# Good for you – Good for the earth

## Finding the middle way to diverse, healthy, and sustainable proteins within the United States

**Introduction**

- **Executive Summary/Overview**

Food is one of the basic necessities of humans. Since the beginning of time, food systems have paved the way for the development, expansion, and decline of human settlements. A food system is the chain of activities connecting food production, processing, distribution, consumption, and waste management (American Planning Association, 2022). In the current context, global food systems face two great challenges of increasing food demand due to the increasing population and the scarcity of resources that affect food supply (Plant Proteins: A Key Lever to Accelerate Food System Transformation, 2020). On top of that climate change and the global pandemic has put more pressure and have highlighted the need for resiliency in global food systems.

Even though we have overcome world hunger significantly in the past few decades, there are nearly 800 million people without access to adequate food and 2 billion people are affected by key nutrient deficiencies (Cassidy et al., 2013). At the same time, nearly 2 billion people are overweight and affected by chronic conditions such as type 2 diabetes, and cardiovascular diseases (Mie et al., 2017). The food system account for more than a quarter of all green gas emissions and meat production or livestock accounts for majority of them (Springmann et al., 2016). Furthermore, current unsustainable food system has further pressurized the land and water resources.

“Protein” is central to the discussion on transforming the global food system. Among many nutrients of food, protein plays a vital role in human life. Proteins contribute to building bones, muscles, cartilage, and skin, repair tissues and many more. Therefore, consuming adequate

protein is vital to ensuring basic human health (USDA.gov, 2022). Besides, proteins make food appealing in terms of aroma, taste, and texture.

When we narrow down the food system challenge to the protein aspect, it is evident that global protein demand is expected to double by 2050 (Henchion et al., 2017). For many people, animal products are the most desirable way to access nutrient-rich tasty proteins. But the current global food system with emphasis on animal protein agriculture has failed to support the increasing demands of the human population and safeguard the planet where it requires a system-wide upgrade for the survival of humankind and the planet (Ranganathan et al., 2016).

Animal Agriculture plays a significant role in the United States economy and will continue to do (Shepon et al., 2016). The consumer's choices and preferences will be the main driving forces for the demand of protein from all sources. The alternative proteins should not be seen as a threat to the existing protein production systems rather a diverse, healthy and sustainable choices for consumers to fill the gap between global protein demand and supply.

**Positionality**

One of the most significant challenges faced by the world today is to ensure that the growing population has access to adequate and nutritious protein while ensuring the sustainability of limited resources.

- **Research Question/ Research Methods**

Based on this challenge, questions arise about how to accelerate protein diversification, sustainable protein production system, and consumer behavior change to achieve a more just food system.

## Understanding the Challenge

- **Root Causes**

The global food system is responsible for a third of all greenhouse gas emissions, which is more than all emissions from transport, heating, lighting, and air conditioning combined (The Guardian.com, 2018). Emissions of $CH_4$ and $N_2O$ from farming contribute around 10–12 % of global emissions and agriculturally induced deforestation causes the release of $CO_2$ accounts for a further 6–17 % of agriculture's share of the burden (EPA.gov, 2022). This agriculturally induced deforestation is also the main cause of biodiversity loss worldwide. Modern farming is also responsible for 70–80 % of all human water withdrawals and is a significant cause of water pollution (Worldbank.org, 2020). Not all foods make an equal contribution to these issues where much research has found that meat and dairy products carry a disproportionately high environmental burden (ox.ac.uk, 2018).

Reducing the animal sourced food from our diet have many environmental benefits as well as leading to improved human health. Also, this will enhance the mission of global food supply while avoiding major environmental impacts such as major agricultural expansions and global warming (Springmann et al., 2016). Industrial facility raising large numbers of animals for food where limiting their movements in a confined area are known to call as “Factory Farms”(*ASPCA*, 2022). Also, these facilities are called as Confined Animal Feeding Operations (CAFO). These CAFOs have many hidden costs pertaining to air and water pollution by manure as well as harming rural communities with many respiratory diseases and antibiotic resistance (Gurian-Sherman, 2008).

Recent US and European cohort studies and meta-analyses of epidemiological studies have indicated that the long-term consumption of increasing amounts of meat is associated with an increased risk of total mortality, cardiovascular disease, colorectal cancer, and type 2 diabetes, in both men and women (Richi et al., 2015). Lipid peroxidation and the formation of mutagenic compounds during the cooking of meat have speculated as to the mechanistic hypotheses that lead to cancer development.

- **Iceberg Model**

Many discussions have evolved around plant-based diets to improve health and promote global sustainability. Rebalancing diets with more plant-based foods can be identified as an opportunity to reduce greenhouse emissions, the amount of land required for agriculture, natural resource consumption, chemical input use, and biodiversity loss. A balanced and diverse market of plant-based foods will require a system-level intervention including all the stakeholders (Ranganathan et al., 2016).

Shifting meat consumption towards more sustainable and healthy choices will not be achieved in a single night. Understanding the food choices and motivations behind the consumer needs to be assessed to address the barriers associated with consuming plant-based food. Power of the consumer and the food choices are determined by many factors such as biological determinants (hunger, taste), economic determinants (cost, income, access etc.), social determinants ( culture, family) and psychological determinants such as mood (Szejda, 2020).

There are three consumer groups in terms of meat consumption; meat reducers (who are open to behavioral change), traditional meat consumers (produce many rationale not to reduce meat and health is a primary driver for them to reduce meat consumption) and meat avoiders (places

higher value on animal welfare) (Szejda, 2020). These three groups will account for the mental models of the iceberg. Their individualism, education, culture, using meat as the staple way of getting protein requirement, conservative patterns of thinking are hidden and very powerful tools that need to be addressed towards the goal of sustainable food system. Most of the structures of the food systems along with policies and concepts of food systems are born and bred around meat (Berrardy, 2022)

- **Symptoms**

An average adult requires 40-70 grams of protein per day and it depends on many factors like gender, weight, and physical activity. Today in North America, Europe, and many developing regions consume more protein than biologically necessary. This overconsumption of proteins is caused by the greater consumption of animal proteins instead of plant proteins due to financial stability in these regions (Cassidy et al., 2013).

- **Problem Landscape**

Plant proteins lack some nutrients, taste, and functionality that animal proteins present (IFT, 2021). Finding the middle ground to adjust protein intake with balanced plant and animal-based diets present tremendous social, environmental, and business challenges.

To address the deficiencies in plant proteins, there is a need for the diversification of plant protein crops, ingredients, and products that are nutritious, enjoyable, and sustainable (Interview: Fernando, 2022). There is a lack of processing knowledge and capacity for a wider variety of plant protein foods and products (The Protein Challenge 2040 forum, 2017). Converting plant proteins into useable products requires significant capital investments and focus from both industries and governments (Interview: Fernando, 2022). Investments to expand sustainable plant

protein innovation still do not sufficiently support mechanisms to encourage all stakeholders to participate in this. Even though the awareness of the benefits of plant proteins is growing, the overall demand remains limited compared to animal proteins (Ismail et al., 2020). The cultural influence over animal-based proteins in many countries plays a critical role in the too slow shift to plant-based food consumption and regulations. These cultural influences have led plant protein products to be isolated on shelves and restricted in labeling which has worsened the consumer perception of plant proteins as a "niche market" (Alcorta et al., 2021). Also the current regulatory and economic policies also do not support healthy and sustainable proteins (Eshel et al., 2014).

- **Power/Social/Economic/Political Dynamics**

There are many stakeholders intervene the food systems and decision on the plant proteins. Farmers, food ingredient manufacturers, food producers, governments and consumers are the major influencers. The decision of consumers to eat more plant proteins can decide what the farmer is going to cultivate. The government's decisions on tax breaks and regulations will impact the decisions from farmer to the consumers. When it comes to the food industry, sometimes they can act as the primary barrier to enacting policies to create healthier, more sustainable food systems. Farm System Reform Act is a good example where political stakeholders can intervene this protein transition. Although the Farm System Reform Act not yet a law, would improve the current farming system and provide more infrastructure to help farmers transition to more and sustainable agricultural methods (*ASPCA*,2022)

- **Description of Loops**

Birth rate and death rates contributes to the world population. World population determines the demand for proteins as well as the selection. To fulfill the demand agriculture needs to cultivate plants or animals. This will govern the available land and water as well as the deforestation and greenhouse gas emission. Deforestation and greenhouse gas emission will lead to climate change. Climate change will influence the availability of land, water and agricultural productivity. Consumers will decide what they would prefer to fulfill their protein requirements based on the knowledge available to them. Farmers need to cultivate protein sources built on consumer demand. Governments can influence the consumer decisions by taxes and regulations. Also, governments can support the farmers to cultivate diversified, health sustainable protein sources. Food industry will lobby the governments on these decisions. At the same time food industry will make decisions based on consumer demand, farmer activities and government policies.

## Solutions

### Local

At local level it is important to balance supplier and buyer risks. This can be done by offsetting financial risks borne by suppliers and buyers and structuring partnerships to make market engagement more attractive. This will encourage new market players and existing suppliers to operate more actively. Farmers lack insight into demand and afraid of growing a novel crop. Similarly, plant protein companies may struggle to prove the scalability of their technology due to the lack of infrastructure facilities. It is important to build more facilities and making them more accessible at local level. Tax reliefs should by the local governments to attract more investments on plant protein productions. Funds cand be transferred to local land grant research institute to conduct research in finding new crop sources and varieties for plant protein

ingredients. Some regions won't be easy to convert into just plant proteins due to their long-rooted cultures where it is important to support the animal protein industry to become more sustainable as well.

What people eat is highly influenced by cultural environment and social norms. Informing and educating consumers, along with efforts to make the preferred food more socially desirable or the food to be shifted from less socially desirable, can influence or change the underlying social and cultural norms that underlie people's purchasing decisions (Sandin Vazquez et al., 2019).

### National

At the national level it is important to address the regulatory deficiencies over plant protein ingredients and products through regulatory body like FDA on the ingredient safety and conformity of plant protein ingredients and products. Federal governments can intervene by providing funds to the research institute to accelerate the research on finding plant proteins with better taste, texture and functionality. Governments also have large food procurement budgets for schools, armies, prisons, and government agencies. These procurement powers can be leveraged to increase the demand for plant protein products.

The government can create a nationally recognized school and daycare food system which would promote more balanced protein intake for kids. It can influence the childhood food preference by getting more plant-based protein meal options into the US school lunch program and daycares. The government should engage school administrators and lunch directors, who are responsible for menu creation and food purchasing. This can increase the awareness of the current products and will provide a stronger business case to food business providers for developing plant-based menu options.  Such initiative could conduct as pilot tests in different states, collect evidences,

measure behavioral changes and later scale up the successes. Meantime, the government should ensure coherence among agriculture, health, water, and environmental policies in relation to promoting sustainable diet with more plant proteins.

### Global

The Paris Agreement's 1.5°C target requires rapid and ambitious food system changes (Clark et al., 2020). Free trade aggrements between countries can enhance the production and consumption in global level. A multilateral scientific assessment of the protein transition should be conducted via the United Nations by considering the current status of individual contries and what they need to follow to achieve the Paris agreement. A diplomatic forum needs to form among countries to promote innovation and policy best practices around plant proteins. It is also important to launch research and development partnerships.

## Levers of Change and Intervention Opportunity

Technology can help support a food system that provides a diversified, healthy and sustainable protein mix. Precision agriculture, smart processing technologies and nutrient fortification are some of the technologies that can help promote plant protein production and consumption. Regenerative agriculture can favor agrobiodiversity. Meantime farmers and manufacturers require access to information and training to master farming practices and production to achieve sustainable plant protein products. Better supply chain can contribute to improve competitiveness against animal proteins. Research and innovations are needed to overcome the texture, taste and functional barriers around plant proteins.

Stakeholders should encourage the development of and transition to a food environment that promotes plant proteins. Socioeconomic factors should influence the availability and

accessibility of plant proteins. There is a need for regulators to develop dietary guidelines on the benefits of eating more plant proteins with animal proteins.

Policies that are sensitive to regional economies need to revisit carefully to support the transition to healthy and sustainable plant proteins. These policies need to address food labelling and taxes with an aim to shift diets towards the diverse plant proteins. Direction of investments can change by these policies. Governments decisions and funding can encourage fair competition of plant proteins with animal proteins. Also, Governments and foundations should create funding mechanisms to support the development, testing, and rollout of evidence-based strategies to shift diets.

**Key Insights, Reflection and Lessons Learned**

There is an urgent need for transform the food system to sustainably feed the growing population. With careful consideration of the different sociocultural and economic factors, it is important to develop a comprehensive set of credible, high-impact solutions across the food system to achieve the middle ground in terms of protein need. On one hand, there is a need to deliver more nutritious and sustainable mix of plant and animal sources to the people living in moderate or severe food insecurity. On the other hand, there is a need to significantly reduce and partly replace the production and consumption of animal protein with plant protein alternatives. The system at large must accept and implement the shift to the wide-scale production and consumption of plant proteins to achieve these goals. In particular, need to create and promote the market conditions to increase plant protein demand, engage stakeholders and building a sustainable supply of plant proteins from the ground up. The solutions are not binary. The system will need to respond to local realities and advance in multiple pathways as to deliver diverse, healthy and, sustainable plant proteins that is good for people and good for the planet.