MINISTRY OF FOOD PROCESSING INDUSTRIES
GOVERNMENT OF INDIA

AGRICULTURAL AND PROCESSED FOOD PRODUCTS
EXPORT DEVELOPMENT AUTHORITY (APEDA)
(MINISTRY OF COMMERCE & INDUSTRY, GOVERNMENT OF INDIA)

The Dawn of a Plant-Based Age

India to Lead the Way to World Food Security and Nutrition

Plant Based Foods Industry Association

Foreword

The Indian food industry is poised for huge growth, increasing its contribution to world food trade. In India, the food sector has emerged as a high-growth and high-profit sector due to the availability of a vast range of raw material and its immense potential for value addition within the food processing industry. India's agrarian culture and varied regional climate enables the country to produce a large range of agri produce which leads to a significant contribution to its food basket for catering to the domestic and global market as well. India is the largest country in terms of food production, processing, supply, and consumption. APEDA being an apex body under the Ministry of Commerce and Industry, Government of India, has made extensive efforts to support and promote the processed food sector. I also congratulate the Plant Based Foods Industry Association for their commendable initiatives to promote plant-based food as an alternative of animal products to the possible extent, while being cautious about our environment.

India has an abundance of protein rich foods such as pulses, soybean, legumes, seeds, nuts, and wheat which are excellent alternatives to meat proteins. As we race into the new decade, it is no secret that plant-based diets are on the rise and as the trend continues to grow, so too are the companies growing with vegetarian and vegan options within the food and beverage industry. Consumers are becoming very receptive to plant-based meat substitutes. Amid the Covid-19 pandemic, the popularity of these products has surged as they are being perceived as immunity boosting food products. Now vegetarians, can relish the taste of animal meat without consuming animal products.

Being a food surplus production country, India has a number of good quality protein raw materials such chickpeas, soy, wheat, millets and many more which can serve as an excellent alternative to the animal products, allowing not only product diversification from former agricultural crops but will also contribute towards a sustainable environment.

APEDA is pleased to be a part of this initiative along with the Plant Based Food Industry Association which will enable India to make its sound position as a quality and reliable supplier in the global market. We wish this initiative and program to be a grand success.

Dr. M. Angamuthu
Chairman
APEDA

Foreword

At a time when we are facing the existential threats posed by climate change and are challenged with feeding our growing world population, optimism shines bright via the dynamic plant-based foods industry. The power and influence of this industry has the potential to revolutionize the food system while presenting solutions that help us mitigate our collective impact on the climate and provide better food security and nutrition for the world's population.

The plant-based foods industry in the U.S. has achieved unparalleled growth in recent years; generating over 7.4 billion USD in retail sales in 2021. The incredible innovation, surging consumer demand, and growing multi-stakeholder support show no sign of slowing, thus leading us to say that the growth will continue to be both accelerated and sustained.

However, here at the Plant Based Foods Association and the Plant Based Foods Institute, our efforts are not, and should not, be focused solely on the U.S. Global collaboration, alignment, and support are essential to realizing the potential of our efforts to positively impact the people, economies, and ecosystems that are part of our interconnected global community.

Given the unique mix of natural, social, and economic advantages, India has the potential to play a prominent role on a global stage by growing and processing plant-based ingredients and building a thriving export market. India is one of the top five producers of core plant proteins: chickpeas, lentils, millet, peas, rice, soybeans, and wheat. In addition, early signs point to a significant opportunity for growth for the plant-based foods industry in the country. Consumer interest is high, private sector companies are coming to market at a rapid pace, and the strength of the agricultural sector provides a strong foundation for growth.

The plant-based foods sector can enable India to create an abundance of nutritious foods, domestically and internationally, without sacrificing the health and future of its ecosystem. As the paper demonstrates, strategic policy measures and investment by the Government of India can ensure that the country seizes the tremendous market opportunity before her, and becomes a global leader in the plant-based foods sector.

I, alongside the teams at the Plant Based Foods Association and the Plant Based Foods Institute, look forward to standing shoulder-to-shoulder with our friends in India to continue to champion this plant-based movement forward, and to celebrating the benefits it will provide to the people and nation of India.

Rachel Dreskin
CEO
Plant Based Foods Association
& Plant Based Foods Institute

Preface

Globally, the number of individuals experiencing acute food insecurity that need immediate food, nutrition, and livelihood assistance is increasing. Plant-based foods present an opportunity to address these crippling nutritional deficiencies sustainably and ethically, without the risks associated with conventional meat, eggs, and dairy. As India's first Plant-Based Food Industry Association (PBFIA), we are committed to playing our part in transforming the food system and alleviating resource constraints. Through networking, collaboration, and the transmission of technical, market, and research knowledge, we hope to assist the growth of enterprises in the plant-based industry. In addition, we emphasise and promote the benefits of the plant-based business in terms of improving health, food security, ethical standards, and meeting sustainable development goals.

Hundreds of SMEs and FMCGs have already entered the plant-based food market in India, including plant-based versions of meat, eggs, shellfish, dairy, and pet meals. The expansion of the plant-based foods business presents a significant potential for farmers to increase their income, and address food insecurity, climate change challenges, hunger, and public health hazards. Furthermore, given India's varied high-value crop output, innovative food industry, research institutes, considerable R&D successes, and increasing venture capital sector, we have a big chance to assist consumers all over the world consume sustainably.

In support of this vital target, I take pride in presenting PBFIA's first publication *The Dawn of a Plant-Based Age*. The report provides insights and an overview of the global plant-based foods market and potential opportunities that will enable India to lead the way to global food security and nutrition. This PBFIA flagship publication aims to raise awareness among Indian policymakers about the need for supporting India's young and expanding plant-based foods sector.

It is fitting that this report is being launched at India's very first plant-based foods summit where we have taken the first step in bringing this report to life by creating a network of organizations, food handlers, startups, scientists and policymakers. Moving forward, we will campaign for policy reforms to eliminate trade restrictions and unfair practices that restrict the industry's growth.

Topics covered in the position paper are the result of consultations with experts in the field. I hope this report is met with interest by policymakers as well as academia, business, civil society, and media, all of whom have a stake in the plant-based foods sector.

Sanjay Sethi
Executive Director
Plant Based Foods Industry Association

Introduction

The global food system is at a crossroads. Over the last century, the primary goal of agriculture was near-term growth via large-scale commercial production of a small mix of food and feed crops, complemented by strong cereal manufacturing and industrialized farm animal agriculture industries. But the sectors which have led growth and the methods that enabled them – particularly in the United States, Europe, Brazil, and China – are facing increasing backlash from the public, politicians, and scientific community alike.

Dying soils and rivers, high greenhouse gas emissions, over-extraction of groundwater, and the continued conversion of biodiverse lands into agricultural ones are the outcomes of a system which prioritizes feed crops, the heavy use of synthetic fertilizers and pesticides, and concentrated animal feeding operations. Meanwhile, high rates of diet-related morbidity and mortality have re-centered the focus on the importance of a well-balanced diet to populations' health and economic productivity.

The winds of change are blowing towards a food system which prioritizes the efficiency of production more than total output. While momentum will continue to carry certain giants forward, increasingly lumbering as they attempt to change course, others are exceedingly well-positioned to take advantage of the opportunity.

India tops the list. A unique mix of natural, social, and economic advantages positions the country to shape its agricultural and food processing sector to effectively, efficiently, and nutritiously feed its people and the world. A key catalyst to growth will be the plant-based foods sector, offering high-quality protein and nutrients with a low environmental impact in the form of plant-based meats, dairy, and ingredients. The sector is one of the fastest growing globally, with a sharp rise in investment and commercial success in the last five years.

India has the opportunity to "leapfrog" its agri-food system. In addition to leveraging modern production and processing methods, India should prioritize products which will most effectively feed its people and the world. The plant-based foods sector can enable India to create an abundance of nutritious foods, without sacrificing the health and future of its ecosystem.

Consumer and investor interest in plant-based foods has skyrocketed in North America, Europe, and China. The sector is growing in India as well, with new products – in the forms of milks, meats, eggs, isolates, and more – regularly landing on market shelves, menus, and B2B catalogs.

We are at the dawn of a plant-based age. India can lead the way.

> "Our endeavor has to be to reimagine protein to feed 1 billion-plus people in a very, very sustainable, healthy, and a very just manner. This is an opportunity to truly transform India, by getting into the sunrise areas of growth. This is an opportunity to really provide protein to a vast segment of our population. It's an opportunity to save water. It's a massive opportunity to really transform India."
>
> Amitabh Kant, CEO, NITI Aayog
> 2019 Future of Protein Summit

Chapter 1
The Global Plant-Based Industry

The plant-based foods sector is growing rapidly around the world across key metrics: consumer interest, product sales, and private and public investment. Most importantly for its near-term growth, the sector has entered the mainstream and attracted interest from consumers who do not define themselves as vegetarian or vegan. Significantly increased investment in research and development for both product characteristics and manufacturing processes are also providing a strong foundation for the relatively young industry. Globally, the future of the plant-based foods sector is bright – the sector's growth is certain, even as its path is still being charted.

Overview of the Global Plant-Based Foods Market

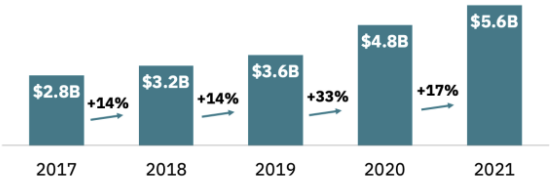
Sales

Comprehensive global data on the plant-based sector is still limited, but data from specific markets provides insight into the sector's overall trajectory.

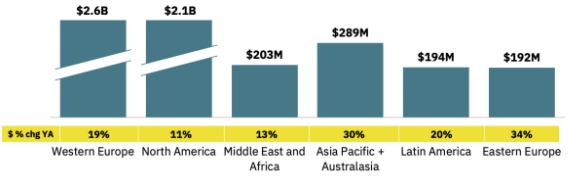
The retail market currently provides the strongest data, and estimated global sales of plant-based meat and plant-based milk products continued impressive growth in 2021. Retail plant-based milk sales grew 14 percent to $17.8 billion and plant-based meat sales grew 17 percent to $5.6 billion. Over a five year timeframe, retail plant-based milk sales grew 18 percent, affected by relatively flat sales from 2018 to 2020. In contrast, retail plant-based meat sales have seen consistent annual growth rates ranging from 14 to 33 percent over the same timeframe, achieving 100 percent growth in total.[1]

Asia Pacific led the plant-based milk sector in retail sales in 2021 with $9.4 billion and also saw the largest growth at 16 percent. Sales were comparable in Western Europe and North America, at $3.5 billion and $3.3 billion, respectively, with the growth rate in Western Europe more than doubling that in North America. Sales in the rest of the world were just over $1.6 billion, though every region saw significant growth.[1]

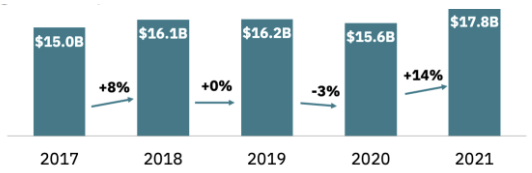
Estimated Global Plant-Based Meat Retail Market Overview



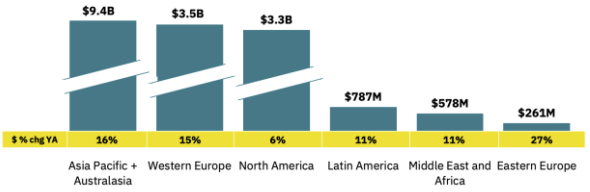
Estimated Global Plant-Based Meat Retail Dollar Sales and Dollar Sales Growth by Region



Global Plant-Based Milk Retail Market Overview



Global Plant-Based Milk Retail Dollar Sales and Dollar Sales Growth by Region



Credit: Good Food Institute

Meanwhile, Western Europe and North America led retail sales for plant-based meat, with $2.6 billion and $2.1 billion, respectively. While sales in Asia Pacific and Eastern Europe were $289 million and $192 million, respectively, both saw growth over 30 percent. Sales in the rest of the world totaled $395 million.[1]

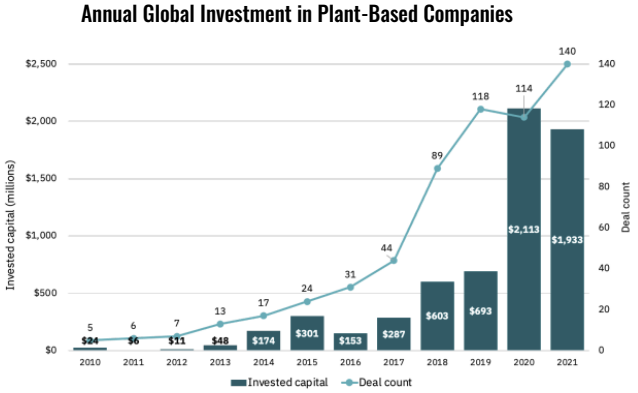
Notably, when including tofu in the plant-based meat category, Asia Pacific again leads the pack at a value of over $16 billion in 2020. China is the largest market in the region, accounting for 70 percent of the total value.[2]

Private Sector Investment

As consumer interest and sales grow for the sector, there has been an accompanying surge in private and public sector investment. Such investment is driving the swift growth of new companies like Beyond Meat and Oatly, the

adjustment of priorities for industry giants like Nestlé and Unilever, and an explosion of startup companies bringing new products to the market. Investment is focused on both increasing consumer access and product improvement – companies are improving recipes and rereleasing established products, such as the Beyond Burger 2.0 and 3.0, and both public and private sector funding is focused on improving manufacturing processes and product characteristics (e.g., taste, texture, nutrient content).

Capital investment in plant-based companies totaled $30 million in 2010 and 2011, but a decade later investment skyrocketed to $4 billion in 2020 and 2021 – a 13 thousand percent increase. Since 2010, over $6.3 billion has been invested in plant-based companies, with 63 percent of that investment occurring in just the last two years.[1]



Credit: Good Food Institute

Following the same trajectory, the number of investment deals increased from 5 in 2010 to 140 in 2021. The investor pool is growing as well – the number of unique investors grew by 40 percent in 2021, with 312 new investors of the total 1,093 investors in the sector since 1980. Two standout events from 2021 include Impossible Foods raising a $500 million funding round and Oatly's IPO raising $1.43 billion.[1]

Regionally, North America led in both investment capital at $1.2 billion and deals at 63 in 2021 while investment topped $800 million in the rest of the world. Investment in Latin America was $310 million with only 7 deals, whereas Europe and Asia Pacific each had less total investment across a higher number of deals, at $248 million with 42 deals and $220 million with 25 deals, respectively. The Middle East only saw $35 million invested with 3 deals.[1]

Ingredients & Supply Network Capacity

Only a handful of ingredients currently make up the majority of the plant-based foods globally. For plant-based milk, soy has long been the dominant ingredient, though other plant-based milks are rapidly gaining a share of the growing market. In 2010, sales for soy-based milk more than tripled other plant-based milks, but in 2021 soy-based milks accounted for less than 40 percent of the total plant-based market. Almond, coconut, oat, and rice milks all now make up a sizable portion of the market, with oat-based milks seeing the fastest growth in recent years.[3,4,5]

Commodity crops account for the majority of the plant-based meat products and ingredients currently. Of the top 75 plant-based meat products in the United States in 2020, 62 percent are primarily wheat- and soy-based, 16 percent are primarily pea-based, and 14 percent are primarily soy-based. Chickpeas are an emerging protein, but still occupy a small subset of the market. The top eight most commonly-used ingredients include: soy protein concentrate, soy protein isolate, wheat gluten, pea protein, coconut oil, canola oil, sunflower oil, and cocoa butter.[6]

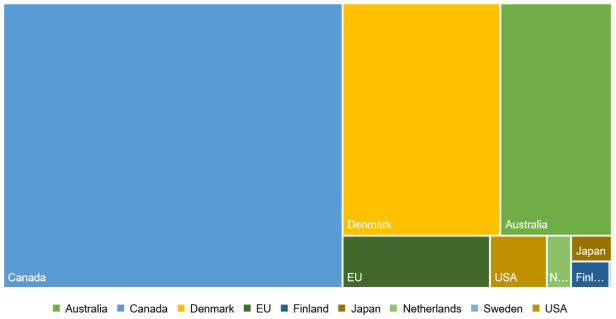
While commodity crops will continue to be appealing for manufacturers in the near-term, the landscape is changing as companies explore the use of a wider range of ingredients and crops are bred to have improved characteristics. Innovation in the plant-based egg sector has seen the use of lentils, mung bean, and chickpea by companies like Eat Just (US), Eggcitables (Canada), and PlantMade (India).[7,8] Even seaweed, which has an advantageous mix of high protein content, low environmental footprint, and processing functionality – such as seaweed is attracting significant attention.[1]

Advancements in breeding could significantly improve crop utility for use in plant-based foods, such as by increasing protein content, improving solubility and water-binding capacity, and decreasing the level of metabolites and enzymes which can negatively impact taste.[1]

Government Investment and Policy Landscape

The rapid growth of the plant-based foods sector has put it higher on governments' agenda. Viewing the sector as both an economic growth and sustainability opportunity, governments are beginning to proactively invest and foster growth. Governments are investing hundreds of millions in the alternative protein sector, including announcements and grants which top $460 million to expand plant-based food R&D and processing capabilities. Canada is leading the charge, while Australia, Denmark, Finland, Japan, United States, have invested as well.[9]

Government Investment in Plant-Based Foods



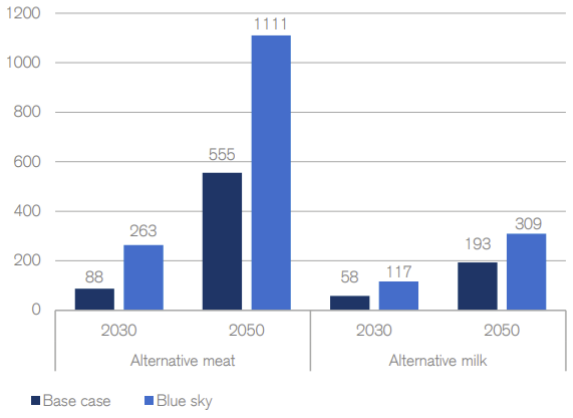
In 2018, Canada announced an agreement to invest $153 million in the Protein Industries Canada Supercluster– a coalition of businesses, academia, and nonprofits – and will be matched dollar-for-dollar by the private sector.[10] One example of such investment is an $8 million public-private investment project to develop new plant-based foods and ingredients utilizing some of Canada's most widely grown crops.[1] In Denmark, the Danish Ministry of Food, Agriculture and Fisheries launched Plantefonden, a $98 million investment fund to support development of new crops, cultivation methods, processing methods, product development, and public education.[11] In Australia, the government is contributing $65 million to a public-private project to construct three plant protein manufacturing facilities to supply both domestic and international markets.[12]

Regulatory approval of novel ingredients and debates on labeling have been complicating factors for the sector's growth, but thus far the impact has been minimal. While pressure from industry associations representing animal-derived proteins have argued that using nouns like "burger" and "sausage" or adjectives like "buttery" can confuse consumers, regulations to censor the terminology of plant-based foods have largely stalled. At the same time, approvals for novel ingredients – such as Eat Just's mung bean-based eggs in Europe and Impossible Foods' heme ingredient in Australia and New Zealand – are opening new markets for plant-based food companies and setting the stage for continued growth.[1]

The Future

Financial institutions are projecting strong continued growth for plant-based foods. Analyzing the potential growth for alternative milk and meat (potentially inclusive of plant-based, cultivated, and/or fermentation-derived products), Credit Suisse projects global sales of alternative dairy and meat to reach between $146 billion and $380 billion by 2030. By 2050, the bank projects sales between $748 billion and $1.4 trillion.[13]

Potential Size of Alternative Meat and Milk Market Globally (USD billion)



Credit: Credit Suisse

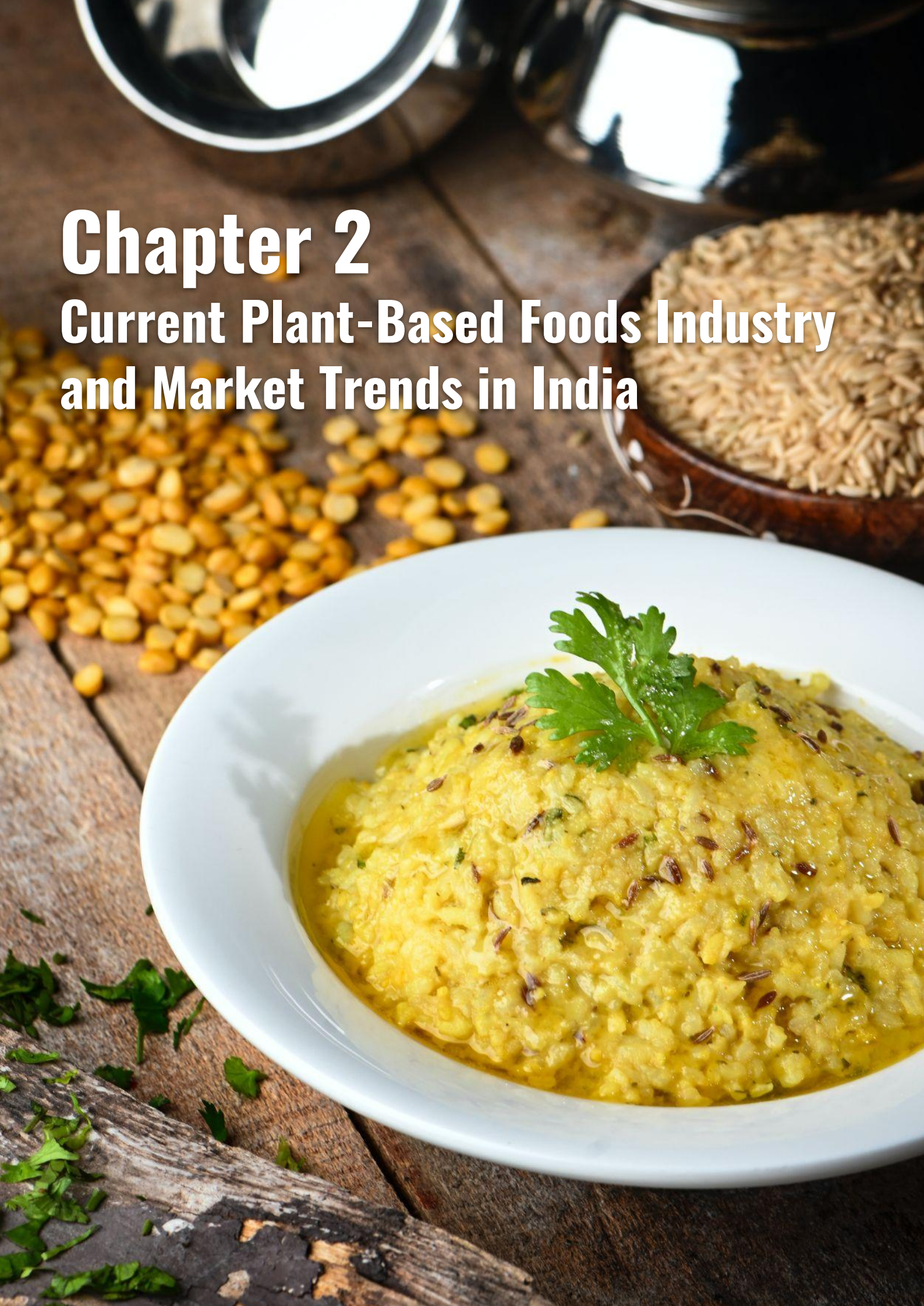
In these projections, although alternative milk is assumed to achieve a higher percentage of its

respective market, alternative meat sales would lead overall due to the size of the market. For instance, in the high-growth scenario for 2050, alternative milk would account for $309 billion in sales compared to $1.1 trillion for alternative meat.[13]

Market growth is driving innovation for plant-based foods at every step of production. 2021 saw an expansion in the number and utility of plant-based ingredients, advancements in the efficiency and scalability of processing techniques, developments in the use of novel technologies (e.g., 3D printing, high-moisture extrusion technology), and improvements to the nutritional and sensory components of products.[1] On the production side, such innovation will bring a range of new, improved products to market at increasingly competitive prices compared to animal-derived products.

For consumers, the strong nutritional profile of plant-based foods will be essential to widespread uptake and particularly so for children. Examples of such products exist in the market already – Ripple fortifies its plant-based milk for kids, which has DHA, choline, prebiotic fiber, calcium, magnesium, riboflavin, and vitamins A, D, and B12; Danone launched Wondermilk which has the fat, vitamin, and mineral content of cow's milk; and Unilever has developed a fortified soy product for the South African market that is more nutritious than the animal-derived mincemeat it replaces.[1,2] Additionally, Danone's Silk brand and Danish brand Naturli' have products which aim to replicate the sensory components of cow's milk, which could catalyze the transition of consumers who currently prioritize a familiar taste, texture, and aroma.[1]

The Good Food Institute projects 2030 production requirements will outpace the industry's supply network capabilities without an increased rate of investment, particularly for pea and soy proteins. There has been recent evidence of this in the market already. Focusing on pea protein, which has seen significant growth in the last decade, the sector will likely require 10x the current projected global supply of enriched forms of pea protein by 2030 – accounting for 34 percent of pea production overall.[6] At the same time, there is increasing interest and opportunity for utilizing a wider range of plant proteins, such as fava beans; for instance, Nutris Group invested $32 million in a hybrid processing facility for fava beans and potatoes and Beneo invested $53 million in a processing facility for fava beans.[14] The future demand for plant-based food ingredients is difficult to predict and will almost certainly change as research improves manufacturing processes and the nutrition, functionality, and yields of crops themselves. In all likelihood, as with the plant-based sector as a whole, the future market will be driven by the research and investment of the next decade as the sector grows into its potential.



Chapter 2
Current Plant-Based Foods Industry and Market Trends in India

The plant-based foods sector is still young in India, but early signs point to a significant opportunity for growth. Consumer interest is high, private sector companies are coming to market at a rapid pace, and the strength of the agricultural sector provides a strong foundation for growth.

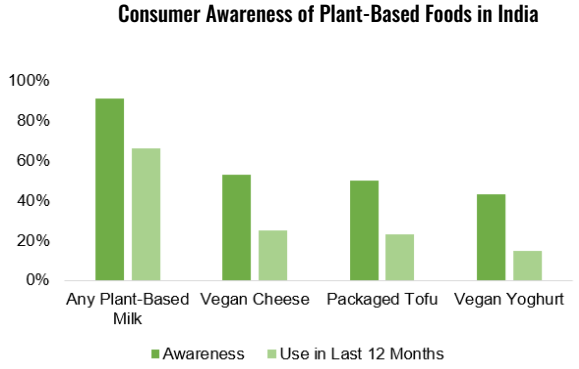
While both plant-based meat and milk categories will grow, milk is expected to occupy a more significant percentage of the market than elsewhere in the world given the population's current and projected consumption of milks. Per the FAO, animal-derived milk provides 7x the grams of protein per capita than the next animal-derived food – freshwater fish – and it is projected to account for 88 percent of the increase in India's animal protein availability in the coming decade.[15,16] Over time, as consumer exposure grows and price parity is widely achieved, plant-based milks could occupy a significant proportion of the overall milk market.

Meanwhile, the true potential for the animal-based meat market is difficult to project based on consumption of animal-derived meats in India or recent consumption trends of plant-based meats elsewhere in the world. The religious and cultural factors which limit consumption of animal-derived meats in India do not apply to the plant-based sector. 30 percent of the Indian population identifies as vegetarian, compared to 5 percent in the United States; moreover, per IPSOS, 56 percent of the Indian population would "prefer not to eat any meat, poultry, or fish" compared to 16 percent in the United States.[17,18] Additionally, because current per capita consumption of animal-derived meats is relatively low (4.3 kilograms per year compared to 101 kilograms per year in the United States), there are not as widely engrained expectations for the taste and texture of meats.[19] As such, the plant-based meats sector is relatively larger and less hindered compared to the markets where plant-based meats are already growing rapidly.

Consumer Trends

Consumer awareness and utilization of plant-based foods is flourishing in India, particularly for plant-based milks. Considering the relative size of the plant-based sector overall, market penetration is significant. Supported by Bollywood stars and social media influencers, the sector is increasing and diversifying how it reaches potential consumers.

A survey by the Good Food Institute India provides insight into consumer awareness of plant-based dairy, including milks, cheese, yoghurt, and packaged tofu. 91 percent of respondents were aware of plant-based milk and about half were aware of plant-based cheese (53 percent), packaged tofu (50 percent), and plant-based yoghurt (43 percent). Even amongst those who do not currently consume plant-based milk, 74 percent of respondents were aware of it. Of those who do consume plant-based milk, soy milk leads the category, followed by almond milk.[20]



Credit: Good Food Institute India

Consumers are not simply aware of the products, they also understand their ingredients. The majority of survey respondents – 70 percent – understand the origin and ingredients of plant-based milk. Even when non-consumers of plant-based milk were asked to identify the primary ingredient of a plant-based milk, 90 percent of respondents answered correctly. Furthermore, 92 percent of non-consumers believe that "milk" is an appropriate or neutral term to use on plant-based milk packaging.[20]

Plant-based dairy utilization is material and demographically diverse. Amongst survey respondents, in the last year, 66 percent had consumed plant-based milk, followed by plant-based cheese (25 percent), packaged tofu

(23 percent), and plant-based yoghurt (15 percent). Penetration was highest in the 24-34 years age category (31 percent), followed by the adjacent 18-24 and 35-44 years categories (20 percent and 23 percent, respectively), and finally the 45-54 and 55-64 years categories (16 percent and 10 percent, respectively).[20]

How consumers are utilizing plant-based dairy varies as well. 40 percent of survey respondents have used more than one type of plant-based milk in the last twelve months, with soy and almond leading the category and oat gaining momentum. Individuals most commonly use plant-based milks in tea and coffee, but also drink it straight, use it in breakfast cereals, blend it in smoothies/shakes, and more. Early adopters of plant-based milks are not exclusive users; 90 percent of current plant-based milk consumers have also used animal-derived milk in the last 12 months. At the same time, 69 percent of plant-based milk consumers expect to increase their consumption of it in the future.[20]

The drivers of plant-based milk consumption are both personal and altruistic, and point towards increased consumption in the future due to expanded familiarity and reduced price. Health/wellbeing and sustainability considerations are top drivers of plant-based milk consumption, and while both drivers more significantly influence the consumption of plant-based milk than animal-derived milk, the difference is particularly stark for sustainability. 63 percent of respondents cited sustainability as a reason for purchasing plant-based milk, compared to only 32 percent for animal-derived milk. Meanwhile, animal-derived milks currently lead for versatility and price, enjoying a 12 percent and 22 percent advantage, respectively.[20]

A beneficial sign for increased market acceptability and uptake, taste is a comparable driver for plant-based and animal-derived milk consumption. Perceptions of taste and versatility will only increase over time, as products continue to improve and consumers gain familiarity with the tastes and flexibility of plant-based products. Furthermore, as prices for plant-based products become comparable or better than their animal-derived equivalents, a prime limiting factor to more widespread consumption will be removed.

Data is currently less available on the plant-based meat market, but there are indications it could exceed that of other large markets around the world. Per a 2018 IPSOS survey, 63 percent of the Indian population would eat a plant-based meat substitute – the second-highest in the world, just behind China, and significantly ahead of countries where the plant-based sector is already well-established like the United States (38 percent) and the United Kingdom (49 percent).[18]

Market Trends

The market for plant-based foods in India is growing strongly, driven by an increase in access and products. The current plant-based milk and meat markets are estimated to be $20 million and $30-40 million, respectively.[21,22]

Access to plant-based foods is growing regionally and beyond major cities.[23] Regionally, plant-based foods are already fairly well-established in Delhi, Telangana, Maharashtra, Haryana, and Karnataka and there is growing interest and availability in Andhra Pradesh, Punjab, Tamil Nadu, Uttar Pradesh, and West Bengal. Because many plant-based products require cold chains, including some which require deep freeze temperatures, access is limited by supporting infrastructure; as cold chain infrastructure expands and the number of ambient-temperature plant-based foods on the market grows, consumer access will increase significantly.

The market is evolving quickly and will continue to do so for the foreseeable future. Both multinational and Indian companies are active and there has been a recent surge in plant-based products in both the business-to-consumer and business-to-business categories.[23] In the plant-based milk category, examples include Hershey's (United States), Life Health Food (New Zealand), Borges (Spain) and Indian companies Raw Pressery, Drums Food International, NatureVit, and Urban Platter.[21]

Plant-based products are increasingly available at restaurants and coffee shops. Compared to their

offerings in the United States, restaurant chains such as McDonald's, Subway, and KFC already offer a wider range of plant-based foods. Café Coffee Day, India's largest coffee chain with over 900 locations, offers multiple plant-based beverages and Starbucks, the world's largest coffee chain and which currently operates over 250 locations in India, offers their customers soy, almond, and oat milks.[24,25]

Production of Key Crops

India is a leading producer of crops rich in protein and well positioned to supply both the national and international plant-based foods sector.

The country ranks as one of the top five producers for each of a core set of plant proteins: chickpeas, lentils, millet, peas, rice, soybeans, and wheat. Analyzing pulses collectively, India is the largest producer by a significant margin, accounting for 24 percent of global production, followed next by Canada with 8 percent.[16] India also stands alone in millet production, accounting for 41 percent of global production, with the next two top producers – Niger and China – producing less than half combined.[15]

Production of Plant Proteins in India (2020)

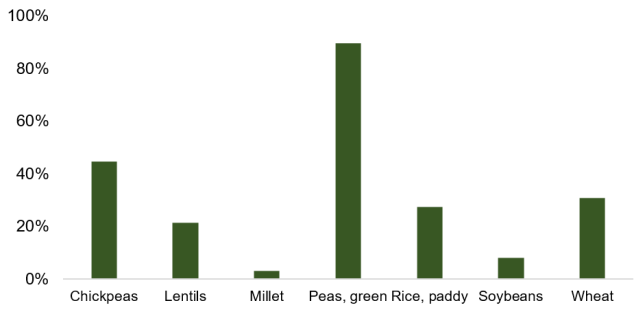
Crop	Production (Tonnes)	Global Rank	% of Global Production
Chickpeas	11,080,000	1	73%
Lentils	1,180,000	2	18%
Millet	12,490,000	1	41%
Peas, green	5,703,000	2	29%
Rice, paddy	178,305,000	2	24%
Soybeans	11,226,000	5	3%
Wheat	107,590,000	2	14%

Credit: Food and Agriculture Organization of the United Nations

Production over the last decade has grown for all key plant proteins, though the gains range widely. Analyzing the combined production of 2009 and 2010 compared to 2019 and 2020, chickpeas, lentils, peas, rice, and wheat all saw production increases ranging from 21 to 89 percent. While chickpeas and millet also saw small production increases over the same period, production varies year to year – comparing only 2010 to 2020, crop production was lower in 2020 for both crops.[15]

Historical trends paint a similar picture. Production for rice, wheat, and pulses have shown strong positive growth rates since the 1950s. Meanwhile, jowar, bajra, ragi, and small millets have seen small growth since the 1960s and negative growth in some recent years.[26]

Percentage Change in Production in India
(2009-2010 to 2019-2020)



Credit: Food and Agriculture Organization of the United Nations

Technological innovation and government policies are expected to continue to drive overall growth for key plant-based food crops. For instance, after a period of low growth between 1990 and 2005, pulses will likely continue to be a strong growth driver due to a mix of higher-yielding hybrid seeds, improved mechanization, price support, and government procurement schemes.[16] As it scales, the global plant-based food sector will reshape the demand and value of plant-protein crops – an opportunity for forward-leaning investors and governments.

Government Initiatives

The Government of India has been an important and effective supporter of the food processing sector, including as one of the pillars of its "Make in India" initiative. Infrastructure investments, advantageous financial and credit schemes, foreign direct investment policy, and centralized procurement schemes have propelled the sector's growth. Federal examples of such support are reflected in Pradhan Mantri Kisan Sampada Yojana (PMKSY), the National Bank for Agriculture and Rural Development (NABARD),

the Production Linked Incentive Scheme for Food Processing Industry (PLISFPI), and specific support for smaller enterprises.

PMKSY provides financial assistance to entrepreneurs to set up food processing and preservation businesses that include farm-level infrastructure like primary processing facilities and collection centers. Schemes within PMKSY include mega food parks, integrated cold chain and value addition infrastructure, creation and expansion of food processing and preservation capacities, infrastructure for agro-processing clusters, food safety and quality assurance infrastructure, and more. Through July 2021, 792 of a total 818 proposed projects have been approved, with approved grants-in-aid totaling $753 million (Rs. 5,792 crore).[27] Per Prahlad Singh Patel, Minister of State for Food Processing Industries, as of July 2021 the government had approved 41 mega food parks, 353 cold chain projects, 63 agro-processing clusters, and 292 food processing units.[28]

With an outlay of $1.5 billion (Rs. 10,900 crore), PLISFPI supports the creation of global food manufacturing champions commensurate with India's natural resource endowment and will help Indian brands increase success in international markets. Objectives of the scheme include creating jobs, attracting investment, expanding industrial capacity to increase production of processed foods, increasing farmer incomes, and boosting exports. The scheme will run 2021-22 through 2026-27.

At NABARD, the government has set up a special "Food Processing Fund" of approximately $265 million to extend affordable credit to designated food parks and the individual food processing units in the designated food parks.[27]

In 2020, Finance Minister Smt. Nirmala Sitharaman announced a scheme worth $1.3 billion (Rs. 10,000 crore) to help micro food enterprises. Support will not only improve the mechanics and safety of production facilities themselves, it will also help them achieve FSSAI standards and better integrate into retail markets. All of the above will also increase access to and competition in an underutilized export market.[29]

Examples of state-level engagement include:

Kerala
Dr. C Anandha Ramakrishnan, Director of the National Institute of Food Technology, Entrepreneurship and Management-Thanjavur, recently shared his optimism for Kerala using the One District One Product (ODOP) philosophy. Kerala Agricultural University (KAU) and the State Industries Department have teamed up to develop the ODOP concept, with the goal to help small businesses and focusing on the strengths of production.

Telangana
Tribal women in Untnoor, Telangana, started a food processing plant for the first time in November 2020. The plant was a partnership between the Tribal Cooperative Finance Corporation Limited (TRICOR), the Telangana Tribal Welfare Department, the Ministry of Tribal Affairs, and the International Crops Research Institute for the Semi-Arid Tropics' (ICRISAT) Agribusiness and Innovation Platform. The project intends to localize production and combat malnutrition while also improving tribal groups' economic conditions, including providing goods to the tribal region's government nutrition programmes and anganwadis.

Punjab
The Government of Punjab established the "Punjab Food Processing Advisory Committee" in September 2020 to encourage investment in the food processing sector. Shri. Om Prakash Soni, Punjab Food Processing Minister, stated that this step will enhance farmer faith in the system since they will be able to receive fair rates for their crops. Captain Amarinder Singh, Punjab's Former Chief Minister, has urged for special attention to be paid to the state's food processing sector, which will enhance farmer earnings and the state's economy.

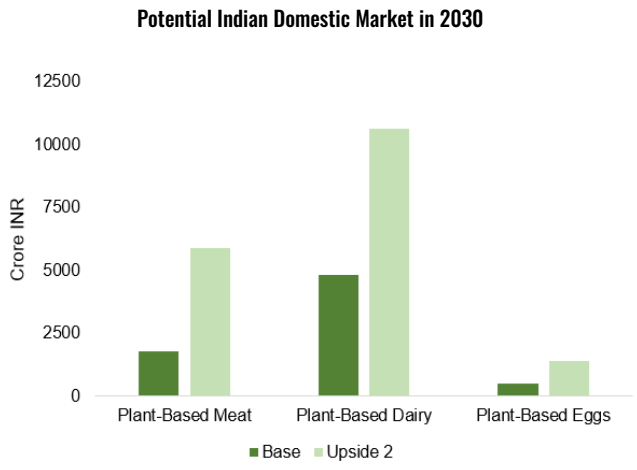
Projected Domestic and Export Market Growth

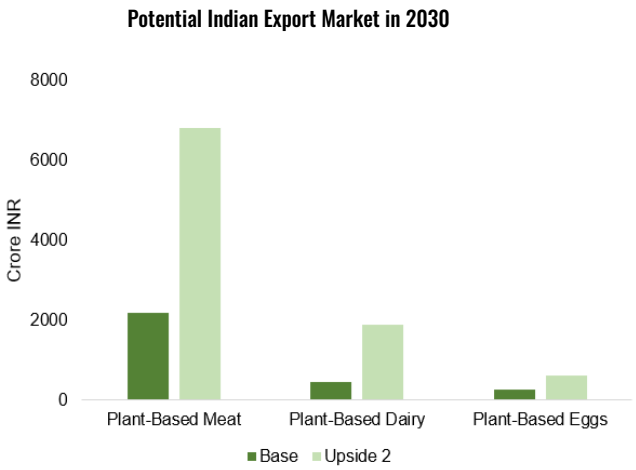
The plant-based foods sector in India is projected to increase significantly over the next decade, driven by increased consumer interest and access, product innovation, and hundreds of millions in domestic and foreign private sector investment.

The Good Food Institute India and Deloitte produced an analysis which projects the Indian plant-based foods domestic and export markets in 2030. The analysis includes a range of scenarios based on different assumptions of consumer uptake.

For the domestic market, the analysis includes the plant-based meat, plant-based dairy, and plant-based egg categories. The plant-based dairy sector is projected to be the largest, ranging from $623 million to $1.4 billion (Rs. 4827 to 10625 crore). The plant-based meat market is projected to be between $233 million to $759 million (Rs. 1803 crore to 5884 crore). Plant-based eggs will be the smallest market, with a projected range from $68 million to $183 million (Rs. 527 crore to 1416 crore).[23]

The export market for India's plant-based sector is also projected to be significant by 2030, though the plant-based meat market is expected to be larger than that of milk. The plant-based meat market is projected to range from $283 million to $880 million (Rs. 2194 crore to 6824 crore), whereas the plant-based milk market is projected to range from $59 million to $244 million (Rs. 459 crore to 1889 crore) and the plant-based egg market will range from $34 million to $81 million (Rs. 266 crore to 631 crore).[23]





Credit: Good Food Institute India and Deloitte

Chapter 3

Plant-Based Foods as a Strategic Opportunity for India

A mix of ambition, strategy, and necessity will shape the future of India's agri-food sector. Agricultural production and manufacturing account for nearly a fifth of GDP and nearly half of employment.[15,30] In the future, a strong and strategic agricultural system must nutritiously and economically feed a population projected to grow by 9 percent and reach 1.5 billion people by 2050.[31]

Current agricultural production, processing, and exports are strong. Recently, India achieved the highest-ever exports for staples like rice, wheat, sugar, and other cereals, with wheat exports jumping nearly four-fold from $568 million in 2020/21 to $2 billion in 2021/22. But according to Professor Ramesh Chand, a Member of NITI Aayog, India's current agri-food system is a paradox. Despite the country having a net food surplus (measured in production/person/day kg) and being a net exporter, under-nourishment rates remain above the global average.[26] The surplus needs to be more beneficial.

At the same time, climate change impacts such as early or late rainfall, rising temperatures, and the weakening of supporting ecosystem services like wild pollination threaten even the current state of affairs.[30,9] Agriculture already uses the vast majority of water resources in the country and the Central Groundwater Board of India estimates that 17 percent of groundwater blocks are being extracted faster than they are recharging, while an additional 19 percent are at critical or semi-critical stages.[32] Furthermore, the soil health card scheme shows alarmingly low levels of soil organic carbon across the country, which has been linked to the overuse of fertilizers.[33]

The plant-based food sector poses an incredible opportunity to provide for the Indian people for the long term by effectively and efficiently utilizing natural resources and adding value through processing. It can cater towards the populations living and working in cities as well as those in rural settings, who increasingly have access to cold chains and supermarkets. It can leverage the unique strengths and qualities of its indigenous crops. It can attract foreign investment, research and technology advancements, and a significant export market.

Compared to animal-derived foods, plant-based foods have a substantially lower environmental footprint. Compared to a ground beef burger, the Impossible Burger generates 89 percent fewer greenhouse gas emissions and 92 percent fewer aquatic pollutants while utilizing 87 percent less water and 96 less land per a comprehensive life-cycle assessment.[34] While life-cycle assessments are not available for all plant-based foods yet, the vast majority, relative to their animal-derived counterparts, will have low environmental footprints based on the footprints of core ingredients.

Climate smart and agroecological production methods will play an essential part in India's agricultural sustainability. To maximize their potential, future production methods must leverage environmentally-strategic crops which are nutritionally rich and can either be eaten directly or processed into useful ingredients – such as pulses and millets.

Pulses are protein rich and their production has a low greenhouse gas footprint. What further sets them apart strategically is that they also fix atmospheric nitrogen and release high-quality organic matter into the soil, reducing reliance on chemical fertilizers while rebuilding soils.

Millets are hardy crops which require significantly less water to cultivate than rice, and thus can be rain-fed even in drier zones with less-nutritive soils. They are easy to digest, highly nutritious, nonglutinous, and high in fiber. Furthermore, the diversity of millets in India – sorghum, pearl millet, maize, barley, finger millet, and small millets such barnyard millet, foxtail millet, kodo millet, proso millet – reflect a ripe opportunity for product innovation and diversity.

While much of the global attention on the plant-based foods sector is on whole products like milks and mock meats, the ingredient market is a significant opportunity as well. Protein-rich concentrates, isolates, and flours can provide

nutrition across a wide range of applications – from protein shakes to mixing protein atta into chapati.

National production of plant-based foods can take advantage of and further stimulate a healthy international market for plant protein crops, processed protein ingredients, and manufactured products. Soaring consumer interest and investment for plant-based foods in North America, Europe, and Asia will provide near-term opportunities to fill supply shortages and take advantage of rapidly-modernizing technology. If India can also create an international market for its indigenous crops, the country and its people will benefit multifold.

Case Study: Plant-Based Foods in a Net-Zero Latin America

In 2020, the Inter-American Development Bank (IADB) analyzed the economic and social impacts of a changing climate on Latin American and The Caribbean and the region's potential shift to an economy with net-zero greenhouse gas emissions. The report summarizing these findings, *Jobs in a Net-Zero Emissions Future*, includes a significant focus on the agri-food sector.

The IADB stresses the impact of climate change on agriculture in particular. The authors write, "People in agriculture, livestock and fishery industries are especially at risk: in many places, water availability will diminish, animal and plant diseases will become more prevalent, land suitable for agricultural production will shrink, and fish populations will continue migrating towards the poles due to ocean warming." Across sectors, agri-food has the highest number of workers who are dependent on healthy ecosystem services. These impacts will affect rural areas especially, including a large number of informal female and child agricultural workers.

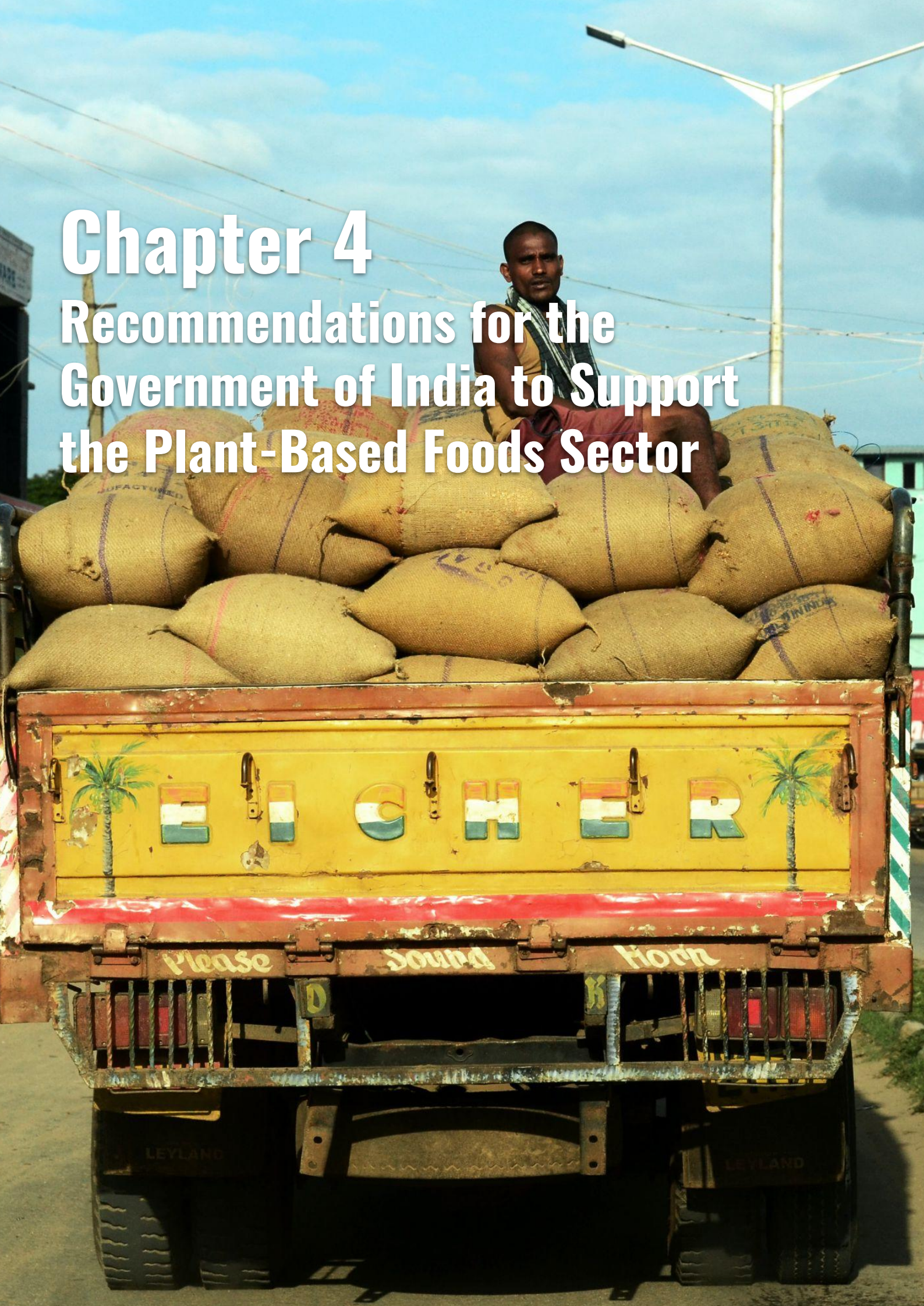
Plant-based food production is emphasized as a critical economic opportunity. The IADB used a decarbonization scenario which models a progressive shift to a diet in which two-thirds of household baseline spending is replaced with spending on plant-based products by 2050. Such a shift would unavoidably negatively impact animal-derived food production systems – with an estimated 500 thousand jobs lost relative to 2014.

However, by 2030, the plant-based agri-food sector would create 19 million full time jobs. Other than the renewable energy sector, the agri-food sector would see greater employment gains than any other. Job growth is more than quadruple that of the business-as-usual scenario, in which only 4.3 million jobs would be created across livestock herding, poultry, dairy, fishing, and related processing sectors. With the expansion of the plant-based food sector and an increase in higher value-added plant-based products, the IADB sees an opportunity "to improve working conditions and incomes and overcome rural poverty."

Employment Gains and Losses by Sector as of 2030 in the Decarbonization Scenario, Relative to 2014 (Percent of Jobs in 2014, all of Latin America and the Caribbean)

Credit: Inter-American Development Bank

In addition to the economic impact, the shift towards plant-based food production is projected to reduce malnourishment and improve overall health outcomes while also improving the region's environmental sustainability. The shift would reduce pressure on deforestation and associated carbon emissions, methane from livestock, and emissions of nitrous oxide from fertilizers.[35]



Chapter 4
Recommendations for the Government of India to Support the Plant-Based Foods Sector

Strategic policy measures and investment by the Government of India can ensure that the country becomes a global leader in the plant-based foods sector. The overarching goal of such measures is to stimulate sector innovation and growth, enabling it to not only be an important economic driver, employer, and nutrition-provider nationally, but also become a robust regional and global exporter as other nations increasingly seek out foods which are both nutritious and environmentally responsible.

In addition to the recommendations below, recommendations developed in collaboration with Yes Bank have been included in Appendix A.

1. Lead the Global Discourse on Transforming the Food System

India has the opportunity to become a global leader in the growth of the plant-based foods sector and thus the future of the food system altogether. While North America, Europe, and China have been early leaders in the plant-based foods sector, the Government of India's active support to shift national policies can enable catalytic growth in this sector.

At the same time, there is a zealous call from intergovernmental, academic, and civil society leaders around the world about the need for the future to be rooted in a food system which ensures healthy diets and efficient, low-waste food production. The much heralded EAT-Lancet Commission report calls the shift the "Great Food Transformation" and highlights the importance of "diversity of plant-based foods" compared to "low amounts of animal source foods."[36] Becoming a torchbearer for plant-based foods will be celebrated by a global chorus of individuals working in agriculture and could catalyze increased external technical and financial support opportunities for the emerging sector in India. The country must continue to be judicious about ensuring foreign interests and investments align with its national economic, social, and political priorities, but the country is set to lead from a position of strength given its agricultural, technological, and labor force assets.

The United Nations General Assembly has endorsed the Government of India's proposal for 2023 to be the International Year of Millets. The Ministry of Agriculture and Farmers' Welfare analysis and plan to foster the millet industry is inspiring and will undoubtedly reinforce India's position as a global leader in millet production. With an eye towards the future, processed plant-based foods can be a key component of the overall strategy – adding economic value, utility, and consumer interest to the crop.

2. Catalyze Research in India with a Focus on Indigenous Crops

The Government of India can shape the future of the plant-based foods sector by strategically supporting related research in the near-term. The sector, currently primarily dependent on staple commodity crops, is already in search of climate-friendly crop varieties with improved nutritional, processing, and taste characteristics. But the sector is still small compared to its projected future status, and thus near-term investments in research into India's indigenous crops can ensure their broad adoption within the sector – both nationally and globally.

Plant proteins will serve India well whether in processed or unprocessed form. For unprocessed plant proteins, investment in high yielding, climate-friendly crops that are particularly suited for India's climate and soil are top priority.

When considering production for processed plant-based foods, the nutritional, processing, and taste characteristics of crops are vitally important as well. Together, these

characteristics shape consumers' initial and sustained interest in a product. The shorter the path to products which are widely desired, the faster the sector as a whole can grow via exponential reinvestment of its earned capital.

Across the sector, governments are investing in research through their federal infrastructure as well as co-financing mechanisms in partnerships with the private sector, academia, and civil society. It would be opportunistic for the Government of India to have a diversified investment strategy, leveraging its strength across all sectors. Given international interest in plant-based research, it would also be strategic to explore co-financing opportunities with international organizations to identify or create opportunities which align with the Government's priorities.

To boost research and foster progress across the sector, the Government can establish a Centre of Excellence. The Centre could be a multi-institutional hub to explore how to optimize the sector to provide social, environmental and economic benefit across the supply network, research crops that are strategically suited for both local conditions and the sector, develop improved processing technologies, pursue public-private partnerships, participate in international capacity building activities, and more.

3. Foster a Healthy and Supportive Ecosystem for Plant-Based Foods

Strategic government policy is critical to creating a healthy and supportive ecosystem for emerging industries, ensuring not only growth but also shared benefit of that growth. Enabling innovation and leveraging government investment are central to fostering this ecosystem. The result will be a strong economic engine at home while supporting the government's objective to become one of the top five exporting countries.[27]

For the plant-based foods sector in India, four areas should be prioritized in particular: supporting the agri-food processing industry, leveraging public procurement and subsidies, trusting consumers' understanding of labels, and prioritizing efficient evaluation and approval of novel ingredients.

Create a Plant-Based Task Force

The plant-based foods sector in India would significantly benefit from the creation of a Plant-Based Task Force with the aim to promote a comprehensive and unified response of the government and plant-based community in achieving India's protein security through plant-based foods. The task force would include collaboration between the Ministry of Food Processing Industries (MoFPI), Agricultural and Processed Food Products Export Development Authority (APEDA), and the Plant Based Foods Industry Association.

The focus of the Task Force would be to mobilize and strengthen attention on local processing and the export of value-added plant-proteins; create an action plan to improve quality standards of plant-based foods with stringent training, handholding, and incubation services; build G2G alliances to strengthen global protein corridors and knowledge exchange; accelerate the productivity and protein yield of pulses; build alliances with farmers' federations and collectives; promote the Accelerated Pulses Production Programme; integrate research of millets and pulses and engaged the Indian Institute of Millets Research (IIMR) with a focus on nutrition; align

with the Mid-day Meal Scheme; align the pulses and millets distribution along with the Public Distribution System (PDS) under the Department of Food and Public Distribution, collaborate with various food processing bodies to promote the utilization of pulses and millets; collaborate with the National Institute of Food Technology Entrepreneurship and Management (NIFTEM) at Sonipat and Thanjavur as well as the Central Food Technological Research Institute (CFTRI) to promote research in processing of pulses and millets; and build a Centre of Excellence in Plant Proteins.

Support the Agri-Food Processing Industry

With the third-largest food processing sector in the world, India is well positioned to be a leader in plant-based food processing.[37] The agri-food processing industry has a mutually beneficial relationship with the plant-based foods sector. The industry is both central to the plant-based foods sector's success and the growth of plant-based foods will provide significant, new and high-quality job opportunities in the industry.

As national and global demand for protein isolates, concentrates, flours, and finished products grows, the Government of India can provide supportive investment to ensure India's processing industry can take advantage. In North America and Europe, the plant-based food sector has already experienced demand outpacing production and companies are increasingly looking abroad for long-term solutions. In the near-term, the Government can refine mapping of agricultural growing regions to identify which crops can be grown to strategically supply the growing plant-based foods industry – both crops currently in high demand and those on the horizon.

Additionally, the Government can support the identification of gaps in infrastructure, processing capacity, transportation, and research that must be addressed for agricultural production in India to shift towards growing more climate-friendly crops for the plant-based foods industry. Ideally, expansion in infrastructure capacity will prioritize processing methods that lower costs, enable the usage of an expanding set of ingredients, and are optimal in terms of their economic, environmental, and social impacts. Capacity expansion could include investments to repurpose existing infrastructure as new facilities are built. Transport is a central component of the sector, and improving support for rail cargo transport will ensure plant-based foods are available across the country and beyond major cities.

The Government of India should also invest in skill development programs as an efficient and equitable means to ensure individuals from both the formal and informal sectors can participate in the plant-based foods sector. This will be particularly important over the longer-term if there is any disruption to the labor market for animal-derived products. Per the International Labor Organization, a good example of such an approach is the Philippines' Green Jobs Act of 2016, which "promotes skills for green jobs by identifying skills needs, maintaining a database of green careers, formulating training regulations, assessing and certifying skills, and developing new curricula."[35]

The Ministry of Food Processing Industry is providing strategic support to the industry and this work should continue and grow. Pradhan Manti Kisan Sampada Yojana (PMKSY) serves as a strong template for future work.[26] All of these efforts are important to the near- and long-term success of the plant-based foods sector.

To ensure sector growth, the Government can create an enabling team to support companies navigate requirements across departments. It is critically important for companies to successfully meet requirements in a timely and efficient manner, and particularly so for start-up companies which may be operating with minimal capital and thus need to get products to market in order to survive.

Leverage Public Procurement, Subsidies, and Credit

The Government of India should invest in public procurement schemes and subsidies as part of its strategy to spark strategic growth. Incentivizing farmers and manufacturers, expanding access, and ensuring smaller businesses can participate in the sector will accelerate growth and innovation in the near-term and strengthen the sector in the long-term. The Government can provide flexible, custom credit programs available to growers in the form of operating capital, term loans, and equipment loans, and assist in building domestic supply networks by identifying key growers, processors, advisors, certifiers, and brand participants. Together, such efforts will also help plant-based foods achieve price parity with animal-derived products – a key factor to ensuring widespread uptake.

Public procurement can support multiple policy objectives at once: providing assurance to farmers and manufacturers participating in a new market; increasing access and exposure to plant-based foods; and fostering access to the market for micro, small, and medium enterprises (MSME) and the innovation which accompanies their participation.[35]

Subsidies can bolster production of the strategic ingredients for plant-based foods. Subsidies for indigenous crops will help ensure that they are of interest to not only national plant-based food companies, but global ones as well. Subsidies can also support the production of crops which are currently central to the global market – particularly soy and peas. If such subsidies are complemented by R&D to improve the crops for utilization in plant-based foods, India can become a formidable producer of raw ingredients globally.

Access to credit is vital to every aspect of the sector's growth and the Government of India should prioritize advantageous terms for the sector to fill market gaps and incentivize investment, particularly in the near-term. Related initiatives could be supported directly or via co-financing arrangements with private institutions.

Trust Consumers' Understanding of Labels

Consumer trust is essential to the success of any industry and policy to provide clear guidelines on labeling is an important component to ensuring such trust. At the same time, overly-restrictive labeling can confuse customers, burden the government, and inhibit growth. In the United States and Europe, the animal-derived foods industries have waged campaigns to enact restrictive legislation on words such as "burger" and "sausage," but to date the efforts have largely failed. Per surveys in these regions, consumers clearly understand the differences between plant-based and animal-derived products and are able to differentiate between them.

Per a survey by IPSOS and the Good Food Institute India, 70 percent of survey respondents in India had no confusion about the origin and ingredients of plant-based milk. Even amongst non-consumers of plant-based milk, 90 percent of respondents were able to correctly identify the primary ingredient in a plant-based milk and 92 percent believe that "milk" is an appropriate term

to use on plant-based milk packaging. Amongst consumers, only 25 percent of plant-based milk drinkers check for labeling that specifies the product is "dairy free" or "vegan" – indicating strong understanding and trust of how products are advertised and labeled.[20]

As the plant-based food sector continues to grow, the public will become increasingly familiar with the core ingredients and manufacturers of products. As such, while clear labeling is important, the Government of India should not overly complicate the utilization of labels or overly restrict terminology used to describe products.

Prioritize Efficient Evaluation and Approval of Novel Ingredients

Innovation in the plant-based foods sector, particularly one which leverages the strengths of Indian crop production, will require Government-led evaluation and approval of novel ingredients. Given the multifaceted benefits of the industry's growth, including the significant economic opportunity, the Government of India should ensure this process is efficient while still protecting consumer safety. The Central Government should prioritize funding to support the critical work of the Food Safety and Standards Authority of India specifically related to plant-based foods. Efficiency in this regard will minimize time between R&D and return on investment, fostering more rapid and confident sector growth.

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Appendices

Appendix A: Recommendations for Government Schemes

Developed in Collaboration with Yes Bank

Agency	Scheme	Amendment/ Addendum requested	
MoFPI PMKSY SAMPADA Yojana	CEFPPC	Point number 2. **Eligible sectors** on Page number 2/29 To add "plant-based alternatives" / animal grade alternative feed / alternative proteins/ cellular meats/ fermentation innovative chemistry	https://www.mofpi.gov.in/sites/default/files/modified_sampda_cefppc_guidlines_-_02032020.pdf
		Point number 3. Indicative list of eligible processing activities To add processes like high moisture extrusion (HME) technology; texturization; heat extraction technology and other technology used for plant proteins products manufacturing	
		Point number 3 - Eligible organizations To add startups registered under DPIIT	
		Appendix-I Criteria for Evaluation of proposals under Scheme for creation of food Processing & Preservation capacities [REFER PARA 10 (iv)] Priority Sector – **20 marks** evaluation criteria for "plant-based alternatives" / animal grade alternative feed / alternative proteins/ cellular meats/ fermentation innovative chemistry	
		For General Areas and for SC/ST, NER/ Himalayan States, Island areas& ITDP areas. – **15 marks** for Leveraging of Investment in the project - Proposed private investment including equity and unsecured loan < grant sought for "plant-based alternatives" / animal grade alternative feed / alternative proteins/ cellular meats/ fermentation innovative chemistry	
		Investment on Eligible Project cost – More than Rs 9 crore to 15 crores- 12 marks Between Rs. 3 crores to 9 crore – 08 marks Below Rs. 3 crore – 06 marks for "plant-based alternatives" / animal grade alternative feed / alternative proteins/ cellular meats/ fermentation innovative chemistry	
		Net worth of the applicant Less than 1.5 times of proposed equity – **05 marks** for "plant-based alternatives" / animal grade alternative feed / alternative proteins/ cellular meats/ fermentation innovative chemistry	

		Women entrepreneur(s) 100% shareholding of women in the firm **– 10 marks** Majority stake / shareholding (more than 50% and less than 100% of women in the firm) – **05 marks** for "plant-based alternatives" / animal grade alternative feed / alternative proteins/ cellular meats/ fermentation innovative chemistry	
		Project Strength- The promoter(s) having professional / special training in food processing / technology M.Tech / Ph.D. in Food Processing / Technology – **10 marks** B.Tech in Food Processing / Technology- **08 marks** Diploma in Food Processing / Technology – **06 marks** Special Training in Food Processing / Technology for a period not less six months from Govt. recognized University / Institute – **04 marks** for "plant-based alternatives" / animal grade alternative feed / alternative proteins/ cellular meats/ fermentation innovative chemistry	
		Experience of applicant firm / promoter(s) in Food Processing: Food processing business having annual turnover of ₹3 crore and above during current/ previous year – **15 marks** Food processing business having annual turnover of ₹2 crore and above during current/ previous year – **12 marks** Food processing business having annual turnover of ₹1 crore and above during current/ previous year - 10 **marks** Food processing business having annual turnover of less than ₹1 crore during current/ the previous year – **5 marks** for "plant-based alternatives" / animal grade alternative feed / alternative proteins/ cellular meats/ fermentation innovative chemistry	
		Introduction of innovative technology / processing in the project – 05 marks for "plant-based alternatives" / animal grade alternative feed / alternative proteins/ cellular meats/ fermentation innovative chemistry	
		Type of unit Setting up / creation of new unit (greenfield) – **10 marks** for "plant-based alternatives" / animal grade alternative feed / alternative proteins/ cellular meats/ fermentation innovative chemistry	

	APC	Page number 2 /35 – Point number 3. Salient Features of the Scheme Subpoint 3.1. At least 5 food processing units with an aggregate investment of minimum **Rs. 15 crore** will be set up in the Agro-processing cluster. These units may be set up by the promoters and associates of Project Execution Agency (PEA) and by other entrepreneurs. The investment in these units will not be eligible under this scheme for “plant-based alternatives” / animal grade alternative feed / alternative proteins/ cellular meats/ fermentation innovative chemistry	https://www.mofpi.gov.in/sites/default/files/revised_operational_guidelines_of_apc-05022019.pdf
		Page number 4 /35 – Point number 4 ; Components of the Scheme: - **Core infrastructure:** To add processes like high moisture extrusion (HME) technology; texturization; heat extraction technology and other technology used for plant proteins products manufacturing	
		Page number 6 /35 – Point number 7 - Eligibility criteria for PEA: Subpoint 7.1 The combined net worth of the PEA may be less than 1.5 times of the grant amount sought If all stakeholders of PEA / SPV are from “plant-based alternatives” / animal grade alternative feed / alternative proteins/ cellular meats/ fermentation innovative chemistry	
		Page number 6 /35 – Point number 7 ; Subpoint 7.5 - Only one agro-processing cluster will be sanctioned in a district. In case of more than one proposal from the same District, the proposal having higher score in the merit based on criteria for assessment as per Annexure-I will be considered. To be modified – if all 5 units are for “plant-based alternatives” / animal grade alternative feed / alternative proteins/ cellular meats/ fermentation innovative chemistry	
		Page number 15 /35 - Annexure-I Criteria for Assessment/ Evaluation of EOIs/ Proposals C. Details of PEA C.1 - Net-worth of PEA- 15 marks More than 10 crore – 15 marks Rs 5 cr - Rs 10 cr: 10 marks C.2: Food Processing Experience of promoter having at least 10% shareholding in PEA – 10 marks Turnover > Rs. 3 crore* - 10 marks Turnover from Rs.1 crore to Rs.3 crore* - 07 marks *Turnover of the promoter claiming food processing experience shall be in at least two of the years out of previous three and current financial year for “plant-based alternatives” / animal grade alternative feed / alternative proteins/ cellular meats/ fermentation innovative chemistry	

	ICC	Page number 2 & 3 /45 - Point number 4. Components of the Scheme – Subpoint number (a) Farm Level Infrastructure; (b) Distribution hub and (c) Refrigerated vans To avail financial assistance under this scheme, the applicant will have to set up Farm Level Infrastructure as mentioned at (a) above and any one or both of the components from (b) and (c) above. **Page number 2 & 3 /45** - For frozen RTC/ RTE subsegment of "plant-based alternatives" / animal grade alternative feed / alternative proteins/ cellular meats/ fermentation innovative chemistry to be modified to avail financial assistance under this scheme, the applicant need not have to set up (a) Farm Level Infrastructure	https://www.mofpi.gov.in/sites/default/files/guidelines_17.12.2019_cc.pdf
		Page number 28/45 - Proposed investment in Cold Chain Components Proposals not creating farm level infrastructure/ but only distribution hub not having combined the processing facility either at farm level infrastructure or distribution hub along with reefer/ insulated vans – **15 marks** Proposals not creating farm level infrastructure but only distribution hub plus processing along with reefer/ insulated vans – **10 marks** For frozen RTC/ RTE subsegment of "plant-based alternatives" / animal grade alternative feed / alternative proteins/ cellular meats/ fermentation innovative chemistry to be modified to avail financial assistance under this scheme	
		Page number 28/45 - Proposals with investment in reefer transport with capacity not less than 15 MT – **05 marks**	
		Page number 28/45- Proposed Investment in Farm Level Infrastructure [Excluding Cost of Project Land] **To be waived off for frozen RTC/ RTE subsegment** of "plant-based alternatives" / animal grade alternative feed / alternative proteins/ cellular meats/ fermentation innovative chemistry	
MoFPI	Operation GREENS/ TOP to TOTAL scheme	Under this scheme ; As per the Budget 2021-22 announcement, Operation Greens scheme has been expanded to cover 22 perishables, including shrimp. Now requested to MoFPI to include all raw materials of alternative proteins segment like all pulses; all beans; jackfruit; pongamia; mushrooms; plant fungi and to be expanded further to include all exhaustive raw materials **And in Eligible entities** to also include startups / foodtechs into "plant-based alternatives" / animal grade alternative feed / alternative proteins/ cellular meats/ fermentation innovative chemistry	https://pib.gov.in/FactsheetDetails.aspx?Id=148583 and https://www.mofpi.gov.in/sites/default/files/20201222164534.pdf
MoFPI	PLISFPI (Food Processing)	Segment II – Innovative/ Organic products of SMEs- is requested to be modified to also include also include **startups / foodtechs** into plant-based alternatives" / animal grade alternative feed / alternative proteins/ cellular meats/ fermentation innovative chemistry	https://www.mofpi.gov.in/PLISFPI/central-sector-scheme-production-linked-incentive-scheme-food-processing-industry-plisfpi

MoFPI	MoFPI	A workshop involving **Invest India/ Startup India/ RBI / NSIC/ FSSAI/ SIDBI/ Udyami Portal/ CGTMSE /TReDS/ NABARD** (NABSAMRAKSHAN for FPO/FPC) to hear out the net worth criteria/ difficulties in startups in raising term loan from financial institutions so that some credit guarantee schemes can be quickly put in place which will help startups to avail term loans and working capital from financial institutions Also to involve the SPOC of Agri Infrastructure Financing (AIF) scheme under **Department of Agriculture and Farmer Welfare (DAFW)** where startups are eligible for Interest subvention of 3% p.a., limited to term loan component of upto ₹ 2 crore per project in one location, though loan amount can be higher.	https://portal.udyamimitra.in/Login https://udyamregistration.gov.in/Government-India/Ministry-MSME-registration.htm https://www.cgtmse.in/ https://www.nsic.co.in/schemes/Credit-Facilitation-Through-Bank.aspx https://www.startupindia.gov.in/content/sih/en/registration.html Trade Receivables Discounting System (**TReDS**) https://agriinfra.dac.gov.in/Home/EligibleProjects and https://agriinfra.dac.gov.in/Home/WhoCanApply
	APEDA FAS (Financial Assistance Scheme)	APEDA is requested to modify FAS guidelines for startups / foodtechs into "plant-based alternatives" / animal grade alternative feed / alternative proteins/ cellular meats/ fermentation innovative chemistry for greenfield processing units to include manufacturing processes like processes like high moisture extrusion (HME) technology; texturization; heat extraction technology and other technology used for plant proteins products manufacturing Also greenfield projects of alternative proteins must be considered apart from or addressing missing gaps	https://apeda.gov.in/apedawebsite/Announcements/FAS_Guidelines_05102021.pdf?v=1

Appendix B: Plant-Based Food Companies in India

1. **Adisoy Foods**
   Adisoy Foods was established in 2003 in the form of a small manufacturing unit of Soya Milk & Tofu in Sangrur, Punjab. Founder Varinder Singh Bhatti tdreams of building an empire to manufacture soya products. It is based in Ludhiana, near Delhi.

2. **ADM**
   Situated in Mumbai, Maharashtra and led by CEO Azmat Sikand, ADM's mission is to unleash the power of nature in order to improve people's quality of life. Their prime products include pea protein, wheat protein, textured vegetable protein and soy protein. Their breadth, depth, insights, facilities, and logistical experience provide unrivaled capabilities to fulfill food, beverage, health and wellness, and other needs.

3. **Agrocorp**
   Based in Mumbai, Agrocorp is a leading integrated agricultural commodity and food solutions company. With Mr. Iyengar VijayKumar Gopalan, founder and Managing Director, the company is driving change by combining data, experience and creative acquisition tactics.

4. **Agromatic Foods**
   Located in Bangalore, Agromatic Foods was founded by Vishal Baid Jain, Sunil Baid Jain & Ashutosh Mishra. It is a dynamic community-driven food company focusing on Indian and South Asian food philosophy. The company offers fresh varieties of authentic and value-added products for consumers, enhancing experiences through great taste and packaging utilities.

5. **Alt Foods**
   The Delhi based company offers the world's first grain and sprouted millets plant-based milk which can be used as a dairy alternative. Their milk is made of ingredients that have been a part of our traditional homemade recipes that date back hundreds of years. The company is led by Sweta Khandelwal and Aman Khandelwal.

6. **Altein Ingredients**
   The company was started by Tarak Badkas at Nagpur. Using natural plant-based sources, they invent functional protein components for an alternative protein food ecology. They produce novel plant protein concentrates from raw materials such as sprouted mung bean, all without the use of chemicals.

7. **Avlaan Pharma**
   Located in Chennai, Tamil Nadu, the company deals with specialty health supplements and food ingredients of plant origin. Anurag Lodha, the director of Avlaan Pharma, believes in creating plant-based ingredients for health supplements and food fortification.

8. **Axia**
   Co-founded by Jasmin Shaikh and Vasim Shaikh, Axis is headquartered in Pune, Maharashtra. The company produces plant-based cheese and butter from almonds, as well as plant-based yoghurt, smoothies, and protein bars.

9. **Azelis**
   Azelis was founded by Aparna Khurana at Mumbai, Maharashtra. They are industry pioneers in offering high-quality food ingredients, effective auxiliary materials, and a comprehensive range of additives to help food, health, and nutritional product makers achieve the taste, texture, performance, and appearance they desire. Their prime products are of pea, soy and whey origins.

10. **Bell Flavors & Fragrances Pvt. Ltd.**
    Pramathesh Shashikant Vora is the director of Bell Flavors & Fragrances, located in Chennai. They are a leading producer of flavors, fragrances, ingredients, and botanicals.

11. **Biotrack Foods Pvt Ltd.**
    Biotrack Foods was founded by Polachi Raja and Vasanthakumari Neela and is based in Chennai, Tamil Nadu. They utilize soya and medicinal mushrooms to create gourmet food products. Under the brand Vegeta Gold, they sell products such as soy burger, biryani, sausages, nuggets, filets and many more.

12. **Bevry**
    Bevry is a plant-based dairy company founded by Avinish Jain. The company is based in Gurgaon, Haryana and is focused on creating healthy and sustainable food products that do not have a detrimental influence on the environment. Their product comes in two flavours: cold coffee and vanilla milkshake.

13. **Blue Tribe Foods**
    Blue Tribe Foods is a Maharashtra-based company, founded by Sandeep Singh and Nikki Arora Singh. Thanks to their research and innovation, the company delivers meat from sustainable plant-based sources that are natural and tasty while also having a good influence on the environment and the earth, thanks to their research and innovation in food science. They make sausages, nuggets, keema, momos, and patties – chicken nuggets are their most popular product.

14. **BOHECO**
    Bombay Hemp Company (BOHECO), founded in 2013, by Avnish Pandya, Chirag Tekchandaney, Delzaad Deolaliwala, Jahan Peston Jamas, Sumit Shah, and Yash P Kotak, is a company seeking to reinvent the future of Indian agriculture and sustainable consumption through hemp.

15. **BVeg Foods**
    Akanksha and Pratik Ghai, co-founded BVeg in Delhi. The company focuses on providing people with sustainable and high-quality food at an accessible price while also helping to reduce pollution and promote a sustainable and healthy food ecology. They offer B2B options to numerous businesses by leveraging their alternative meat facility, the largest of its kind in India. They aim to be a “one-stop-shop solution” for all.

16. **Chetran’s Foods**
    Situated in Maharashtra, Chertran’s Foods was founded by Chetan Pal. They focus on plant-based dairy products using soy as their ingredient, including tofu (soya paneer), soya milk, soya spreads, soy curd, soya shrikhand, and more.

17. **Cowvathi**
    Cowvathi was founded by Shasvati Siva and is headquartered in Bombay. Cowvathi is a plant-based dairy company, and they produce an array of products, including plant-based cream cheese, block cheese, mozzarella, cheddar cheese, dips, and curds.

18. **Cure by Design**
    Headquartered in Bangalore, Cure by Design was founded by Daanish Matheen. Their company sells hemp products, including hemp protein.

19. **Dakini Health Foods**
    Dakini Health Foods is based in Maharashtra. They sell plant-based dairy products including peanut butter, white tahini paste, sesame butter, and fresh soy goods like tofu and tempeh soy.

20. **Demolish Foods (Formerly Brew51)**
    Founded by Ravali Amba, Demolish Foods is located in Bangalore, Karnataka. The company uses proprietary technology to develop plant-based alternatives to whole-cut meats, intended to be at the center of dinner plates. Currently, the company is focused on producing whole-cut, plant-based chicken products.

21. **Devigere Biosolutions**
    Founded by Smitha Devigere and Abhishek Devigere, Devigere Biosolutions is India's first B2B plant-based ingredients company that produces protein concentrates which are functional, unique, and clean labeled. Their proteins are water soluble and provide excellent functioning and nourishment. They manufacture egg substitutes, dairy alternatives, and plant-based protein isolates, including mung bean protein isolates, and black pea protein isolates.

22. **Dhatus Organic**
    Hemanth Kumar is Dhatus Organic's CEO, and the company is located in Mysore, India. They sell coconut ghee, nut and seed butters, and other goods that are free of preservatives and additives. Their nut and seed butters are stone ground and produced with only one ingredient.

23. **DuPont India**
    Edward Breen is the Executive Chairman and CEO of DuPont India. They offer many plant-based products which include meat alternatives, soy protein, nutritional bars, cereals, and pea proteins.

24. **Emkay Food Products**
    Emkay Food Products was founded by Mukund Parmar and is based in Ahmedabad, Gujarat. The company started as a flexible packaging industry and has expanded to food products as well. They offer a number of plant-based options, including plant-based ghee, sugar- and dairy-free tea, coffee, milk and milk powder.

25. **EVO foods**
    Based out of Mumbai, Shraddha Saurabh Bhansali and Kartik Rajendra Dixit are the co-founders of the company. EVO Foods launched India's first liquid enriched egg made from plants. They're developing a new generation of plant-based alternatives to animal products utilising cutting-edge science and technology. They are also backed by a handful of international investors and mentors of the alternative protein industry.

26. **Evolved Foods**
    Roma Roy Chowdhury and Pradeep Rao are the co-founders of Evolved Foods. The company is situated in Bangalore, Karnataka. The new age plant-based cuisine startup is aiming to provide delicious, healthier, and more sustainable meat and paneer substitutes.

27. Fitjars

Shiva Kumar founded Fitjars, based in Hyderabad. The company is award-winning and specializes in nut butters, holistic foods, and plant-based nutrition. Some of their products include almond butter, pumpkin seeds butter, brazil nut butter, nut seeds butter, and many more combinations.

28. Fortune Foods

Fortune Foods is situated in the Maharashtra city of Nasik and was founded by Naresh Gupta. The company aims to be a leading agribusiness company committed to delivering safe, nutritious, and high-quality agricultural commodities and food to all of our stakeholders through innovation, the highest standards of environmental, social, and governance practices, and the creation of livelihoods in the communities where they operate. In addition to oil and rice products, they offer soya and pulses products.

29. Functional Foods

Based in Alindra, Gujarat, Functional Foods was founded by Reddy Alla. The company uses quinoa as a main ingredient in their products.

30. Go Vegan Soy Foods

Based in Gujarat, Go Vegan Soy Foods make tasty probiotic plant-based milks and milk products. Soya Paneer (Tofu), Soymilk, Soy Shrikhand, Soy Frozen Desserts (Ice Creams), and Soy Buttermilk are just a few of their hit products.

31. Green Protein

Founded by Madhvi Datwani, Parag Khimani, and Parigna Thorat in Mumbai make pea protein bars in a variety of flavours.

32. Greenest Foods

Founded by Gaurav Sharma, Greenest Foods is based in Delhi. Greenest Foods aspires to alter the way Indians consume protein and to contribute to the growth of Asia's plant-based food sector by developing the next generation of plant-based meals that improve the nutrition, taste, and environmental impact of our food.

33. Good Dot

Good Dot is a food technology start-up by Deepak Kumar Parihar, Abhinav Sinha, and Aakash Aryan Srivastava based in Udaipur, Rajasthan. Their products deliver protein and flavour of meat at a low cost, while also being a healthier and cruelty-free option.

34. Hangyo

This company is situated in Mangalore, Karnataka, in Gujarat and was founded by Mr. Dinesh Pai. They offer different plant-based ice creams capturing the imaginations of ice cream lovers.

35. Hello Tempayy

Siddharth Ramasubramanian started Hello Tempayy, based in Bangalore, Karnataka. The company produces tempeh made from only three ingredients: non-GMO soybeans, water, and a Rhizopus culture with no preservatives or additives.

36. Imagine Meats

Imagine Meats is headquartered in Mumbai, Maharashtra and was co-founded by Genelia Deshmukh and Ritehsh Deshmukh. They're on a quest to serve cruelty-free beef that's good for the environment and delicious. They offer kheema, patties, biriyani, and nuggets, among other things. The chicken nuggets are their most popular product.

37. India Hemp & Co

The India Hemp & Co was founded by Jayanti and Shalini Bhattacharya and is located in Bangalore, Karnataka. They use natural hemp in all their products, and leverage plant-based nutrition to create a healthier, greener, and more sustainable world. Their products include hemp powder and hemp pet foods.

38. Indian Hemp Company

Continuously researching and looking ahead for new ways to deliver wholesome, potent, and pure wellness goods to our community, Indian Hemp Company's hemp is farmed and shipped directly to consumers from the Himalayan foothills. Their crops grow in a natural and clean environment, free of harsh chemicals, compounds, or pesticides of any kind.

39. Jus' Amazin'

Jus' Amazin' was started by Jitin Munjal in Bengaluru, Karnataka. The company offers plant-based nut butters, almond milk, chutneys, pasta Sauce, dessert mixes, and more.

40. Katharos Foods

Founded by Jasmine Bharucha, Katharos Foods is headquartered in Mumbai, Maharashtra. Katharos Foods creates dairy-free, oil-free, preservative-free, sugar-free, soy-free, chemical-free, stabilizer-free, and emulsifier-free plant-based cheese and desserts. Katharos Foods arose from a desire for natural food that was free of chemicals and preservatives.

41. Letz Vez!

Letz Vez was founded by Vishal Baid Jain and is based in Bangalore. They sell plant-based kebabs, keemah, nuggets, sausages, samosas, and more.

42. Life Health Foods

Located in Mumbai, Maharashtra, Life Health Foods was founded by Rajeev Jain. The company sells plant-based milks, including those from soya, almonds, and cashews. Their "So Good Soy +" product is fortified with protein and nutrients.

43. Live Yum

Founded by Taanya Ravi and based in Bangalore, Live Yum was formed with the goal of making plant-based food more inexpensive, accessible, and enjoyable in India. The company sells plant-based cheese shreds in mozzarella and cheddar, ghee, cream cheese, and more.

44. Marine Hydrocolloids

Headquartered in Kerala and founded by Kurian Jose, Marine hydrocolloids is India's largest manufacturer and exporter of food grade Agar Agar, a plant-based gelatin derived from seaweed.

45. MilkinOats

MilkinOats is headquartered in Delhi and was founded by Ashna Goel. The company sells oat milks and oat milk chocolates.

46. Mister Veg

Located in Haryana's Faridabad, Mister Veg was founded by Rupinder Singh and Simarjeet Singh. The company sells plant-based fish and meat products in ready-to-cook and ready-to-eat style. Their products include plant-based mutton curry, butter chicken, tawa chicken, and pomfret fish.

47. Naka Foods

Founded by Kushal Aradhya R and headquartered in Mysore, Naka Foods makes spirulina nutritional bars.

48. Nutiva

Headquartered in Coimbatore, Tamil Nadu, Nutiva is an Indian nut butter producer that sells high-quality nut butters, nutri powders, and nut milks.

49. OGMO Foods

Founded by Sanjeeta KK and based in Chennai, OGMO is short for “Organic Move” and takes pride in resurrecting foregone ancient grains. One example of a unique offering is their OGMO Overnight Millets.

50. One Good (formerly Goodmylk)

Abhay Rangan founded One Good, headquartered in Bangalore. They produce a variety of plant-based milk, cheese, butter, dips, paneer, protein, and more.

51. Only Earth

Kunal Mutha is the founder and director of Only Earth, located in Delhi. The company produces plant-based oat, almond and coconut milks which are high in vitamins, proteins, and fibre.

52. OhVeg

OhVeg is based in Rajasthan's Jaipur and was founded by Mehul Mittal. The company makes plant-based meat.

53. Plantaway Foods

Plantaway Foods is headquartered in Mumbai and uses only plant-based products, packaged in and 100 percent recyclable material. The company dedicates one percent of their sales to planting trees.

54. Plant Made

Plant Made, founded by Prakarshi Pulkit, is located in New Delhi. The company uses a proprietary approach to extract proteins from indigenous grains and transform them into functional plant-based foods. The company developed the first plant-based egg in India.

55. Plant Power

Located in Mumbai, Plant Power was founded by Kajal Bhatia. The company produces plant-based protein isolates, snack bars, cookies, and more.

56. Plantveda

Sunny Gurnani and Vanita Gurnani co-founded Plantveda, headquartered in Vadodara, Gujarat. The company makes plant-based milk, creamer, an award-winning lassi, and more.

57. Plix

Based in Mumbai and founded by Rishubh Satiya, Plix makes a range of products intended for a healthy lifestyle – including plant-based protein, probiotics, and collagen supplements.

58. Protein Foods

Located in Pune, Maharashtra, Protein Foods was founded by Ashish Korde and Kevin Parekh. The company produces groundnut chikki, cashewnut chikki, peanut chikki, and more.

59. Pro Plant

Pro Plant was founded by three young professionals Debabrata Das, Pranjuli Garg and Sugriv Shyamlal Gupt and it is based in Sibsagar, Assam. Promeat is one of their brands which aims to produce tasty plant-based chicken options meanwhile, not compromising on the health aspects of the product as well. They use a blend of soy, pea and mung proteins to provide all the essential amino acids. The use of elephant foot yam, an indigenous ingredient, in its product makes it more meat-like fibrous and unique.

60. Raw Pressery

Founded in 2013 by Anuj Rakyan and now owned by Arjun Srivastava, Raw Pressery is headquartered in Mumbai. The company has four different flavours of dairy-free almond milk.

61. Roquette

Headquartered in Uttarakhand, Roquette is a leader in producing plant-based ingredients. The company extracts its protein from yellow pea, fava bean and wheat.

62. SAIN

Sheena and Tarun Jain co-founded SAIN Gurugram, Haryana. The company manufactures a range of almond milks, including those with cacao, cardamom, coffee, and vanilla.

63. Shaka Harry

Founded by Anoop Haridasan, Shaka Harry is based in Bangalore. The company produces plant-based foods, including mutton samosas, chicken and mutton keema, kebabs, patties, and nuggets.

64. Soft Spot

Anushi Patel founded Soft Spot in Mumbai. The company produces a range of plant-based cheeses.

65. Symega

Symega is based in Ernakulam and was founded by Santhosh Stephen. The company aspires to be India's first fully integrated and sustainable plant-based food company and currently produces plant based foods in filet and minced formats as well as premixes for kheer, kulfi and gulab.

66. Symrise

By combining proprietary technologies with the best of nature, Symrise provides integrated solutions for plant-based protein products across the entire spectrum of taste solutions, from maskers and optimizers to an entire range of chicken and meat flavours.

67. Tempe Wala

Tempe Wala is based in Bangalore and was founded by Vaibhav Krishnaswamy. The company produces tempeh strips and bites, soy milk, soy yogurt, and a vegan butter.

68. The Butternut Co.

Ankita Maniktala Kukreja and Sahil Kukreja co-founded The Butternut Co., situated in Mumbai. The company produces plant-based nut butters and snack foods.

69. The Happy Calf

Anushree Kamath founded The Happy Calf, located in Bangalore. The Happy Calf specialises on lactose-free, preservative-free, artisanal, plant-based, dairy-free, and probiotic items, including peanut coladas, plant-based buttermilk, and cashew parmesan sprinkles in a variety of flavours.

70. Unived

Headquartered in Mumbai, Amit Mehta founded Unived. Unived produces plant-based supplements, including protein powders, vitamins, and more.

71. Vegeta Gold

Vegeta Gold is based in the Tamil Nadu city of Chennai and was founded by Pollachi Raja and Vasantha Kumari Neella. The company makes healthy soya and medicinal mushroom-based gourmet food products, including plant-based soyato puffs, roast, chukka, filets, curry, cutlet, nugget, keema, and more.

72. Veggie Champ

Amit Bajaj is the founder of Veggie Champ, situated in New Delhi. Founded in 2008, Veggie Champ was producing “mock meat” before many others and now sell plant-based alternatives to salami, kebabs, sausages, fish, meat, hotdogs, and finger snacks, among other things.

73. Veggie Way

Veggie Way opened its doors in Bangalore in 2010. The company produces tofu, plant-based meat, sauces, noodles, momos, and more.

74. Vezlay

Laxman Dass and Amit Bajaj are the directors of Vezlay, located in New Delhi. Vezlay offers ready-to-eat soya products, including soya shawarma, chop, nuggets, kababs, and many more. They are one of India's largest suppliers of soya products.

75. Wakao Foods

Founded by Sairaj Dhond, Wakao Foods is headquartered in Panaji, Goa. Using jackfruit as their major ingredient, the company sells BBQ jack, teriyaki jack, butter jack, raw jack, and burger patties, among other things.

76. WhiteCub

Headquartered in Haryana, Gurgaon, WhiteCub was founded by Sonal. The company sells 20 different flavours of plant-based ice cream, as well as plant-based butter, curd, beverages, and nut spread.

Appendix C: Overview of Key Plant-Based Food Ingredients

Soy
Soybean is one of the more important and prominent agricultural commodities because of its high protein content, about 35-40 percent. Traditional foods made from soybean have been consumed throughout East Asia for more than two thousand years. Soy's high protein level and well-balanced amino-acid composition makes it a vital source of plant protein and a top ingredient for plant-based meats and dairy.

The range of soy products include soy flour, soy protein concentrate, soy protein isolate, texturized and hydrolysed soy proteins. Soy protein concentrate is made from defatted soy flakes after removing most of the soluble cell wall materials and has greater than 65 percent protein. Soy protein isolate, produced by alkali extraction and isoelectric precipitation, is the most refined form of soy protein with a protein content higher than 90 percent. Textured soy protein is produced by extrusion to resemble the texture of meat chunks. Soy flour, soy protein concentrate, soy protein isolates and their texturized products are mainly used as ingredients in formulated foods for their functional properties, such as water and fat binding, emulsification, foaming and gelation. Soy protein is also used as a protein source in infant formulae. Tofu, a traditional soy-protein food product originating in Asia, is a protein curd made by precipitating the protein from soy milk and is used as a paneer replacement.

Wheat
Wheat is eaten in various processed forms by billions of people around the world and is an important contributor to meeting individuals' calorie and protein needs. The primary proteins in wheat grains are the gluten proteins, which has a unique physical functional property that no other plant proteins have – gluten forms a cohesive, viscoelastic proteinaceous network that provides the unique ability of wheat to produce leavened products. Commercial gluten (vital wheat gluten) with a protein content as high as 75-80 percent is made by the simple physical separation of wheat flour. Apart from binding and dough forming capacity, wheat gluten has additional desired functionality including advantageous viscosity, swelling, and nutritional characteristics. Its functionality enables it to be used both as a binder and a structuring agent. The use of gluten in extrusion or shear cell can transform raw materials into fibrous structures, providing a base for both whole-cut and minced meat-types of analogues.

A variety of modified gluten (e.g., isolated wheat protein) is also produced commercially by further chemical or enzymatic treatments of vital wheat gluten to obtain modified gluten with enhanced functionality and increase its protein content. Traditionally, gluten is used in baked products, pasta, noodles, and breakfast cereals and can be used to fortify flours and improve their overall protein content. A major use of gluten in non-bakery foods is a wide range of plant-based foods. Texturized wheat protein, produced via extrusion, is used increasingly as in plant-based foods to replicate the look and texture of meat products.

Due to its correlations with celiac diseases, some companies and innovators are searching for ways to replace wheat with alternative ingredients which offer the same nutritional and processing characteristics.

Pea
Pea has also been used extensively as a plant protein and interest in expanding its usage in plant-based foods continues to grow. One of the reasons why pea is more commonly used instead of other pulses for commercial fraction of proteins is that it can be grown extensively all over the world and the hull is easily and efficiently removed. Peas contain high levels of protein and carbohydrates, relatively high concentrations of insoluble dietary fibre, and low concentrations of fat.

Three forms of pea protein ingredients are produced commercially: pea flour, pea protein concentrate, and pea protein isolate. Pea flour is produced by dry milling of dehulled peas. Pea protein concentrate is produced by dry separation methods. Pea protein isolate is produced by wet processing using either alkali

or acid solubilisation, followed by isoelectric precipitation or an ultrafiltration process which produces a protein fraction with a much higher protein content of 85-95 percent.

Pea proteins have found applications in a range of food products such as cereal and bakery products, nutritional snack bars, pasta, meal replacement beverages, baby food formulations, and plant-based meat and seafood products. The increasing popularity of using pea proteins is largely due to its advantageous fat- and water-binding capabilities, emulsification properties, gelation, texture, and nutritional qualities. The ability of pea ingredients to bind water and fat, and to generate a firm texture after thermal processing, allows them to act as binders, fillers, and functional improvers in formulation of plant-based foods. Pea protein concentrate may be used as an ingredient for producing plant-based non-fat dry milk replacement for the bakery industry and in deserts.

Chickpea

Chickpea is one of the most important pulse crops consumed in the Indian subcontinent. It contains a similar amount of protein compared with peas, and both the protein and the starch component of chickpea flours have been regarded as very valuable due to their versatile functionalities. There is increasing interest in utilizing chickpea flour and chickpea isolates as a key ingredient in plant-based foods. Like other flours derived from pulses, chickpea flour is advantageous due to its superior technological functionality and minimal effects on flavour.

Millets

Millets are nutritionally similar or superior to major cereal grains. The benefits of the millets include gluten-free proteins, high fibre content, low glycaemic index, and richness in bioactive compounds. Millet proteins are also rich sources of essential amino acids – including methionine – phytochemicals, and micronutrients. The nutritional quality and drought-resistant properties of millets have made them a focus of research agencies around the world and there is increased interest in improving millet varieties to enhance their utility in processed food products.

Hemp Seed

Hemp seed is an undervalued co-product resulting from the cultivation of industrial hemp. Hemp seed has significant protein content, a strong amino acid profile, and high digestibility. Scientific evidence has highlighted that hemp protein hydrolysates possess a wide range of health biological activities, such as antioxidant properties, metal chelation, antihypertensive, and hypoglycaemic properties. Hemp proteins also have techno-functional properties such as gelling, emulsifying, and foaming properties that are well-suited for plant-based foods. Different treatments of hemp proteins can improve their functional properties, such as enzymatic and chemical modifications or pH- and heat-induced denaturation. One such example is hemp milk, an emerging beverage with high nutritional value and low allergenicity.

Potato

Potato is a versatile, carbohydrate-rich food widely consumed worldwide in a variety of ways. Potato is not typically considered to be a good dietary protein source due to its low overall protein content which is around 1-1.5 percent of tuber fresh weight. However, potato is also widely used for industrial starch production. The process generates an aqueous by-product, potato fruit juice which contains most of the tuber soluble protein. Potato protein has a relatively high nutritional quality and, therefore, has good potential for utilisation in foods. Potato protein ingredients are commercially available and can be used in a wide range of plant-based foods, across plant-based meats, dairy, and bakery categories.

Sunflower
Sunflower seed is the third largest source of edible oil (after soybean and rapeseed) in the world and is high in protein content, with the dehulled seed consisting of about 20-40 percent crude protein. One of the by-products of the sunflower oil extraction process is sunflower meal, which also has a high protein content. Although the high protein content of the sunflower meal makes it an attractive source of proteins, the suitability of the proteins for food applications depends on the oil extraction method.

Canola/Rapeseed
Canola/rapeseed is the second leading oil seed, after soybean, in the world and has a protein content lower, in the range of 17-26 percent. With increasing production of canola oil worldwide, the quantity of canola meal – a by-product of oil extraction – is also increasing. The use of more sophisticated protein extraction and fractionation processes, such as ultrafiltration and membrane separation, can produce protein isolates with protein contents above 80 percent with most of the undesirable chemical compounds removed. One of the attractive characteristics of the canola protein is its well-balanced amino acid composition that can be used to complement cereals that tend to be low in lysine and to improve the nutritional quality of baked products. Canola protein isolates can be used in plant-based beverages, meats, baked foods, protein bars, dressings, and sauces.

Quinoa
Quinoa has gained significant popularity as a sustainable protein source. At neutral pH, quinoa isolate has moderate solubility, but its water absorption, emulsifying, and foaming capabilities are like that of soy protein. It has good gelation capabilities, as well as fibre-like connections in the gel network. While quinoa is widely consumed in unprocessed form, there is increasing interest in utilizing it more widely in plant-based foods.

Mung Beans
Mung beans have been an emergent ingredient in plant-based foods, particularly eggs. It has a high protein content with advantageous foaming capacity, gelation, and water and oil absorption capacities. The physical features of the textured mung bean are close to the commercially textured soy protein.

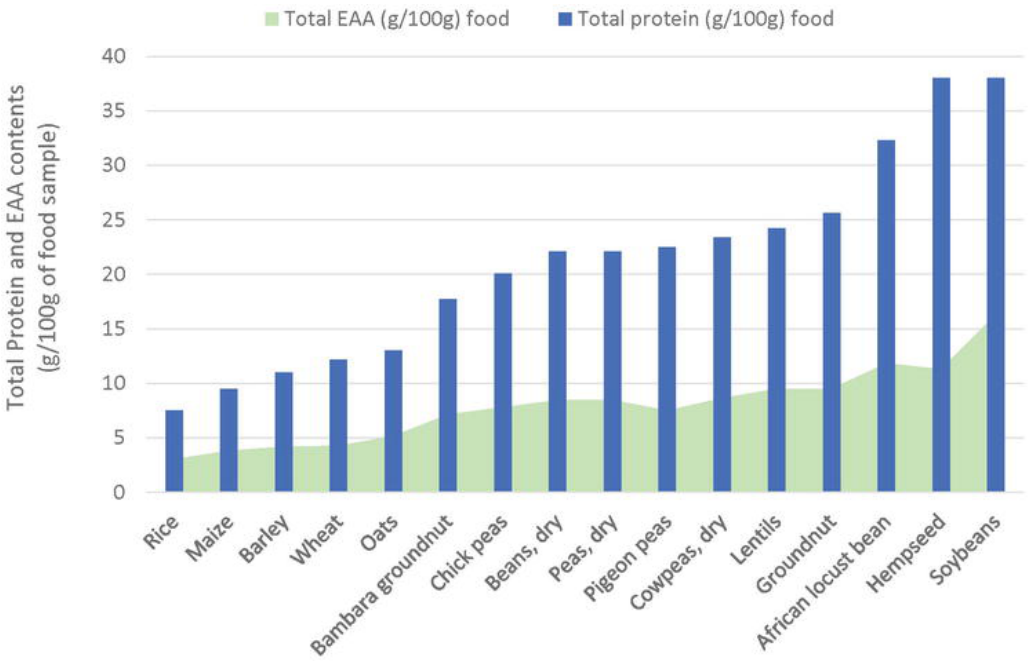
Oat
Oats are a source of quality protein, complemented by a good amino acid balance. Oats' health benefits are linked to dietary fibers like β-glucan, functional protein, lipid and carbohydrate components, as well as the phytochemicals found in the grain, making it the emergent raw materials for plant-based milk.

Mushrooms
Mushrooms are increasingly being used as sustainable plant-based meat ingredients and substitutes.

Jackfruit
Jackfruit is an indigenous fleshy fruit with a texture and taste that is advantageous for creating plant-based meats. It can be produced with minimal processing and is being used in both processed foods and restaurant settings.

The figures below summarize the protein and amino-acid content of plant proteins per the Food and Agriculture Organization of the United Nations.

Dietary Protein and Equivalent Essential Amino Acids (EAA) of Cereals and Legume Sources



Credit: Food and Agriculture Organization of the United Nations

Protein Quality of Protein Sources

Protein type	% Protein digestibility	% Biological value	% Net protein utilization	% PDCAAS
Soy flour	80	N/A	N/A	93
Soy protein isolate	98	74	61	100
Yellow split pea	88	N/A	N/A	64
Pea protein concentrate	99	65	N/A	89
Chickpea	89	N/A	N/A	74
Wheat	91	56–68	53–65	51
Wheat gluten	85–95	64	67	25

Credit: Food and Agriculture Organization of the United Nations

The Plant Based Foods Industry Association (PBFIA) is a CEO-led body that will drive the plant-based industry forward in India. With sustainability and health as the key driving forces behind the activities of the association, the foremost aim of PBFIA is to make plant-based foods mainstream while providing new avenues for economic growth.

PBFIA will support the growth of a robust ecosystem for the plant-based food industry in India through strategic collaborations, by creation of networks between stakeholders, by facilitating research to enhance the capabilities of the sector, by pushing for positive policy-making and by dissemination of key trends and information in the interest of its members.

The core tenets of PBFIA are:

- As an association of plant-based companies, PBFIA will mobilise the plant-based foods industry to create a healthy and sustainable future for all stakeholders mainly – consumers, farmers, food handlers and investors.

- Together with its members, PBFIA applies its revered thought leadership and effective advocacy to generate constructive, technological, social and supply chain business solutions for the plant-based foods industry.

- PBFIA will be a respected thought leader and advocate for a plant-based future for the food industry.

- PBFIA will partake in policy development to influence key decisions and create a favourable environment for the plant-based industry.

- PBFIA will work towards bringing mentorship and investment opportunities for its member organisations.

- PBFIA will facilitate and support research and technical development unique to their requirement, with a view to expedite setting up and organising of plant-based food start-ups, sustainable businesses, enhancing capabilities and building capacity of the industry.

- PBFIA will develop case studies and measure the impact of the plant-based industry on the environment, health of the people, its effect on land and other natural resources and sustainable development

Plant Based Foods Industry Association
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Plant Based Foods Industry Association

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PLANT BASED FOODS ASSOCIATION

Founded in 2016, the Plant Based Foods Association is the first and only trade association in the United States representing over 350 of the nation's leading plant-based food companies.