identified to advocating for higher plant-based protein sales ratios are:

Consumer preferences, habits, and beliefs:

- Many consumers are accustomed to animal-based protein and may perceive plant-based options as less satisfying or palatable.
- Cultural and dietary norms often prioritize meat as a primary protein source.
- There is ongoing confusion about the environmental and nutritional value of plant-based proteins compared to animal proteins.

Price and accessibility:

- Plant-based protein analogs (e.g., Beyond Meat, Impossible Meat) products are often more expensive than conventional meat.
- Limited availability in some countries and/or supermarket chains

Retailer resistance and profit margins:

- In some cases, meat sales are high-revenue items, and supermarkets may be reluctant to reduce their space.
- In other cases, animal products are “loss leaders” that are promoted to encourage consumers to shop in certain supermarkets

- Supermarkets may be hesitant to invest in expanding plant-based product inventory if consumer demand is unreliable or low.

Policy and Regulation Issues:

- Marketing regulations may limit the ability to label and promote plant-based proteins as equivalent to meat.

2.2 Theory of change of this charity

We decided to focus on the ToC depicted in Figure 2, which is similar to that used by organizations in the Netherlands who have successfully advocated for higher plant-based protein ratios. The core focus of the envisioned charity organization would be to advocate for higher plant-based protein sales with supermarkets and provide technical support to help supermarkets meet their protein sales ratio goals.

There are several ways to encourage plant-based eating, including through government incentives (e.g., subsidies for plant-based products, "true cost pricing" that accounts for negative externalities like emissions into meat prices), changes to dietary guidelines (e.g., updating national dietary standard to recommend higher plant consumption), and supermarket level interventions (e.g., price parity, shelf placement, promotional policies). We focus on the latter in this ToC.

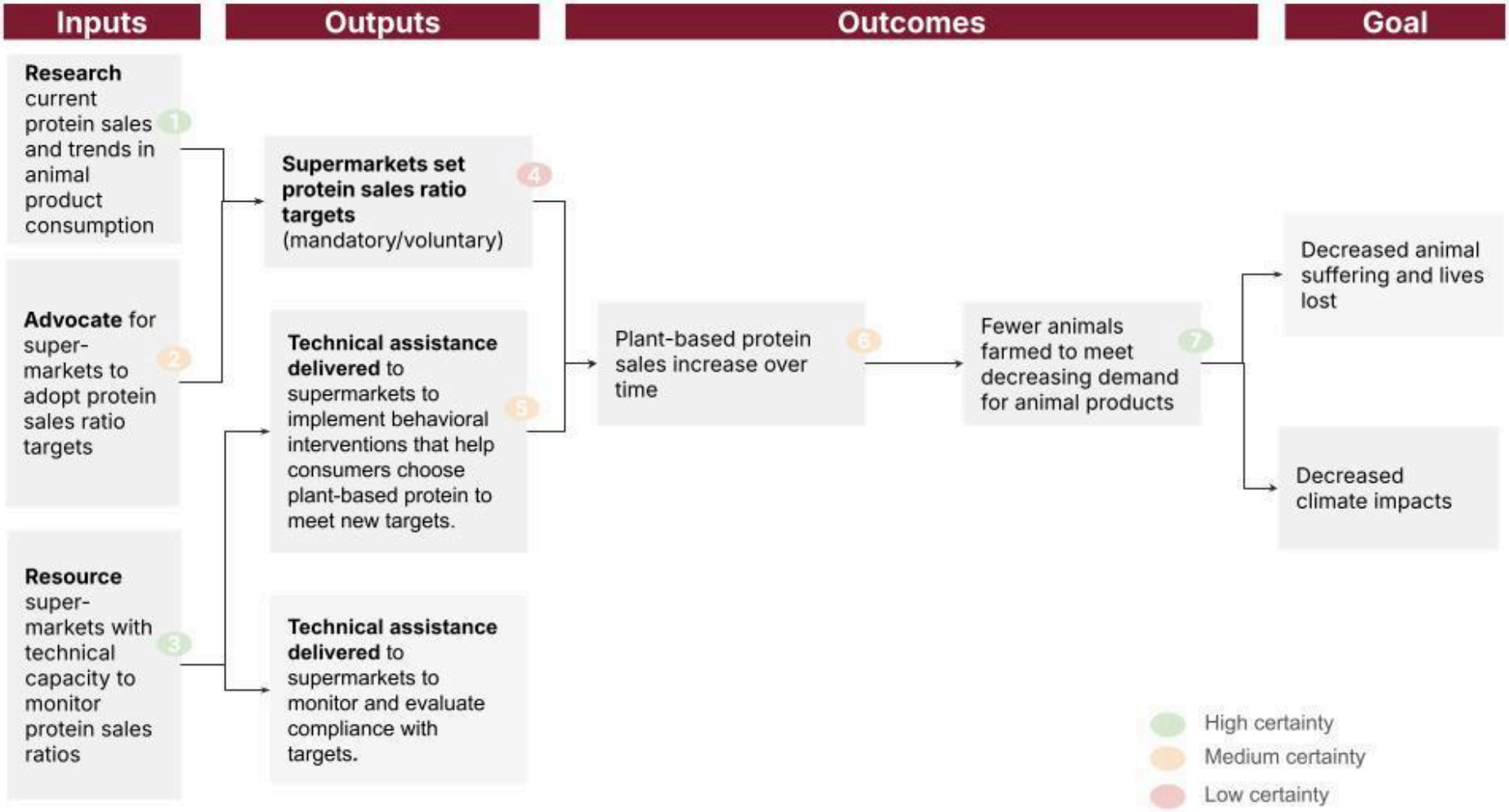

Figure 2: The primary ToC of this non-profit

2.3 Assumptions and key factors

1. It is very likely, with access to government and industry data, that we will be able to research current protein sales.

2. There are roughly even odds that advocacy work will result in supermarkets implementing protein sales ratio targets that reduce the sale of animal protein. Successful campaigns have resulted in protein sales ratio targets being set by supermarkets in the Netherlands, the UK, and Germany, but campaigns are new (<2 years old) and some are already off track to meet current commitments. For example, data from the Green Protein Alliance efforts in the Netherlands shows that annual plant-protein sales increases are not on track to meet 2030 commitments.

3. It is very likely that we will be able to monitor protein sales. Tools and methods, such as the Protein Tracker, to monitor protein sales require few data inputs, are simple to use, and are accessible online.

4. It is highly improbable that, even if set, plant-based protein sales ratios will be met by the set target date. Current similar commitments in the Netherlands are not on track. However, we think that these commitments are still impactful as it is good to have something for supermarkets to aim for and something we can hold them accountable to for reducing animal product sales. Even if they do not meet the deadline, they will continue to make progress and we think that setting these targets will speed up the date that the desired protein sales ratios will be met.

   We can also prolong the deadline. We consider both a 2030 and a 2040 deadline in our cost-effectiveness analysis.

5. There are roughly even odds that behavioral and food environment changes can be successfully made in supermarkets to shift behavior. Part of the work of this new organization will be to deliver technical assistance to supermarkets to help them meet their commitments. This will likely involve testing many interventions and studying their impacts to determine which

interventions work best. There are also already a handful of interventions (plant-based promotions, shelf placement, product availability, and price parity) that are being tested in the Netherlands, Germany, and the UK that could be successful in helping shift behavior. The effectiveness of these interventions is discussed in Section 3.2.

6. There are roughly even odds regarding whether animal meat will be replaced with or eaten in addition to plant-based protein. It seems likely that neither all animal products would be substituted for plant-based protein nor would all plant-based protein be eaten in addition to meat, but the percent substituted or added is uncertain.

7. It is almost certain that shifting to plant-based diets reduces the climate and animal welfare impacts of foods (Scarborough et al., 2023; Poore & Nemecek, 2018; Scherer et al., 2019). However, the extent of these impacts does depend on which animal products are replaced. For example, if beef products are replaced there will be greater climate benefits than if predominantly chicken purchases are replaced because beef has higher emissions, but lower animal welfare benefits. If chicken purchases are replaced there will be greater animal welfare benefits because chicken has worse animal welfare, but lower climate benefits. We discuss this more in Sections 3.3 and 3.4.

3 Quality of evidence

Some supermarkets have committed to shifting toward plant-based protein sales, but early data suggests progress is slow—Dutch retailers increased plant-based sales by just 1.3 percentage points in a year, leaving them off track to meet 2030 targets. Evidence shows that interventions like price parity, promotions, and changes to the food environment can boost plant-based sales, but there is weaker evidence showing that these interventions can reduce meat sales. Studies on price elasticity suggest plant-based products respond well to discounts, though whether they substitute for meat is unclear and context-dependent.

3.1 Evidence that a charity can effect change in this space

Several existing charities currently advocate for higher plant-based protein ratios, predominantly in high-income countries. The best evidence we have of charities successfully advocating for increased plant-based protein sales ratios is in the Netherlands and Germany (Stevenson, 2025). In the Netherlands, nearly all supermarkets have committed to 60% of protein sales being sourced from plants by the year 2030, using the Protein Tracker's methodology[2], prompted by strategic action from Wakker Dier, Proveg, and the Green Protein Alliance (Protein Tracker, 2025, p. 3). In Germany, Lidl committed to 20% of core protein sales coming from plants by 2030, using WWF's methodology[3], as a result of strategic action by The Albert Schweitzer Foundation, ProVeg, the Green Protein Alliance, and WWF (Stevenson, 2025). Several other major supermarkets in Europe have also made commitments, including some as a direct result of advocacy work by existing charities, as seen in Table 1. There is credible and growing evidence that nonprofit-led efforts can pressure or persuade retailers to adopt sales ratio targets and hold companies accountable through public reporting (e.g., Protein Tracker, WWF methodology).

[2] Protein Tracker's methodology calculates the amount of protein in all products ("core" like meat, seafood, eggs, dairy, nuts, and legumes, and "non core" like bread, rice, vegetables, fruit, and other plants or plant-derived grains).
[3] WWF's methodology calculates the total weight of "core" protein products.

Table 1: Current plant-based protein sales ratio commitments and supporting charities

Country	Supermarket(s)	Plant:Animal protein ratio commitment	Target year	Supporting charities	Source
Austria	Lidl	20:80†	2030	WWF	Stevenson, 2025
Netherlands	Aldi, Albert Heijn, Crisp, DekaMarkt, Dirk, Ekoplaza, Jumbo, Lidl Netherlands, Picnic, PLUS, Odin, and SPAR	60:40*	2030	Green Protein Alliance, ProVeg, Wakker Dier	Protein Tracker, 2025
Germany	Lidl Germany	20:80†	2030	Albert Schweitzer Foundation (ASF), ProVeg, The Green Protein Alliance, WWF	Giles, 2025
United Kingdom	Lidl UK	25:75†	2030	WWF	Giles, 2025
Belgium	Ahold Delhaize, Lidl	50:50	2030	WWF, maybe others.	Ahold Delhaize, 2025
Netherlands	Ahold Delhaize	50:50	2030	Green Protein Alliance, ProVeg, Wakker Dier	Ahold Delhaize, 2025
Croatia	Lidl	20:80†	2030	WWF	Stevenson, 2025
Czechia	Ahold Delhaize	50:50	2030	Unsure	Ahold Delhaize, 2025

Country	Supermarket(s)	Plant:Animal protein ratio commitment	Target year	Supporting charities	Source
Serbia	Ahold Delhaize	50:50	2030	Unsure	Ahold Delhaize, 2025
Switzerland	Lidl	20:80†	2030	WWF	Stevenson, 2025
Romania	Ahold Delhaize	50:50	2030	Unsure	Ahold Delhaize, 2025
Greece	Ahold Delhaize	50:50	2030	Unsure	Ahold Delhaize, 2025
Finland	S Group	65:35	2030	Pro Vege	Mridul, 2025; Pro Vege, n.d.
Germany	Rewe Group	Mentioned commitment, but no specific ratio	Unsure	Unsure	Mridul, 2025

* Uses The Protein Tracker's methodology

† Uses WWF's methodology

For those unmarked we are unsure how these protein ratios are being monitored.

However, there is little evidence that participating supermarkets will successfully reach protein sales ratio commitments by the target date. Existing commitments are recent (<2-3 years), and there is little-to-no available data on their progress. For participating supermarkets in the Netherlands[4], data from the first year of commitments shows that plant-based protein sales increased from 40.9 to 42.2%- a 1.3% increase over the course of a year from 2023 to 2024 (Protein Tracker, 2025, p. 6). At this current rate, supermarkets in the Netherlands are off track to meet their goal of 60% protein from plants by 2030. This gradual progress may reflect the time required to establish early-stage initiatives to increase plant-based production consumption and build foundational momentum. However, we also believe that this may be due to difficulties influencing consumer purchasing behavior at scale, as discussed below in Section 3.2.

3.2 Evidence that supermarkets can impact the sale of animal products

We reviewed the relevant evidence on the success of interventions for encouraging increased plant-based protein sales in supermarkets, such as plant-based food promotions, shifts in the food environment, and price parity. We conducted a non-systematic review of the literature on the four types of interventions, starting with Google Scholar and then used a snowball search to find relevant papers from their reference lists. We also reviewed studies returned using the search tool Elicit.

Overall, we think it is possible for supermarkets to effectively influence the sale of plant-based products through a variety of interventions. Broadly, these interventions fall into three main categories:

[4] Note that these estimates do not include data from Albert Heijn which is the biggest supermarket in the Netherlands. It chose not to have its data evaluated by the Protein Tracker but did report on sales individually. Albert Heijn conducted its own analysis, which shows a slight decline in sales of plant-based protein. Using a methodology that is similar—but not identical—to the one used by the Protein Tracker, Albert Heijn reported a decrease from 44.5% to 44.2% plant-based protein.

1. **Plant-based food promotions**: Advertising, campaigns, coupons, and discounts on plant-based foods
    a. This could also include an end to meat promotions, as seen in the Jumbo supermarket chain in the Netherlands
2. **Changes to the food environment:** Behavioral interventions that change consumer purchasing, including availability (when supermarkets stock more and a larger variety of plant-based products)
3. **Price parity**: Analogous animal and plant-based protein products are priced the same

However, the effects across all intervention types are often short-lived or understudied. Several studies reported that positive effects on plant purchases were short-lived. Follow-up data indicated that increases in purchasing generally were not maintained once an intervention ended.

Moreover, many studies that find an increase in plant-based protein sales either do not report impacts on meat sales, or do not find statistically significant impacts on meat sales. Because of this, we have some uncertainty that plant-based sales will fully displace sales of animal products.

Most studies also do not explicitly measure the primary outcomes of interest (e.g., plant-based and animal protein sales), but results are likely transferable. For example, we believe it is reasonable to assume that results improving plant-based sales overall will also improve plant-based protein sales because they are overlapping food categories. However, interventions that target other goals (e.g., health interventions) may promote less protein-rich plant-based foods in some cases. Other studies only report changes in animal product purchases. In these cases, it may be unreasonable to assume that decreases in meat purchases correlate with increases in plant-based purchases because several studies that measure both outcomes show that meat purchasing remains constant, even when plant-based food purchasing increases.

We remain uncertain about:

- Which individual intervention category or combination of categories is the most effective at shifting purchases away from animals toward plants

    - However, part of the theory of change of this new organization is to figure this out through work with supermarkets and running studies.
    - It is likely that the interventions that we know work to increase plant-based product sales will be insufficient to reach the required protein ratios. Part of the theory of change of this new organization is to find new interventions that supermarkets can implement to further shift consumption towards plant-based products.
- The long-term effects of interventions on purchasing habits
- The differences in intervention effectiveness across animal product types
- The extent of substitution versus addition between plant-based protein and animal-based protein foods as a result of interventions

Evidence on the effectiveness of plant-based food promotions

Prominent positioning and price promotions boost plant-based food sales in supermarkets. Luick et al. (2024) reported that repositioning and discounts increased sales of plant-based milk by 126 units (95% CI: 105, 148) from 66 units and Veganuary products by 60 units (95% CI: 37, 84) from 15 units over a 3–4-week period. However, they found that while this intervention increased the sales of plant-based foods that were on promotion, it didn't increase the sales of plant-based foods in general. Moreover, they found that the effect on the promoted products was short-lived. This study does not report on meat sales. Trewern et al. (2022) observed that a multi-component intervention—combining improved visibility, accessibility, affordability, and availability—increased plant-based product sales by 57% (incidence rate ratio (IRR) 1.56, 95% CI: 1.54–1.58) over 4 weeks and maintained a 15% higher sale rate post-intervention after a 2 month follow up period (IRR 1.14, 95% CI: 1.13–1.16). The study didn't find a significant effect on the sales of meat products. However, given the baseline meat-product sales of 26.52%, it is likely that even if all of the increase in plant-based product sales displaced meat-product sales, the effect would have been too small to observe.

Price discounts also proved effective. Waterlander et al. (2013) noted that a 50% discount raised fruit and vegetable sales by 3.9 kg per 2 weeks (up to 5.6 kg with added nutrition education). The study did not report whether animal product sales changed. Mhurchu et al. (2010) found that a 12.5% discount increased healthier food sales, which included healthy meat and meat alternatives, by 11% at 6 months and the effect was sustained after a 12-month follow up. This study does not report on meat sales. Effects were often strongest in stores serving lower socioeconomic or below-average affluence areas (Luick et al., 2024; Trewern et al., 2022).

The addition of educational information did not change purchasing habits. Both studies that included nutrition education (Waterlander et al., 2013; Mhurchu et al., 2010) reported no significant effect for education alone. The addition of education to price discounts also did not substantially enhance effects.

Evidence on the effectiveness of shifts in the food environment

Food choices are highly responsive to choice architecture, with effects up to 2.5 times larger than in other behaviors (Mertens et al., 2022). The food environment is the choice architecture that supports (or hinders) decision making (European Public Health Alliance, 2019). In supermarkets, the food environment includes how products are placed, ordered, and/or portioned. Alterations to the food environment are designed to shift consumer behavior toward a desired outcome, such as changing purchasing habits. Common shifts in the food environment include shelf placement, in-store advertisements, nudges, and labeling.

Changes to the food environment appear to boost plant-based and healthier food sales in supermarkets, but it is unclear if this translates into a fall in meat sales. Trewern et al. (2022) observed that a multi-component intervention—improving visibility, accessibility, affordability, and availability of plant-based products—yielded a 57% rise in plant-based sales during a one-month intervention (incidence rate ratio 1.52, 95% CI 1.51–1.55) and a sustained, though lower, effect post-intervention. However, it did not find a significant effect on the sales of meat products. Piernas et al. (2021) reported a 31% increase in meat-free

products when repositioned into the meat aisle with promotional signage, compared to a 6% increase in controls (IRR 1.43, 95% CI 1.30–1.57). In the same study, meat sales decreased by 6%(IRR 1.01, 95% CI 0.95–1.07), but this decrease was not significant compared to the control (Piernas et al., 2021). Similarly, Coucke et al. (2022) documented a 67% boost in meat substitute sales following nudging interventions that placed meat substitutes added to butchery, placed next to meat, although the effect reversed after removal. Coucke et al. (2022) did not report changes in meat sales. In several cases, the interventions were most effective in less affluent areas (Piernas et al., 2021; Trewern et al., 2022; Vogel et al., 2021) **Rethink Priorities' analysis of studies on fully integrated shelf placement was also skeptical of the effectiveness of this tactic to decrease meat sales,** as most studies they analysed just looked at plant-based product sales not meat sales directly (and increased plant-based sales does not necessarily mean a reduction in meat sales, as we discuss below in Evidence on addition vs. substitution), and those that did look at meat sales did not find a significant decrease.[5] The report concludes: "We see limited drawbacks in an integrated placement strategy but, on the basis of this evidence, do not expect it will prove a highly effective tactic to decrease meat sales." (Stevenson, 2025).

Evidence on the effectiveness of price parity

Surveys show that high prices are one of the top barriers to plant-based purchasing, particularly among non-vegetarians. Lidl Germany introduced a price parity policy in 2023, pricing its Vemondo plant-based products to match comparable animal-based items and saw sales of these products increase by 30% after intervention, which coincided with moving plant-based products next to their animal analogs (Wimpfen, 2024). A review of economic studies from the U.S. and

[5] Rethink Priorities analysed:

- A study of shelf placement in Lidl in the Netherlands which found that meat sales fell slightly when their plant-based analogue was placed on the shelf next to them, but did not fall at the level of statistical significance (Vegconomist, 2024).
- Piernas 2021 which compares 20 intervention stores (where plant-based protein products were moved to the meat aisle) to 88 control stores from the same UK retailer. This study found that although there was a significant increase in plant-based sales, there was not a statistically significant decrease in meat sales. We also included this study in our evidence review.

Europe suggested that plant-based meats generally have elastic demand, meaning price reductions can significantly boost sales (Stevenson, 2025). However, evidence on whether this leads to reduced meat consumption is mixed and inconclusive. While price cuts are popular and may drive sales, their effectiveness in displacing animal products remains uncertain and context-dependent (Stevenson, 2025).

A series of controlled studies show that discounting plant-based foods in supermarkets leads to immediate increases in plant-based purchases during the discount period. In interventions offering a 20% discount, fruit purchases increased by up to 35% (roughly 364 grams per week) and vegetable purchases by 15% (about 233 grams per week) (Ball et al., 2013). Studies using a 50% discount reported increases equivalent to 3.9-5.6 kilograms of fruits and vegetables over two weeks or weekly spending rises of 15-20% (Geliebter et al.,2013; Polacsek et al., 2017; Waterlander et al., 2013). Olstad et al. (2017) recorded relative risk ratios for purchasing at discounted supermarkets between 1.8 and 2.2 increased fruit and vegetable purchasing. None of the aforementioned cited studies reported changes in meat consumption.

Evidence on addition vs. substitution

We have some uncertainty that plant-based sales will fully displace sales of animal products as we have seen that plant-based food can be purchased in addition to animal products, instead of displacing animal products (Trewern et al., 2022).

- Consumer insights from GFI suggest that 20% of consumers of plant-based products are trying them alongside their usual meat consumption, but the remaining 80% of consumers are replacing at least some of their meat consumption with plant-based products (Good Food Institute, n.d.b).
- Analysis of Tonsor, Lusk & Schroder (2021) by Bryant Research (2023) found that “Consumer reports that examine product specific behaviour reveals that among consumers who buy plant-based meat, 49% of these individuals said they would have bought beef otherwise, and 38% said they

would have bought chicken otherwise" which suggests that 13% of consumers could be trying plant-based products alongside their usual meat consumption.

- Neuhofer & Lusk (2022) find that most households that buy plant-based products also buy meat: "About 2.79% of households only purchased PBMAs [Plant-Based Meat Alternatives]. About 86% of PBMA buyers also bought ground meat; however, PBMA buyers spent about 13% less on ground meat" (abstract).

On the other hand, a review of existing literature on this question by Bryant Research (2023) suggests that alternative proteins are replacing animal proteins. To arrive at this conclusion, they cite a negative correlation between change in consumption of animal products and change in consumption of alternatives in the same category—essentially that a plant-based burger is likely to displace a meat burger more than a bean stew. They also reference another study (Slade, 2023) suggesting that a one-gallon increase in non-dairy milk sales is associated with a 0.43-0.6-gallon reduction in dairy milk sales. Ultimately, their argument is that available evidence suggests the similarity in the taste profile of alternative proteins means that they're more likely to be purchased as a substitute for meat products. This holds even in cases where an alternative (such as soy milk) is purchased alongside the animal product (cow's milk) as the alternative displaces some amount of the animal product bought.

Overall, the concern that the increased demand for plant-based products doesn't actually offset animal products but is instead additive is a valid one, but we would not expect all consumption to be in addition to normal levels of animal product consumption. However, it is difficult to determine what percentage of consumption is actually substitution and what percentage is additive.

3.3 Evidence that animal products cause suffering for animals

Demand for animal products necessitates the mass slaughter of billions of farm animals. Roughly 85.44 billion land animals, a majority of which are chickens, are

slaughtered annually for meat (Ritchie, Rosado, & Roser, 2023). Another 78 to 171 billion fish and crustaceans are also killed for human consumption (Mood et al., 2023; Tenniswood, 2023).

A majority (>99%) of farm animals are raised on factory farms (Anthis, 2024). The high demand for animal products necessitates that a majority of farm animals are raised in intensified systems (i.e., factory farms), which result in severe welfare harms for farm animals and increased zoonotic disease risks (Hayek, 2022). Farm animals in these production systems are often subject to:

- Severe confinement and space restrictions that limit natural behavior. For example, laying hens are most often confined in conventional cages where they cannot spread their wings or engage in normal grooming and social behaviors (Welfare Footprint Project, n.d.)
- Mutilations (e.g., castration, beak trimming, dehorning) with no or little pain relief (Grandin, 2020). For example, a majority of male pigs are regularly castrated with no anaesthetia or analgesia (Texas Tech University, n.d.).
- Selective breeding for productivity that increases the risk of lameness and disease (van Marle-Köster & Visser, 2021)
- Psychological stress from separation, social disruption, and abnormal herd behavior (Welfare Footprint Project, n.d.)
- Poor transport conditions and slaughter practices (Broom, 2005; Nielsen et al., 2011)

3.4 Evidence that animal products have a high carbon footprint

Animal production is responsible for the majority of food systems environmental impacts (Poore & Nemecek, 2018). Leading researchers and international organizations estimate that livestock production is responsible for 12.0 to 19.7% of global anthropogenic emissions or roughly 36 to 60% of total food system emissions (Blaustein-Rejto & Gambino, 2023). Ruminant animals, particularly cattle, are major contributors due to methane (CH_4) emissions from enteric

fermentation and high land-use change emissions related to pasture expansion and feed crop cultivation (Joiner & Toman, 2023).

Life cycle assessments (LCAs) consistently rank beef, lamb, and dairy as the highest-emitting food item, including per kilogram of product, per 100 g of protein, and per kilocalorie (Poore & Nemecek, 2018). Beef is the most resource- and emissions-intensive livestock product with 99.48 kilograms CO2 eq generated per kilogram of beef produced on average (Poore & Nemecek, 2018; Ritchie, 2022). Animal-based foods also generally require more land, water, and energy inputs than their plant-based alternatives (Ritchie, 2022).

3.5 Evidence on externalities

We believe it is unlikely that there are negative externalities associated with increasing plant-based protein ratios. One possible negative externality is an increase in food waste associated with the purchase of more plant-based products. Plant-based foods tend to have higher rates of food waste compared to animal products (UNEP, 2024). As a result, replacing animal protein with plant-based protein could result in increased volumes of food waste. However, even with increased rates of food waste, the environmental impacts of animal products are much higher (Shepon et al., 2018), such that there are still positive gains from switching to more plant-based foods.

We believe it is likely that there are positive externalities associated with increasing plant-based protein ratios. Poor diets are the leading cause of non-communicable diseases like diabetes and cardiovascular disease worldwide (WHO, 2024). Increasing the consumption of plant-based foods could improve public health in addition to improving animal welfare and food system related emissions (Clark, Hill, & Tilman, 2018).

4 Expert views

We interviewed experts from existing nonprofit organizations advocating for high plant-based protein ratios. They agreed that the European landscape is largely saturated, although there may be room for additional support in Nordic countries. Experts emphasized that successful supermarket engagement depends on strong relationships, tailored national strategies, and clear value to retailers. Economic barriers make plant-based shifts risky without policy support. Additionally, data limitations hinder progress tracking and evaluation, with the Netherlands being the only country with relatively robust protein sales data. There was broad agreement amongst experts that more evidence is needed on which interventions work to shift consumer behavior.

As part of our investigation, we consulted six people who are familiar with this space:

- **Anke van 't Klooster** - Protein Transition Expert at Green Protein Alliance
- **Clara Cho** - Data Lead, Coolfood at World Resources Institute
- **Collin Molenaar** - Press Officer at Wakker Dier
- **Julian Cottee** - Senior Corporate Engagement Manager at ProVeg
- **Nico Muzi** - Managing Director & Co-Founder at Madre Brava[6]
- **Pablo Moleman** - Strategic Director at ProVeg Netherlands

Our findings from these conversations have influenced our decision-making across the reporting. This section summarizes the key findings from the consultations not mentioned elsewhere.

[6] Summary of views not shared publicly

4.1 Anke van't Klooster - Protein Transition Expert at Green Protein Alliance

The Green Protein Alliance has supported supermarkets in the Netherlands to make 60:40 plant:animal protein sales ratio commitments. They take a collaborative “good cop” approach by working with the sustainability teams at supermarkets to help supermarkets achieve the goal. The main form of support they provide is with their Protein Tracker monitoring tool. The Protein Tracker helps to measure supermarket progress toward their commitment.

Every transition starts with awareness about the problem of the current state and a vision of the desired state. The insights from the Protein Tracker have helped increase internal awareness about the protein transition in general, enabled goal setting for various departments, and motivated them to take action. The Green Protein Alliance has observed that supermarkets are using multiple measures to meet their 2030 target, including promoting plant-based options through visibility, recipe ideas, and eliminating meat promotions (in some supermarkets).

However, Green Protein Alliance sees it remains challenging to meet the 60:40 target by the year 2030. Commercial objectives are often still stronger than sustainability objectives, where for example selling more legumes and reducing meat and dairy sales is not commercially attractive. They see furthermore that supermarket sustainability commitments and consumer demand are misaligned. They have observed that most shoppers aren’t actively seeking to reduce meat and dairy, which requires an active approach of supermarkets to increase plant-based protein sales. Supermarkets can use their commercial influence in a positive way by inspiring and encouraging consumers to embrace more plant-based eating habits. Some solutions, like marketing blended products that contain both plant and animal protein could help shift purchasing, even if sustainability is not always a top consumer priority.

4.2 Clara Cho - Data Lead, Coolfood at World Resources Institute

Coolfood is the World Resources Institute's (WRI) initiative on shifting diets to reduce emissions. The initiative contains two major programs: The Coolfood Pledge, where organizations commit to reducing their emissions by 25% by the year 2030 and the Coolfood Meals label, which is a low-carbon label used by organizations to market meals with low emissions. They predominantly work in high-income regions with large animal product consumption like North America and Europe.

WRI predominantly works with food service organizations (e.g., hospitals, cities, caterers), rather than supermarkets. Clara mentioned that she thinks it is slightly easier to obtain commitments for Coolfood from food service organizations rather than supermarkets because they are more flexible and less profit driven.

Shifting protein sales ratios is just one way to achieve the Coolfood pledge. Clara said that WRI has a team of behavioral scientists that provide behavior change techniques to organizations, including two publicly available playbooks that detail best practices. The most recent Food Service Playbook for Promoting Sustainable Food Choices (Coolfood, 2024a) includes nearly 90 techniques for shifting consumer behavior in dining settings.

Making plant-based foods the default option is a highly tractable intervention. Clara mentioned that in addition to work by WRI, Greener by Default is helping to spearhead this work on plant-based defaults. For example, Greener by Default has successfully worked with Sodexo, which caters all New York City hospitals, and they are now implementing plant-based defaults across all Sodexo hospitals.

Many Coolfood members are on track to meet their 2030 commitments in both relative and absolute terms. In 2024, organizations that committed to the Coolfood pledge have reduced per-plate emissions by 12% compared to 2023 (Coolfood, 2024b). All sectors reduced emissions per plate, with cities and hospitals on track to meet their 2030 commitment (Coolfood, 2024c). Clara mentioned that it is useful to track progress in terms of both per plate and absolute

emissions. The former is particularly useful for understanding if consumers are actually replacing animal products with plant-based products.

Clara said one of the biggest challenges is overcoming the lack of knowledge around food related emissions with organizations. She mentioned that some organizations are not aware that food systems make up a substantial part of global emissions and that food is usually one of the biggest contributors to an organization's Scope 3 emissions. As a result, Clara said WRI has a mix of organizations coming to them and WRI going to organizations making the case for reducing food-related emissions.

It is very important to have an internal primary contact who is a "champion" within the participating organization. Clara said these champions are the people who make sure the data and reporting is reaching senior leadership. Usually this is a person working with the organization's sustainability team.

Generally, it helps to have a favorable political environment for making these commitments. Clara mentioned that culture is also an important determinant for organizations making plant-based commitments.

4.3 Collin Molenaar - Press Officer at Wakker Dier

Wakker Dier is a Dutch nonprofit focused on improving animal welfare, particularly by targeting animal protein sales and labeling. They are known for their "bad cop" approach, applying pressure on supermarkets through campaigns that name and shame companies that fall short of ethical standards. This strategy has proven effective, especially with major supermarket chains that are highly concerned about their public image. Wakker Dier also originally concentrated on animal welfare labels, but they shifted focus to protein sales ratios to address the growing urgency of reducing meat consumption.

In alignment with other nonprofits, Wakker Dier supports the 60:40 plant:animal protein target. The commitment includes all plant-based protein sources such as bread, grains, legumes, and vegetables, as defined by the Green Protein Alliance's Protein Tracker tool. Supermarkets are the primary focus for this campaign due to

their market dominance, with 70% of food sales in the Netherlands coming from them. Collin believes that once the largest retailer in the Netherlands, Albert Heijn, committed to the goal (most likely for climate reasons), other supermarket chains followed. Wakker Dier has also worked with food service providers, like caterers, to adopt similar commitments. Collin notes that food service tends to be more progressive and often more proactive on these sustainability targets.

There are significant obstacles for supermarkets achieving their 60:40 commitment. Collin noted that political support has declined due to a more conservative government being elected in the Netherlands, leaving supermarkets and non-profits to push forward on protein sales ratio commitments without support from the government. The government originally championed a 50:50 protein split in all Dutch supermarkets, but has since provided little support. Further, while supermarkets may sell more plant-based alternatives, Collin perceives that they are reluctant to reduce meat and dairy sales because they risk losing profit. In several Dutch supermarkets, promotions still heavily feature animal products. Collin believes the rise of hybrid meat-plant items complicates progress by allowing companies to technically meet targets without fundamentally changing their offerings.

Another major challenge working with supermarkets is the lack of transparency. While some data on the percent of sales from different protein types is publicly available, Collin mentioned that most supermarkets are hesitant to share detailed quantity data because of vulnerability and competition concerns. This limits the ability of nonprofits to assess whether consumers are replacing meat with plant proteins or merely adding to their consumption. The Protein Tracker tool helps monitor progress, but it relies on voluntary data sharing, which can lead to gaps or inconsistencies. Nevertheless, Wakker Dier believes these tracking tools are critical to maintaining momentum and accountability.

Looking ahead, Collin believes that success requires strong local organizations, reliable measurement tools, and sustained pressure. Collin mentioned that continued “bad cop” approaches, like naming and shaming, are necessary alongside more collaborative “good cop” efforts.

4.4 Julian Cottee - Senior Corporate Engagement Manager at ProVeg

ProVeg is working in a number of countries on plant-based protein ratio commitments. These countries include Belgium, Czechia, Germany, the Netherlands, Poland, Portugal, Spain, South Africa, and the United Kingdom.

ProVeg's approach to engaging supermarkets varies by country and also depends on existing relationships. Julian mentioned that in places like Belgium, Germany, and the Netherlands, ProVeg collaborates directly with retailers on interventions to increase plant-based sales, such as marketing plant-based products.

Julian said that understanding market context and readiness is important to make progress in this space. Factors like retailer size, ownership structure, and consumer attitudes shape where progress is feasible. Julian also noted that retailers need to have a certain level of sophistication in how they think about sustainability to adopt commitments related to protein sales ratios.

It is key for retailers to perceive clear added value from working with ProVeg, especially in comparison to consultants or other groups. Julian said that ProVeg aims to be a supportive, business-friendly partner, while still holding supermarkets accountable for progress toward plant-based targets.

The biggest barrier for supermarkets making commitments is competitive markets and profitability. Julian said that animal products are generally high-margin products and this can make it hard for supermarkets to justify shifting away without policy or sector-wide coordination. He also noted that there is a "first-mover disadvantage," where the first supermarkets to sign these commitments can be penalized. As a result, obtaining commitments from a large section of the market simultaneously is important for tractability.

Data limitations are a challenge in tracking progress toward plant-based protein sales ratio targets. Outside of a few core countries, there is little market-wide reliable supermarket-level data on protein sales. Even in the Netherlands, where data exists, Julian noted that progress is positive, but slow. Julian hopes that

ProVeg can help to build a more comprehensive, market-wide data approach to tracking progress toward existing commitments.

Julian said that understanding what interventions work in a commercial context to shift consumer purchasing toward plant-based foods remains a challenge. Retailers are often reluctant to share commercial data, which makes evaluating progress difficult. Julian thinks there is more to be done in this space for tracking which interventions have strong evidence for initiating change.

The advocacy landscape for this idea is getting crowded, especially in Europe. Julian noted that retailers are facing growing demands, and uncoordinated efforts risk creating confusion or resistance. A balance is needed—multiple voices can help, but only if they're aligned and strategic. Julian thinks that some regions, like the Nordics, could be promising and there are fewer organizations working there on this issue.

4.5 Pablo Moleman - Strategic Director at ProVeg Netherlands

If achieved, the 60:40 plant:animal protein ratio would represent a major shift in protein consumption. Assuming total protein consumption stays constant, it would cut animal protein by about a third.

Unlike earlier protein transition targets, this one compels supermarkets to reduce animal protein. Previous goals often focused on boosting plant-based sales without directly tackling animal sales. This target stands out because it requires supermarkets to cut back on animal products as well, not just promote alternatives. It also limits their ability to game the system. Moreover, supermarkets with CO_2 targets alone might be tempted to replace red meat with chicken or fish. A 60:40 target pushes for reductions across all animal categories, making partial substitutions less viable.

While the target is ambitious, it is already prompting real action. There is no guarantee that supermarkets will meet the 2030 deadline, but it has clearly driven

initiatives they might not have otherwise pursued. These include price parity commitments, changes to recipes, shelf placement experiments, hybrid product launches, and Jumbo's ban on meat promotions.

So far, these measures have not shifted the protein balance much. Most of the "easy wins" appear to have been used up. To make further progress, supermarkets will likely need to take steps that are more controversial or financially painful. One obvious next step is a broader ban on meat advertising. Jumbo has taken the lead here, but other chains have not followed, and Jumbo has lost market share as a result. If supermarkets introduced this change collectively, the impact would likely be greater, and the individual risk lower.

Pablo also noted that the 40.9–42.2% plant-based shift does not include Albert Heijn. Albert Heijn, the largest supermarket in the Netherlands, chose not to have its protein sales data independently validated. As a result, its figures are not included in the sector-wide analysis.

Albert Heijn conducted its own analysis, which shows a slight decline in sales of plant-based protein. Using a methodology that is similar—but not identical—to the one used in the official analysis, Albert Heijn reported a decrease from 44.5% to 44.2% plant-based protein. This means the market leader moved in the opposite direction from the trend. Still, its absolute level of plant-based sales is likely above the national average. ProVeg hopes to include Albert Heijn in next year's reporting so the data can fully reflect sector-wide trends.

5 Additionality and geographic assessment

This section discusses our considerations of additionality and our review of locations where this idea could be delivered in light of the burden, tractability and potential additionality.

5.1 Neglectedness

Results from our geographic assessment suggest that existing work advocating for protein-sales ratios is predominantly being done in a handful of high-income countries in Europe. Other countries—including high-income countries with high animal production consumption within and outside of Europe—have no organizations working on this issue.

Actors delivering this intervention

Table 2: List of actors delivering this intervention

Organization/ Link	MANGO/FoNGO[7]	Scale/Coverage	FTEs	Funding
Albert Schweitzer Foundation (ASF)	MANGO	Germany	21	2
Green Protein Alliance	FoNGO	Netherlands, Germany	2-10	Report here
Madre Brava	MANGO	Germany, United Kingdom, Spain, Thailand	NA	NA
ProVeg	MANGO	Belgium, Czechia, Germany, Netherlands, Poland, Portugal, Spain, United	NA	NA

[7] Multi-armed NGO (MANGO) and Focused NGO (FoNGO). See "Why household name NGOs are unlikely to offer the best value for money" from the Happier Lives Institute (2025)

Organization/ Link	MANGO/FoNGO[7]	Scale/Coverage	FTEs	Funding
		Kingdom		
Pro Vege: Plant-Based Food Finland	FoNGO	Finland	NA	NA
Questionmark	MANGO	Sweden, France, Germany, Netherlands, Poland, Spain, Switzerland, United Kingdom	NA	NA
Wakker Dier	MANGO	Netherlands	NA	NA
WWF	MANGO	Germany, Switzerland, United Kingdom, Austria, Belgium, Croatia	NA	NA

Attention and Funding

Attention

This topic is receiving increasing attention from nonprofits. ProVeg and Madre Brava have arms explicitly targeting protein sales ratios in supermarkets. Other organizations, such as WWF and WRI include protein sales ratios as one option in a suite of interventions promoting plant-based diets. Julian Cottee from ProVeg also mentioned that there is increasing interest in this topic from climate organizations, like Carbon Trust, as they expand their climate objectives to include food.

Funding

We are uncertain about the current state of funding for plant-based protein sales ratios specifically. However, there is a substantial portfolio of investors interested in advancing alternative proteins, reducing environmental impacts, and improving animal welfare (GFI, n.d.c).

Since 2016, the global alternative protein industry (including plant-based products has raised $18.6 billion USD in private funding (GFI, n.d.c). In the United States, investment in plant-based startups declined by 64% in 2024, totaling $309 million, down from $854 million in 2023 (Watson, 2025). This could indicate decreased interest by investors in plant-based food products as a result of declining consumer demand.

5.2 Geographic assessment

Our geographic assessment identified ten Tier A target countries for this work: Australia, Norway, Austria, Estonia, France, Brazil, Iceland, Luxembourg, Taiwan, and Canada. Our weighted factor model ranked Australia as the top location.

Link *to our model*[8]

Our geographic assessments seek to identify priority countries that are then explored in depth by the entrepreneurs who take up the ideas to put them into action. We focus on high-income countries only (with the exception of Brazil) as we think they are the most likely to be ready for this kind of intervention.

Our model uses several factors that we believe are most important for scale, neglect, and tractability of successfully advocating for higher plant-based protein ratios at the country level. Table 3 describes the criteria used and weights assigned.

Table 3: Criteria and weights used in geographic assessment

Criteria	Data source & Manipulations	Strengths/Weaknesses	Weight
Total meat, fish, & seafood production (tonnes/year)	FAOSTAT - terrestrial animals OWID - fish & seafood	• Maximizes impact • Could over prioritize large exporters	5%

[8] Reported as of June 6, 2025—-note the models are live and may be subject to tweaks or (in rare occasions) large changes that may not be reflected in the text if carried out after publication.

Criteria	Data source & Manipulations	Strengths/Weaknesses	Weight
Per capita animal product consumption (kg/person/year)	FAOSTAT - terrestrial animals OWID - fish & seafood	• Maximizes impact	10%
Trade ratio of animal based foods (imports:exports)	FAOSTAT	• Controls for countries that might not produce a lot of meat, but consume a lot via imports	5%
Number of organizations working on similar interventions	Various. Compiled from interviews and searching organization websites	• Identifies neglected countries • Data on related charity work in this area is poor quality	5%
Protein ratio (% protein from animals)	FAOSTAT	• Identifies countries with high counterfactual impact	15%
Percent change in animal product consumption 2020-2022	FAOSTAT	• Identifies which countries may be more or less tractable for advocacy work due to current consumption trends	5%
Number of farmed animal advocacy organizations	ACE, 2023	• Identifies countries that have high care for animals • Could prioritize countries that are more likely to do this anyway	5%
Environmental Performance Index	Yale University	• Proxy for openness and adherence to environmental commitments	10%
Vegetarian percent	CEOWorld	• Proxy for consumer willingness and/or interest in more plant-based foods	25%
Sanctioning cruelty	VACI	• Proxy for openness and	5%

Criteria	Data source & Manipulations	Strengths/Weaknesses	Weight
index		adherence to animal welfare commitments	
AIM Tractability Score	AIM	• Identifies where countries may or may not have the infrastructure, safety, or governance mechanisms necessary to ensure success	5%
GNI per capita	World Bank	• Identifies high-income countries, where there is generally highest meat consumption	5%
Population	We removed countries that had a population of less than one million people because we felt this was a major limitation to the scale of the idea.		Rule out
Existing organization already working on this intervention in the country	To avoid duplication of efforts, we removed countries that already had an organization working with supermarkets to achieve protein ratio commitments.		Rule out

We found that this work is cost-effective (<$33/tCO2e averted and >8 SADS/$) in 46 high-income countries plus Brazil (n=47), which we included because of its strong emerging plant-based movement.

Table 4 provides what we think are top candidate countries for this work.

Table 4: Recommended target countries

Country	Score	Per capita consumption of animal products (kg/person/year)	Environmental Performance Index	% population identifies as vegetarian
Australia	0.882	363.98	63	12
Norway	0.788	330.49	70	9
Austria	0.673	315.61	69	11
Estonia	0.646	430.66	76	6
France	0.629	403.94	67	5

Country	Score	Per capita consumption of animal products (kg/person/year)	Environmental Performance Index	% population identifies as vegetarian
Brazil	0.608	269.40	53	14
Iceland	0.592	381.11	64	6
Luxembourg	0.592	373.07	75	6
Taiwan	0.545	193.24	50	14
Canada	0.538	285.12	61	8

Potential changes to the model

We think this model could be improved in several ways:

- Further exploration of variables that better capture political and social openness to plant-based foods could improve this model. Our model relies heavily on percentage of vegetarian consumers as a proxy for consumer demand, but would be improved if there was better national data on demand for plant-based foods nationally.
- We used the Yale Environmental Performance Index as a proxy for environmental commitments, but data on the number of supermarkets with corporate social responsibility (CSR) commitments could improve this. We were unable to find this data at the national level.
- We could be missing some promising countries by narrowly focusing on high-income countries. While we are less confident, we think there could be promising exceptions to the HIC rule, like Brazil. We didn't comprehensively consider each upper-middle income country, but if we did then we may have added more.

6 Cost-effectiveness analysis

We modeled the cost-effectiveness of a charity advocating for increased plant-based protein sales ratios in our top target country based on our geographic assessment, Australia, aiming to shift the national protein ratio to 60:40 (plant-to-animal) by 2040. Our analysis suggests the intervention could be highly cost-effective, costing $0.21 per tonne CO_2 equivalents averted and saving 153 Suffering-Adjusted Days (SADs) per dollar. Cost estimates include fixed and variable expenses for staffing, corporate campaigns, and randomized controlled trials, while impact estimates are based on national consumption and emissions data across seven major animal products.

Link *to our model*

6.1 Results

We modeled our cost-effectiveness analysis based on a charity that would advocate for increased plant-based protein ratios in Australia. We assumed that our charity would reach 90% of the market share of protein sales in Australia and would reach a 60:40 plant-to-animal protein ratio by the year 2030 or 2040. **Our main CEA uses a 2040 target as we think this is most realistic.**

Our results suggest that a charity doing this work would be extremely cost-effective. We expect the charity would spend only $0.09 for every tonne of CO_2 equivalents averted and could save 375 SADs per dollar with a 2030 target and $0.21 per tonne CO_2 equivalents averted and 153 SADs per dollar with a 2040 target.

We also modeled a lower-bound CEA which shows that this work would be cost-effective even in pessimistic modeling scenarios. In our lower bound CEA model (See the "1.3% annual increase CEA" tab), we assume only a 1.3% increase in plant-based sales until the target year (2040). This is based on the concern that we have only seen short-term evidence of a 1.3% increase in plant-based sales in the Netherlands between 2023 and 2024. In this model the charity would spend

$2.65 for every tonne of CO_2 equivalents averted and could save 12 SADs per dollar with a 2040 target.

6.2 Modeling choices

Costs

Fixed costs: We assumed fixed staffing costs of $130,000 in year one, increasing to $280,000 at scale.

Variable costs: We assumed that variable costs included:

- Staffing ($93,933)–two staff paid median country salary
- Campaigning ($198,274)–based on the cost of corporate campaigning taken from relevant ACE recommended charities (Kafessiz Türkiye, Shrimp Welfare Project, Sinergia Animal, and THL)
- Experiment studies ($409,000)–based on the cost of running randomized controlled trials (RCTs) for public health interventions we assumed an annual study including 1,000 consumers at $409/consumer

We calculated the net present value of these costs using a standard 4% annual discount.

Effects

We estimated the effects of this charity on two primary outcomes:

- Climate change impacts (measured in tonnes CO2 eq)
- Animal welfare impacts (measured in Suffering Adjusted Days (SADs))

To calculate carbon impacts, we collated data on animal product consumption at the national level across seven major animal product categories (chicken, beef, lamb/mutton, pork, fish and seafood, milk, and eggs). We then discounted this total consumption by the percentage of consumption that happens at home, which is

69.7% in Australia. Next, we multiplied consumption data per category by their corresponding emissions intensities (kg CO2 eq per kg product) (Poore & Nemecek, 2018; Ritchie, Rosado, and Roser, 2022) to determine total emissions per category at the national level. Then, we summed the emissions across all categories to determine total carbon emissions from animal product consumption at the national level.

To calculate animal welfare impacts, we multiplied total animal product consumption in the home by yield (kg product per animal) across the same seven major animal product categories. Next, we multiplied the total number of animals within each category by their SADs per animal. We then added the SADs across each category to determine the total SADs from animal product consumption at home at the national level.

We calculated the net present value of the benefits for the intervention by applying the following discounts:

- A standard annual discount of 1.4%.
- A 6.91% annual discount to account for current reductions in annual meat consumption.

Scaling

The counterfactual impact at scale is dependent on three major factors:

- **Current protein ratios.** We assumed that the modeled charity would aim for a 60:40 plant-to-animal protein ratio based on current commitments (see Table 1). We reduced the effects on climate change and animal welfare by multiplying the effects by the percent decrease in protein ratios. For example, if current plant-to-animal protein ratios are 40:60 and the goal is to reach 60:40, then we multiply carbon emissions and SADs by 33%.
    - Instead of assuming that the 60:40 protein ratio would be achieved by the target year, in our lower-bound CEA model we assumed that plant-based sales would increase by 1.3% each year from now until the target year (2040). See the "1.3% annual increase CEA" tab.

- **Percent market share reached.** We assumed that the percentage of the market share reached was equivalent to 90%, which is the current market share owned by supermarkets in the Netherlands that have made protein sales ratio commitments.
- **Replacement of animal protein with plant protein.** We assumed that the total protein consumed remained constant. This has no impact on SADs because no animals are farmed for plant-based foods. However, it does offset some carbon emissions from reducing animal product consumption because plant-based foods are consumed instead and they have their own carbon footprint. As a result, we multiplied the total protein decrease from animals to reach the 60:40 goal by the average emissions for plant-based foods.

Sensitivity analysis and Considerations

We compared our results to the cost-effectiveness of achieving the intervention by the year 2040 instead of 2030. Current charities already implementing this work in Europe are off track to meet commitments by the year 2030. As a result, we also model our CEA to the year 2040. We find that the intervention is still very cost-effective even if no benefits are achieved until the year 2040. Under this scenario, we expect the charity would spend only $0.21 per tonne CO_2 equivalents averted and could save 153 SADs per dollar target.

There are several reasons our CEA could be over-stating or under-stating the results.

Table 5: CEA considerations

Reasons this intervention could be more cost-effective than modeled, all else equal.	Reasons this intervention could be less cost-effective than modeled, all else equal.
• Overall, we are very conservative in estimating costs. A charity might not require such high costs for campaigning or might be effective without	• We use global averages for carbon emissions. High-income countries often have more efficient livestock production systems, which means we could

Reasons this intervention could be more cost-effective than modeled, all else equal.	Reasons this intervention could be less cost-effective than modeled, all else equal.
running studies to help supermarkets determine the most effective interventions. Or the studies we run may be much cheaper than we have modelled. • For simplicity, we assume that the benefits of the intervention are not achieved until the target year (e.g., 2030, 2040). We expect that the intervention will actually have some immediate impacts and simultaneously offset the growth in demand for animal products. • We assume that consumers are equally likely to replace animals with any type of plant-based food. If consumers replace animal products with low-carbon plant-based foods (e.g. nuts) then the impact will be greater than if they replace with higher-impact carbon foods (e.g. rice). • We exclude the health benefits of switching to plant-based diets.	be overestimating the carbon emissions. • Our model assumes that all animal products are decreased equally, but this may not be the case. • If consumers replace predominantly beef with plants, then the environmental impacts will likely be greater but the animal welfare impacts will be worse • If consumers predominantly replace chicken and fish with plants, then the environmental impacts will be less, but the animal welfare impacts will be better. • We assume that the amount of protein sold is constant and that any reduction in animal protein is replaced 100% by plant-based protein by the target date • The commitment may not be met by the target year. For example, plant-based protein sales may only increase by 1.3% each year, as they have in the Netherlands between 2023 and 2024, which leave supermarkets off-track to meet their 2030 target. ○ We model this scenario in our lower-bound CEA (See the "1.3% annual increase CEA" tab) and this still meets our cost-effectiveness bars.

7 Implementation

This section discusses implementation factors that we think are of relevance for both 1) deciding whether we should recommend the ideas, and 2) the entrepreneurs considering taking the idea to scale.

7.1 What does working on this idea look like?

Figure 3 notes how we would characterize this proposed idea along an explore-exploit continuum.[9]

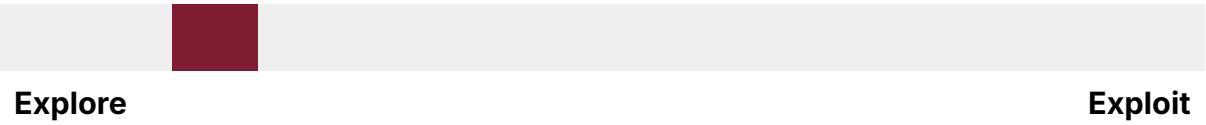

Figure 3: Explore-exploit

We feel there is still a lot of exploration to be done on how to help companies meet plant-based protein sales ratio targets. It is likely that the interventions that we know work to increase plant-based product sales (introducing new products, shelf placement, price parity, changes to recipes, hybrid products, banning animal product promotions, plant-based product promotions) will be insufficient to reach the required protein ratios. We need to find interventions that supermarkets can implement to further shift consumption towards plant-based products. This means that there will need to be innovation to find interventions that supermarkets can implement to further shift consumption towards plant-based products.

Moreover, there are still uncertainties on the tractability of this intervention in high-income countries outside of Europe.

[9] Our recommendations can be characterized along a spectrum between exploration and exploitation— ideas closer to exploration require more research and design, and involve riskier bets and wider confidence intervals; ideas closer to the exploit side of things usually have narrower confidence intervals and rely more on replication/expansion of well-developed and concrete interventions.

Day-to-day activities:

- Engage supermarket decision-makers to advocate for plant-based protein ratio targets
- Develop advocacy materials and data-driven business cases
- Track retail sales data and monitor progress on protein ratios
- Run small-scale experiments to test and find effective interventions
- Collaborate with researchers and plant-based suppliers

Strategic considerations:

- Build partnerships with NGOs, academics, and plant-based brands
- Align asks with corporate ESG goals and consumer trends
- Use a mix of diplomacy and public campaigning as needed
- Navigate complex stakeholder dynamics

7.2 Key factors

This section summarizes our concerns (or lack thereof) about different aspects of a new charity putting this idea into practice.

Table 6: Implementation concerns

Factor	Level of concern
Talent	Unconcerning
Access to information	Moderate
Access to relevant stakeholders	Moderate
Feedback loops/Monitoring and Evaluation	Moderate
Execution difficulty/Tractability	High
Complexity of scaling	Low

Factor	Level of concern
Risk of harm	Unconcerning

Talent

We do not expect talent to be a bottleneck, since skilled generalist could learn to do this type of work. The following backgrounds, skills or profiles would likely be useful for the co-founders or early hires in this organization but are not a necessity:

- Familiarity with and/or expertise in food systems, particularly the food retail sector
- Corporate engagement experience, especially working on corporate advocacy campaigns related to the environment or animal welfare
- Existing network or ability to network with existing nonprofits working to promote plant-based diets

We have low concern about recruiting and finding talent. While familiarity with food systems and corporate engagement may be useful, this idea does not require specialization in these areas.

Access

Information

We have moderate concerns about access to information. Tools like the Green Protein Alliance's Protein Tracker and WWF methodologies are readily available online and existing organizations seem willing to collaborate. However, access to supermarket sales information may be limited because of concerns about privacy and vulnerability in the marketplace held by supermarkets. Supermarkets can voluntarily share this information. We have seen some supermarkets in the Netherlands sharing it, but expect many to not be willing. Obtaining this information is critical to monitoring and evaluating progress toward set targets.

Relevant stakeholders

We have moderate concerns about access to relevant stakeholders. Existing nonprofits are working closely with large supermarket chains in Europe, like Lidl and Ahold Delhaize. Securing similar relationships with relevant stakeholders in countries outside of Europe may be difficult.

Feedback loops/Monitoring and Evaluation

We have moderate concerns about feedback loops/monitoring and evaluation. With access to the data on annual product sales, it is easy to calculate progress toward a protein sales ratio target at the individual retailer and country level. However, as mentioned above, we have concerns about how forthcoming supermarkets will be with this data. Additionally, we expect the non-profit to have challenges determining their contribution to changes in consumption with precision and confidence, given the absence of counterfactuals and large scale nature of the work.

Tractability

We have high concerns about the intervention's tractability.

While existing organizations working on this issue in Europe have achieved some success, we are unsure how easy it will be to obtain similar commitments in other countries.

Further, we are highly uncertain about how easy it will be to achieve protein sales ratio commitments by the target year (e.g., 2030, 2040). The success of this intervention relies heavily on consumers' willingness to purchase plant-based products as a replacement for animal products. Long term trends indicate increasing demand for animal products. While some interventions have proven successful at increasing plant-based purchases and/or reducing meat purchases in experimental settings (see Section 3.2), we are uncertain how or if purchasing behavior will change in the long term response to supermarket efforts. We also think it is likely that the interventions that we know work to increase plant-based

product sales (introducing new products, shelf placement, price parity, changes to recipes, hybrid products, banning animal product promotions, plant-based product promotions) will be insufficient to reach the required protein ratios. We need to find interventions that supermarkets can implement to further shift consumption towards plant-based products.

Complexity of scaling

We have low concerns about the complexity of scaling. Scaling this intervention is likely to be easy because it already targets large-scale actors—supermarkets—with strong existing capabilities in supply chains, marketing, and data. The intervention builds on their infrastructure, requiring minimal external resources to expand impact.

Risk of harm

We are unconcerned about the risk of harm. This is a low-risk intervention because it targets corporate practices through advocacy and public accountability, without involving any on-the-ground or high-risk activities.

8 Conclusion

Overall, our view is that working with large food retailers to achieve plant-based protein sales commitments is an idea worth recommending to future charity founders. We are excited about the high potential upside of this intervention and think that the space could benefit from an AIM-incubated non-profit that can help retailers innovate and test new interventions to help them reach their commitments.

References

Ahold Delhaize (2025) Ahold Delhaize announces protein split target of 50% by 2030 for European food retail brands. https://newsroom.aholddelhaize.com/ahold-delhaize-announces-protein-split-target-of-50-by-2030-for-european-food-retail-brands

Anthis, J. R. (2024) U.S. factory farming estimates. Sentience Institute. https://www.sentienceinstitute.org/us-factory-farming-estimates

Ball, K., McNaughton, S. A., Le, H. N., Gold, L., Mhurchu, C. N., Abbott, G., ... & Crawford, D. (2015). Influence of price discounts and skill-building strategies on purchase and consumption of healthy food and beverages: outcomes of the Supermarket Healthy Eating for Life randomized controlled trial. The American journal of clinical nutrition, 101(5), 1055-1064. https://doi.org/10.3945/ajcn.114.096735

Blaustein-Rejto, D. & Gambino, C (2023, March 30) Livestock don't contribute 14.5% of global greenhouse gas emissions. https://thebreakthrough.org/issues/food-agriculture-environment/livestock-dont-contribute-14-5-of-global-greenhouse-gas-emission

Broom, D. M. (2005). The effects of land transport on animal welfare.

Bryant Research (2023). Alternative meats displace demand for animal products. https://bryantresearch.co.uk/insight-items/alternative-meats-demand/

Clark, M., Hill, J., & Tilman, D. (2018). The diet, health, and environment trilemma. Annual Review of Environment and Resources, 43(1), 109-134. https://doi.org/10.1146/annurev-environ-102017-025957

Coolfood (2024) The food service playbook for promoting sustainable food choices https://www.wri.org/research/food-service-playbook-promoting-sustainable-food-choices?ap3c=IGgvZlUh3l4EDzMFAGgvZlVUPhbCpNLXb6k2LcCE6_IlBIg75A

Coolfood (2024) A look at Coolfood in 2024 https://coolfood.org/a-look-at-coolfood-in-2024/

Coolfood (2024) Coolfood pledge: Collective member progress through 2023 https://coolfood.org/news-and-updates/2023-coolfood-pledge-progress/

Coucke, N., Vermeir, I., Slabbinck, H., Geuens, M., & Choueiki, Z. (2022). How to reduce agri-environmental impacts on ecosystem services: the role of nudging techniques to increase purchase of plant-based meat substitutes. Ecosystem Services, 56, 101444. https://doi.org/10.1016/j.ecoser.2022.101444

Crippa, M., Solazzo, E., Guizzardi, D., Monforti-Ferrario, F., Tubiello, F. N., & Leip, A. J. N. F. (2021). Food systems are responsible for a third of global anthropogenic GHG emissions. Nature food, 2(3), 198-209. https://doi.org/10.1038/s43016-021-00225-9

Drewnowski, A., & Hooker, K. (2025). The protein transition: what determines the animal-to-plant (A: P) protein ratios in global diets. Frontiers in Nutrition, 12, 1518793. https://doi.org/10.3389/fnut.2025.1518793

European Public Health Alliance (2019) What are food environments? https://epha.org/what-are-food-environments/

FAOSTAT (2025) https://www.fao.org/faostat/en/

Foley, J. A., Ramankutty, N., Brauman, K. A., Cassidy, E. S., Gerber, J. S., Johnston, M., ... & Zaks, D. P. (2011). Solutions for a cultivated planet. Nature, 478(7369), 337-342. https://doi.org/10.1038/nature10452

Food and Agriculture Organization of the United Nations (2024) – processed by Our World in Data. Per capita meat consumption by type, Netherlands, 2020 to 2022. https://ourworldindata.org/grapher/per-capita-meat-consumption-by-type-kilograms-per-year?time=2020..latest&country=~NLD&tableSearch=netherlands

GDI (n.d.) Investment resources. https://gfi.org/investment/

Geliebter, A., Ang, I., Bernales-Korins, M., Hernandez, D., Ochner, C. N., Ungredda, T., ... & Kolbe, L. (2013). Supermarket discounts of low-energy density foods: effects on purchasing, food intake, and body weight. Obesity, 21(12), E542-E548. https://doi.org/10.1002/oby.20484

Giles, J. (2025, January 24) Lidl and European supermarket rivals commit to shifting sales from animal to plant-based food. https://trellis.net/article/lidl-supermarkets-plant-based-europe-us/#:~:text=Lidl%20Germany%20has%20committed%20to,and%206%2F94%2C%20respectively

Good Food Institute (n.d.a) Environmental impacts of alternative proteins https://gfi.org/resource/environmental-impacts-of-alternative-proteins/

Good Food Institute (n.d.b) Consumer insights. https://gfi.org/industry/consumer-insights/

Good Food Institute (n.d.c) Investment resources (2025). https://gfi.org/investment/

Grandin, T. (Ed.). (2020). Improving animal welfare: A practical approach. Cabi.

Green Protein Alliance & ProVeg Netherlands (2025). The Protein Tracker National Supermarket Protein Split 2024. https://theproteintracker.com/wp-content/uploads/2025/07/2025_17_July_The-Protein-Tracker-Dutch-National-Protein-Split-2024-Green-Protein-Alliance-ProVeg-Nederland-1.pdf

Hayek, M. N. (2022). The infectious disease trap of animal agriculture. Science Advances, 8(44). https://doi.org/10.1126/sciadv.add6681

Joiner, E. & Toman, M.A. (2023, September 8). Agricultural greenhouse gas emissions 101. https://www.rff.org/publications/explainers/agricultural-greenhouse-gas-emissions-101/

Koosis, A. (2024, November 27). Consumer demand for animal products In 25 years. https://faunalytics.org/consumer-demand-for-animal-products-in-25-years/

Luick, M., Bandy, L., Piernas, C., Jebb, S. A., & Pechey, R. (2024). Do promotions of healthier or more sustainable foods increase sales? Findings from three natural experiments in UK supermarkets. BMC Public Health, 24(1), 1658. https://doi.org/10.1186/s12889-024-19080-x

Mertens, S., Herberz, M., Hahnel, U. J., & Brosch, T. (2022). The effectiveness of nudging: A meta-analysis of choice architecture interventions across behavioral domains. Proceedings of the National Academy of Sciences, 119(1), e2107346118. https://doi.org/10.1073/pnas.2107346118

Mhurchu, C. N., Blakely, T., Jiang, Y., Eyles, H. C., & Rodgers, A. (2010). Effects of price discounts and tailored nutrition education on supermarket purchases: a randomized controlled trial. The American journal of clinical nutrition, 91(3), 736-747. https://doi.org/10.3945/ajcn.2009.28742

Mood, A., Lara, E., Boyland, N. K., & Brooke, P. (2023). Estimating global numbers of farmed fishes killed for food annually from 1990 to 2019. Animal Welfare, 32, e12. https://doi.org/10.1017/awf.2023.4

Mridul, A. (2025, March 11). As Finland promotes plants, its largest supermarket sees vegan sales grow – Here's why https://www.greenqueen.com.hk/finland-s-group-market-plant-based-food-vegan-sales-pro-vege/

Neuhofer, Z. T., & Lusk, J. L. (2022). Most plant-based meat alternative buyers also buy meat: An analysis of household demographics, habit formation, and buying behavior among meat alternative buyers. Scientific reports, 12(1), 13062. https://doi.org/10.1038/s41598-022-16996-5

Nielsen, B. L., Dybkjær, L., & Herskin, M. S. (2011). Road transport of farm animals: effects of journey duration on animal welfare. Animal, 5(3), 415-427. https://doi.org/10.1017/S1751731110001989

Olstad, D. L., Crawford, D. A., Abbott, G., McNaughton, S. A., Le, H. N., Ni Mhurchu, C., ... & Ball, K. (2017). The impact of financial incentives on participants' food purchasing patterns in a supermarket-based randomized controlled trial.

International Journal of Behavioral Nutrition and Physical Activity, 14, 1-7. https://doi.org/10.1186/s12966-017-0573-0

Piernas, C., Cook, B., Stevens, R., Stewart, C., Hollowell, J., Scarborough, P., & Jebb, S. A. (2021). Estimating the effect of moving meat-free products to the meat aisle on sales of meat and meat-free products: A non-randomised controlled intervention study in a large UK supermarket chain. PLoS Medicine, 18(7), e1003715. https://doi.org/10.1371/journal.pmed.1003715

Polacsek, M., Moran, A., Thorndike, A. N., Boulos, R., Franckle, R. L., Greene, J. C., ... & Rimm, E. B. (2018). A supermarket double-dollar incentive program increases purchases of fresh fruits and vegetables among low-income families with children: the Healthy Double Study. Journal of nutrition education and behavior, 50(3), 217-228. https://doi.org/10.1016/j.jneb.2017.09.013

Poore, J., & Nemecek, T. (2018). Reducing food's environmental impacts through producers and consumers. Science, 360(6392), 987-992. https://doi.org/10.1126/science.aaq0216

Protein Tracker (2025) The protein tracker: National supermarket protein split 2024 https://theproteintracker.com/wp-content/uploads/2025/07/2025_17_July_The-Protein-Tracker-Dutch-National-Protein-Split-2024-Green-Protein-Alliance-ProVeg-Nederland-1.pdf

Pro Vege (n.d.) https://www.provege.fi/in-english/

Ritchie, H. (2019) What are the environmental impacts of food and agriculture?. Published online at OurWorldinData.org. https://ourworldindata.org/env-impacts-of-food

Ritchie, H. (2021a). Drivers of deforestation. Published online at OurWorldinData.org. https://ourworldindata.org/drivers-of-deforestation

Ritchie, H. (2021b). To protect the world's wildlife, we must improve crop yields — especially across Africa. Published online at OurWorldinData.org. https://ourworldindata.org/yields-habitat-loss

Ritchie, H. (2021c). If the world adopted a plant-based diet, we would reduce global agricultural land use from 4 to 1 billion hectares. Published online at OurWorldinData.org. https://ourworldindata.org/land-use-diets

Ritchie, H. (2022) Dairy vs. plant-based milk: what are the environmental impacts? Published online at OurWorldinData.org. https://ourworldindata.org/environmental-impact-milks

Ritchie, H. (2024). Drivers of Deforestation. Published online at OurWorldinData.org. https://ourworldindata.org/drivers-of-deforestation

Ritchie, H., Rosado, P., & Roser, M. (2022) Environmental impacts of food production. https://ourworldindata.org/environmental-impacts-of-food

Ritchie, H., Rosado, P., & Roser, M. (2023). Animal Welfare. Published online at OurWorldinData.org. https://ourworldindata.org/animal-welfare

Scarborough, P., Clark, M., Cobiac, L., Papier, K., Knuppel, A., Lynch, J., ... & Springmann, M. (2023). Vegans, vegetarians, fish-eaters and meat-eaters in the UK show discrepant environmental impacts. Nature Food, 4(7), 565-574. https://doi.org/10.1038/s43016-023-00795-w

Scherer, L., Behrens, P., & Tukker, A. (2019). Opportunity for a dietary win-win-win in nutrition, environment, and animal welfare. One Earth, 1(3), 349-360. https://doi.org/10.1016/j.oneear.2019.10.020

Shepon, A., Eshel, G., Noor, E., & Milo, R. (2018). The opportunity cost of animal based diets exceeds all food losses. Proceedings of the National Academy of Sciences, 115(15), 3804-3809. https://doi.org/10.1073/pnas.1713820115

Slade, P. (2023). Does plant-based milk reduce sales of dairy milk? Evidence from the almond milk craze. Agricultural and Resource Economics Review, 52(1), 112-131. https://doi.org/10.1017/age.2022.22

Stevenson, B. (2025) Plant-based diet-shift initiative case studies: German retailer transitions. https://rethinkpriorities.org/research-area/plant-based-diet-shift-initiative-case-studies-german-retailer-transitions/#Plant-based_sales_vs_protein_split_targets

Tenniswood, K. (2023, October 2) How many fishes are slaughtered annually? https://faunalytics.org/number-of-farmed-fish-slaughtered-yearly/

Texas Tech University (n.d.) Pig castration. http://depts.ttu.edu/animalwelfare/research/pigcastration/

Tonsor, G. T., Lusk, J. L., & Schroeder, T. C. (2021). Impacts of new plant-based protein alternatives on US beef demand. Assessed online on, 3(23), 2021. https://www.agmanager.info/sites/default/files/pdf/PlantBasedProteinAlternatives_FullReport.pdf

Trewern, J., Chenoweth, J., Christie, I., & Halevy, S. (2022). Does promoting plant-based products in Veganuary lead to increased sales, and a reduction in meat sales? A natural experiment in a supermarket setting. Public health nutrition, 25(11), 3204-3214. https://doi.org/10.1017/S1368980022001914

UNEP (2024) Food waste index report. https://wedocs.unep.org/handle/20.500.11822/45230

USDA (2025) Retailing & wholesaling - retail trends. https://www.ers.usda.gov/topics/food-markets-prices/retailing-wholesaling

van Marle-Köster, E., & Visser, C. (2021). Unintended consequences of selection for increased production on the health and welfare of livestock. Archives Animal Breeding, 64(1), 177-185. https://doi.org/10.5194/aab-64-177-2021

Vogel, C., Crozier, S., Penn-Newman, D., Ball, K., Moon, G., Lord, J., ... & Baird, J. (2021). Altering product placement to create a healthier layout in supermarkets: outcomes on store sales, customer purchasing, and diet in a prospective matched controlled cluster study. PLoS Medicine, 18(9). https://doi.org/10.1371/journal.pmed.1003729

Wageningen University (2024). Meat consumption in the Netherlands in 2023 almost the same as 2022. https://www.wur.nl/en/newsarticle/meat-consumption-in-the-netherlands-in-2023-almost-the-same-as-2022.htm

Wakker Dier (2024). Supermarket meat sales plummet. https://www.wakkerdier.nl/persberichten/vleesverkoop-supermarkten-maakt-duik vlucht/

Waterlander, W. E., de Boer, M. R., Schuit, A. J., Seidell, J. C., & Steenhuis, I. H. (2013). Price discounts significantly enhance fruit and vegetable purchases when combined with nutrition education: a randomized controlled supermarket trial. The American journal of clinical nutrition, 97(4), 886-895. https://doi.org/10.3945/ajcn.112.041632

Watson (2025, May 16) Plant-based meat by numbers: Grim reading for the US retail market, brighter spots in foodservice and globally https://agfundernews.com/plant-based-meat-by-numbers-grim-reading-for-the-us-retail-market-brighter-spots-in-foodservice-and-globally?utm_source=chatgpt.com

Welfare Footprint Project (n.d.) Quantifying the welfare impact of the transition to indoor cage-free housing systems. https://welfarefootprint.org/laying-hens/

WHO (2024) Noncommunicable diseases. https://www.who.int/news-room/fact-sheets/detail/noncommunicable-diseases#:~:text=tobacco%20use%20(including%20the%20effects,insufficient%20physical%20activity.

Willett, W., Rockström, J., Loken, B., Springmann, M., Lang, T., Vermeulen, S., ... & Murray, C. J. (2019). Food in the Anthropocene: the EAT–Lancet Commission on healthy diets from sustainable food systems. The Lancet, 393(10170), 447-492. https://doi.org/10.1016/S0140-6736(18)31788-4

Wimpfen, B. (2024, April 12) Lidl invites you to a dialogue: How can we successfully transition to a healthy and sustainable protein supply? https://unternehmen.lidl.de/pressreleases/2024/240412_lidl-im-dialog

WWF (2024) Achieving a planet-based diet: Retailer methodology https://wwfint.awsassets.panda.org/downloads/wwf-planet-based-diets-retailer-methodology.pdf