



# THE RISE & PROGRESS OF PROTEIN

Farrelly & Mitchell Report

**FARRELLY  
& MITCHELL**

Food & Agri-Business Specialists



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**Malachy Mitchell**  
Managing Director

I am pleased to introduce this Farrelly & Mitchell report focusing on the global protein sector.

Our specialist research team, based at our Dublin headquarters and Middle East and Africa office, has been compiling data over several years and has developed a deep understanding of the market, which has formed the basis for this report.

Globally, the protein sector faces many changes impacted by socio-economic developments, resource efficiency and consumer nutrition and health. This important sector also offers several very attractive opportunities for growth. However, both existing players and new market entrants are presented with a complex and ever evolving market landscape.

As international food and agribusiness specialists, we believe that understanding global issues and how they impact local markets is essential to delivering real value to our clients.

We predict a range of challenges and opportunities for the protein industry. In particular, continued industry consolidation and backwards vertical integration are key emerging trends, which are predominantly driven by the rise of emerging markets and health and wellness trends, particularly prevalent in developed markets.

I would like to thank various contributors who have helped to put this report together and hope you find it provides useful and valuable insights.

We welcome your feedback.





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If you would like to discuss any of the ideas or analysis in this report or how they can be implemented, please contact us.





## Executive Summary

**We forecast the continued growth in demand for protein due to the rise of emerging markets from increasing population, urbanisation and affluence.**

The protein value chain is highly complex, involving multistage production systems with multiple types of actors in multiple locations. Figure 1 illustrates some of these activities and actors in a simplified way.

This demand is also being driven by demand for health and wellness nutrition and growing acknowledgement of the role and importance of protein in our diets.

However, the industry is not without its challenges and companies must be vigilant to avoid market pitfalls. Developing opportunities include shifting protein sources up the value chain; use of plant-sourced substitutes and the use of novel sources for both animal and human nutrition.

Additionally, further progress is required in increasing the diversity of livestock resources, the introduction and implementation of sustainable agricultural policies and the enhancement of plant yield and quality along with better plant breeding.

Targeted interventions by both policy makers and agri-food operators, can lead to improved protein security across the world.

The creation of this protein secure future will require:

- Improvement in the nutritional quality of food crops
- Promotion of sustainable agricultural practices allied with a supportive policy environment
- Enhancing the efficiency of livestock and poultry production
- Sustainable agro-biodiversity to ensure sufficient production of food proteins at low costs
- The promotion and support of agricultural research to enhance nutritional quality
- Facilitating expansion of commercial and home fortification techniques to poorer regions
- Continuing to explore radical innovations in the production of animal proteins
- Support enhanced cooperation and collaboration among food manufacturers

These areas are further explored and expanded upon in our report.



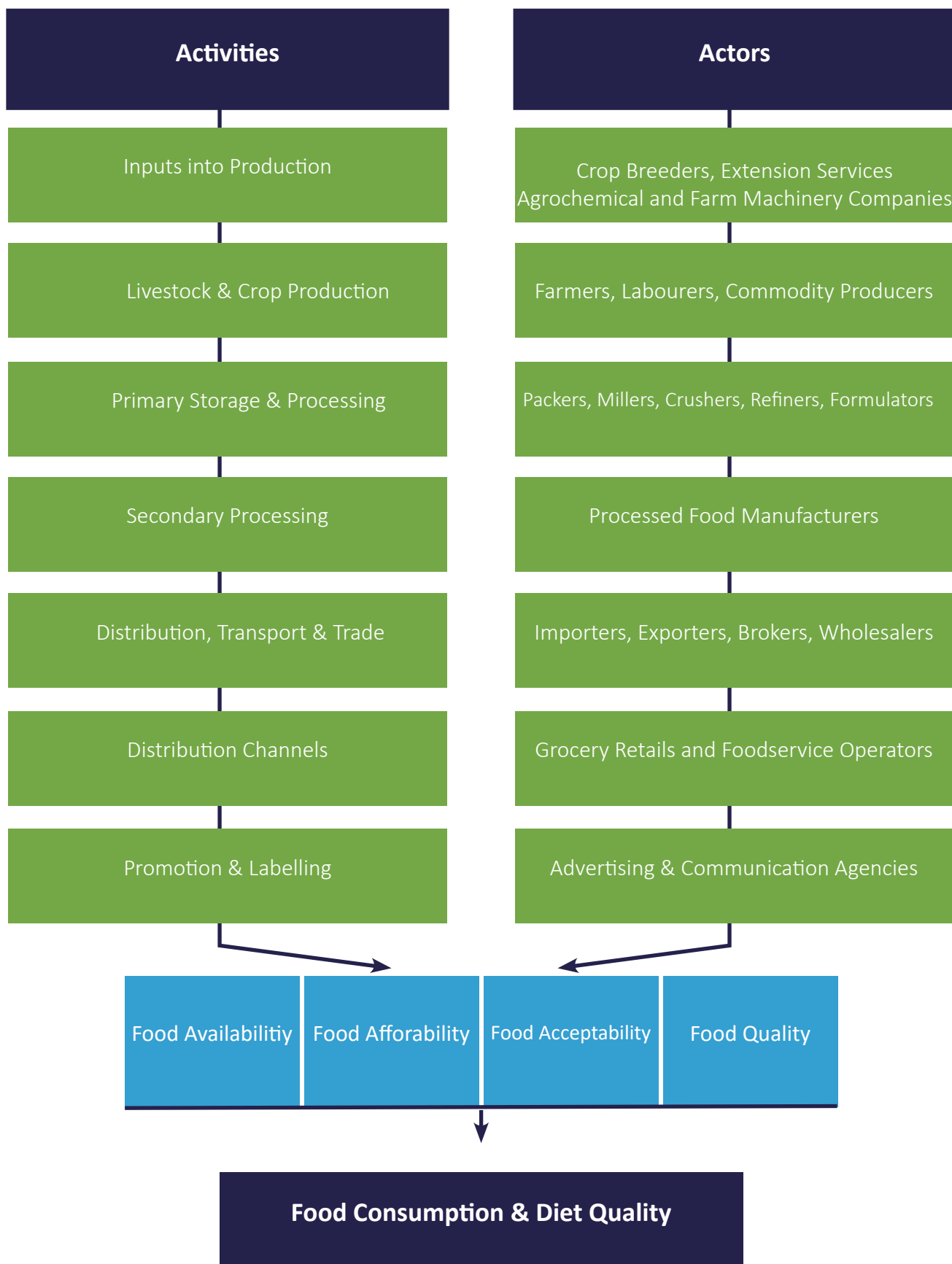


Figure 1 Simplified Protein Value Chain

Source: FAO (2011)



# 1. Introduction

Proteins are an essential part of human nutrition and biochemistry.

Demand for protein is undergoing a period of unprecedented growth. This demand is being driven by a number of factors, including:

- Population growth and economic development in emerging and developing economies;
- Growing awareness of the role of proteins in diets and, in particular, the role they can play in muscle building, weight management and in reducing risk of heart disease; and
- The drive from the food industry for increased functionality in the specialist ingredients used in food manufacturing.

Protein is a key macronutrient in the human diet. Proteins are found in all cells and tissues, each providing equally important, specialised roles necessary for the normal development and function of humans.

As well as providing for some of human’s energy needs, proteins are the building blocks of cell tissue and provide structure to cells, help build and repair tissue and facilitate muscle contraction and movement. Figure 2 gives an overview of the many functions of proteins.

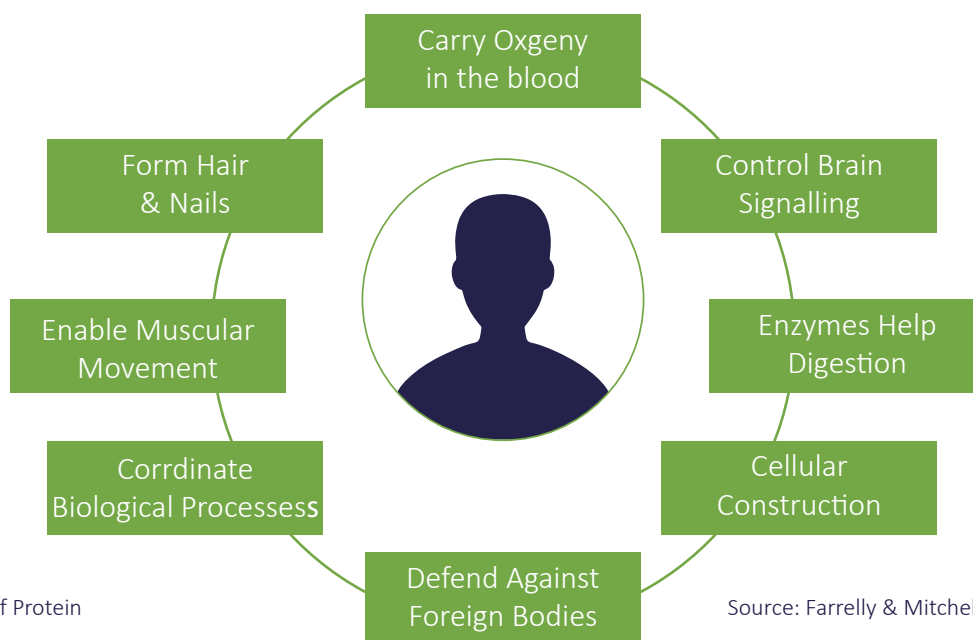


Figure 2 Functions of Protein

Source: Farrelly & Mitchell Research

Many of the hormones and enzymes that regulate bodily processes and chemical reactions are made up of protein. In addition, proteins are vital constituents of antibodies which provide defence against diseases.

Proteins are composed of amino acids and there are 20 standard amino acids required by the body to function. The body can make 11 of these itself. However, there are 9 amino acids, considered essential amino acids, which the body cannot synthesis itself in the quantities needed. Humans must acquire these essential amino acids through their diet.

Humans can consume protein through food products derived from animals and plants. However, the quality of protein available from these sources varies depending on the amino acid composition and digestibility i.e. does it provide all the essential amino acids in the required ratios and quantities.

Animals are generally considered the best source of protein, providing all essential amino acids in the right ratios that allow us to make full use of them. In contrast, most plant are incomplete sources of protein i.e. they do not contain one or more of the essential amino acids. However, incomplete sources of protein can be combined to attain sufficient quality protein.

The PDCAAS (Protein Digestibility Corrected Amino Acid Score) is a tool used to determine protein quality of various sources of protein; reflecting a protein’s digestibility as well as the proportions of amino acids that it provides. Figure 3 illustrates the PDACCS of selected foods. It can be seen that animal proteins rank higher than most plant proteins as quality sources of protein.

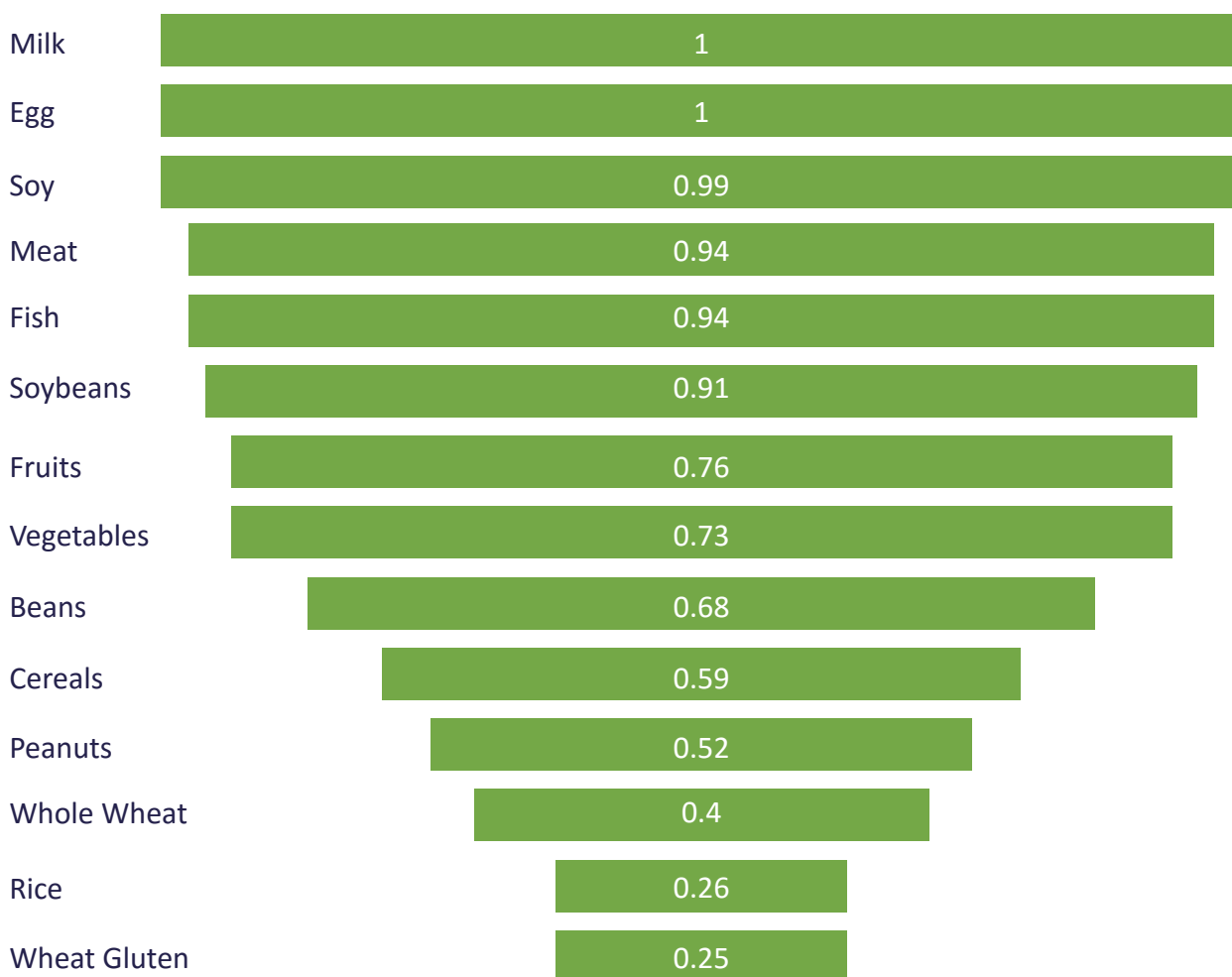


Figure 3 PDACCS of Selected Foods<sup>1</sup>

Source: Farrelly & Mitchell Research

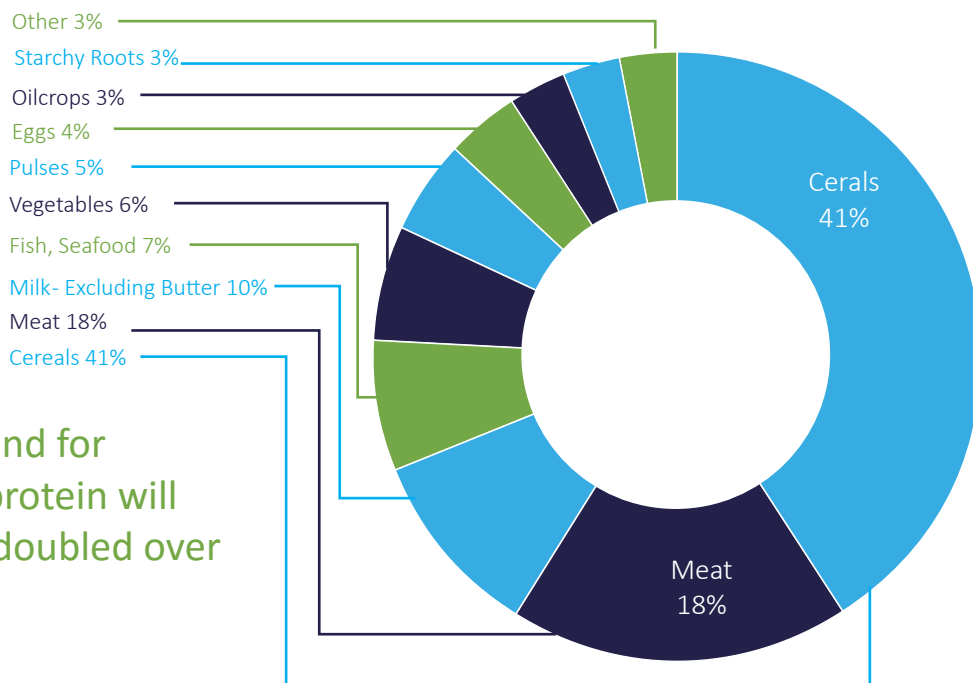
<sup>1</sup> Note that this figure is for illustrative purposes only. The FAO recently recommended the use of the Digestible Indispensable Amino Acid Score (DIAAS). The DIAAS is considered as a more accurate measure of protein quality than the PDACCS.



In contrast, when we look at protein availability globally (see figure 4) we see that cereals, a relatively low quality source of protein, are the main sources of available protein.

This imbalance in the availability of high quality protein manifests itself in approximately one billion people worldwide who have chronically inadequate protein intake or suffer from protein-energy malnutrition. This, allied with the fact that worldwide demand for animal-sourced protein is forecast to have doubled in the period 2000-2050, represents a significant opportunity and challenge for the agri-food industry to develop its capabilities and efficiently meet the global supply gap in high quality protein foods.

**Worldwide demand for animal-sourced protein will most likely have doubled over the period**



Source: Farrelly & Mitchell Research

Figure 4 Breakdown of Per Capita Supply of Protein by Food Category







## 2. The Challenge

The agri-food sector must respond to changing consumer demand within the limits of sustainability.

Population growth, rising incomes and an accelerating urbanisation rate continue to increase global demand for food. Economic development and changing lifestyles are also enabling a shift in food consumption patterns, with consumers consuming a more diverse range of foods as well as more protein and processed foods.

On the other hand, primary production is constrained by limited available agri-land resources and a primary sector fast approaching productivity ceilings in many of the main agricultural regions of the world. At the same time, the agri-food companies must confront the issue of sustainability, in both their own business practices and in their supply chains. These are all significant challenges that the sector must overcome.

In order to do so, the global food value chain requires innovative solutions to respond to the inefficiencies that emerge from its operations and to continue to meet the needs of the consumer.

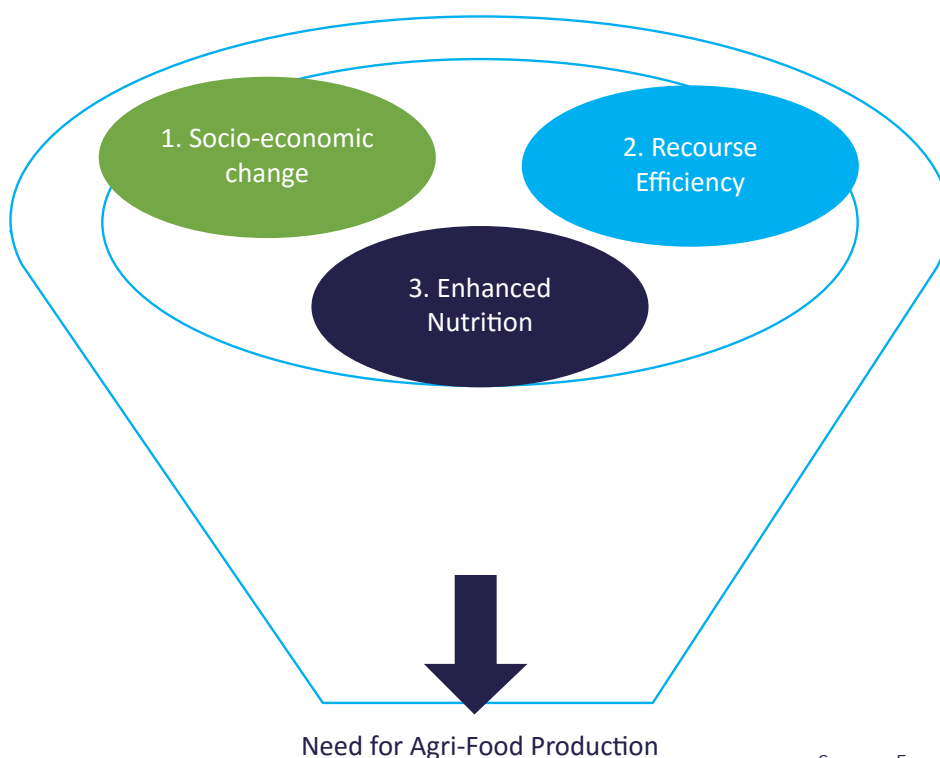


Figure 5 Key Themes

Source: Farrelly & Mitchell Research

Our research has identified three broad thematic areas that the agri-food sector must address in order to secure the protein supply chain. These thematic areas are shown in the diagram on the previous page and detailed below.

1. **Socio-economic Change:** The need to better manage the changing global socio-economic environment and its impact on the total demand.
2. **Resource Efficiency:** The need for new tools and processes that safely optimise resource efficiency in agri-food production. This includes the need to enhance yields and outputs and lower costs.
3. **Enhanced Nutrition and Health:** The rise of “health and wellness” and the need for enhanced nutritional and health benefits in food products. This drives up agri-food production costs, starting from the use of safer and cleaner seeds and livestock to produce more environmentally friendly crops.





## 2.1 Socio-Economic Change

Economic development leads to higher incomes which, in turn, lead to changes in consumer food preferences including the consumption of a greater variety of foods, more processed foods and higher protein diets.

As a region’s income increases, so does its taste for food rich in proteins such as meat (see figure 6). On the other hand, there is an inverse relationship between the share of total calories sourced from cereals and other staple foods and increases in per capita income – essentially, the ratio of starchy foods in the diet falls as income rises (see figure 7). Low income population tends to eat more starchy-foods such as grains and root crops, whereas higher income population consume more meats, fruits and vegetables.

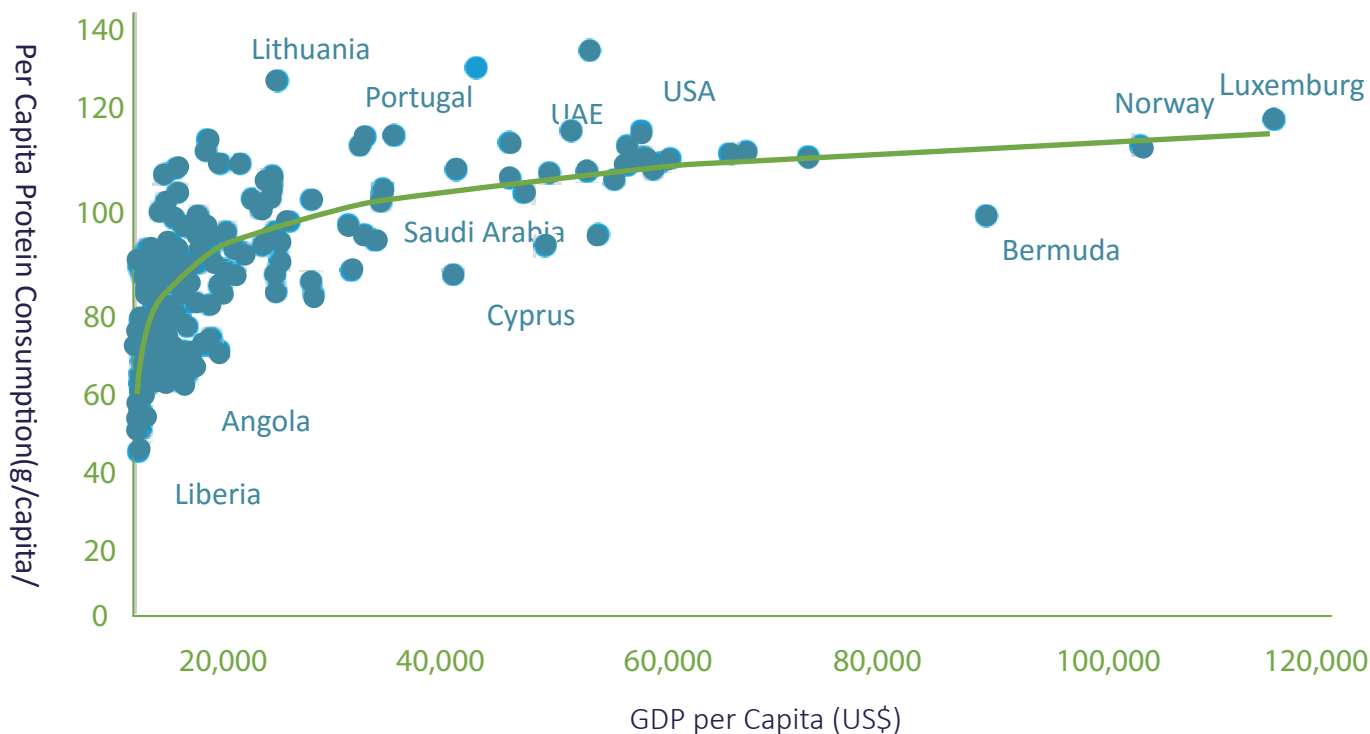


Figure 6 Correlation Between Protein Consumption and Per Capita Income

Source: Farrelly & Mitchell Research



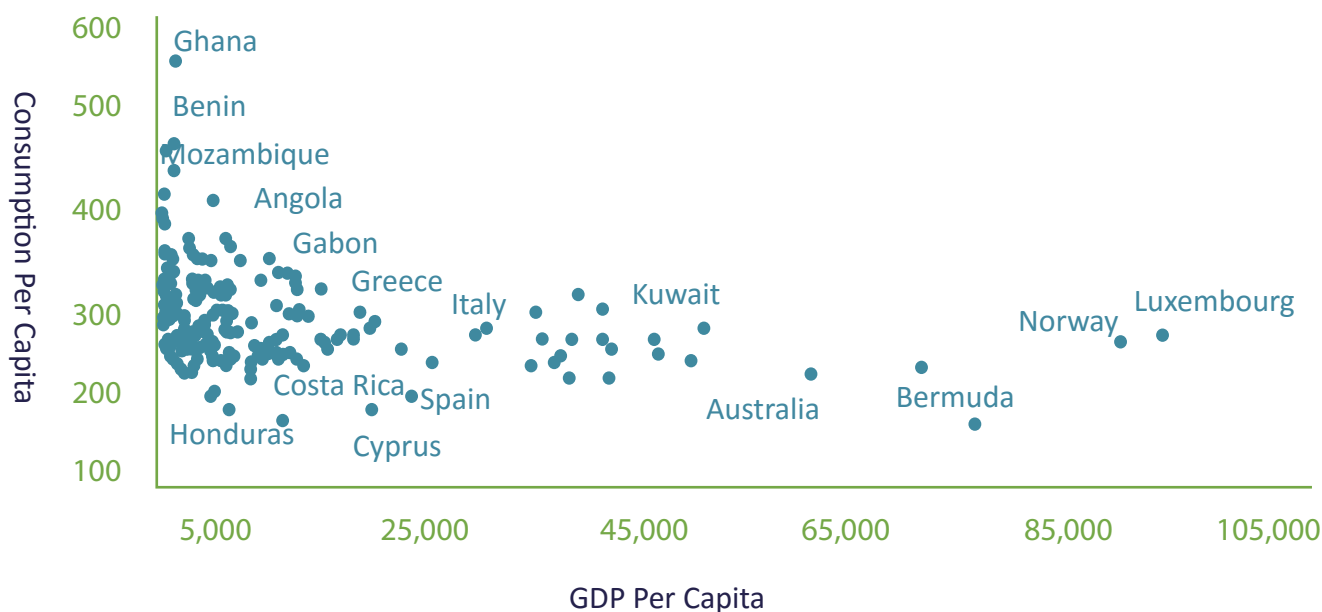


Figure 7 Correlation Between Consumption of Cereals & Starchy Food with Per Capita Income Source: Farrelly & Mitchell Research

As incomes grow in emerging and developing economies, there will be an increasing demand for richer, healthier foods with higher protein content. This is what has played out in the Asia-Pacific region over the last decade. The region consumes most of the meat it produces and became a net importer in the early 2000s. Meat consumption in the region has grown by an average of 3% over the period and this trend is expected to continue, as urbanisation increases and living standards improve. East and South Asia is expected to see the greatest rise in demand for value-added foods in the coming decade.

These trends represent significant opportunities for the agri-food sector. However, it is also important to note that average household food expenditure is growing faster than income. Its growth relative to income growth drives increased price sensitivity among buyers, leading to increased pressure on the ability of agri-food suppliers to pass on cost increases to their customers. Consequently, the increase in average household expenditure on food relative to average household income constrains consumer spending on value-added products.

“Increased price sensitivity among buyers will lead to increased pressure on the ability of agri-food suppliers to pass on cost increases onto their customers.”





## 2.2. Resource Efficiency in Protein Production


The benefits of livestock production over crop production include the higher protein content of meats, eggs and dairy products and the ability of livestock to convert protein sources that humans cannot or will not eat into “usable” protein sources. However, global production of animal protein is a resource intensive activity.

Land given over to pasture accounts for 69% of the world’s agricultural land, while land used for animal feed crop production accounts for a further 11%. Beef production is particularly land intensive, accounting for 60% of agricultural land but just 24% of world’s meat consumption. Given feed conversion ratios, the use of land to produce animal feed crops results in the loss of significant calories that could instead be fed directly to humans. The UN estimates that by converting land used for animal feed crop production to cropland for direct human consumption it would be possible to feed an additional 3.5 billion people.

In addition, livestock production has considerable negative environmental impacts and results in land degradation, green gas emissions, the destruction of ecosystems and the pollution and depletion of water resources.

These are major issues for policy makers, agri-food companies and increasingly informed and environmentally conscious consumers. The introduction of smart farming and food production systems have the potential to alleviate these issues over the coming years and ensure output continues to meet global demand. Our research shows that technological innovations can increase efficiency in protein production and we believe they will be essential in addressing the global protein gap, promoting stable increases in productivity and output and reducing systematic waste.

In order to avoid a global food supply crisis in the future with significant social, political and economic consequences, enabling technologies from other industries such as aerospace, defence and petrochemicals will be crucial to increasing and enhancing yield and production efficiency across the agri-food value chain.

 Our research shows that technological innovations to increase efficiency in protein production are essential to bridge the protein supply gap.





## 2.3. Global Health Trend

There is increasing demand for healthier, more nutritious food and food products that have proven health benefits. Driving this demand is the growing incidence of non-communicable diseases such as cardiovascular disease, diabetes, cancer, and osteoporosis. All of these diseases are more prevalent in the aging population of the economically affluent regions of the world- Europe, Japan, Australasia and the United States.

Consumers are increasingly demanding value-added food and beverage products that are free from negative externalities (e.g. environmentally damaging pollutants, allergens or over-utilisation of natural resources), that are highly nutritious, offer additional health benefits and are produced ethically. Green, safe, healthy and ethical are the four key buzzwords for this global trend (see figure 8).



Figure 8 Health & Wellness Value-Added Solutions in Agri-Food Production

Source: Farrelly & Mitchell Research





Meeting these consumer needs typically adds to the cost of production, which is compounded by the fact that producers generally cannot compromise on taste and texture. However, consumers searching for “health and wellness” food products are usually willing to pay a premium for value-added products, especially those that offer more than one solution- but at a decreasing rate as more products with these types of features become available.

In order to offset these additional costs, food manufacturers need to continue to invest in innovation and technology to address supply chain inefficiencies and bottlenecks, as these issues will only add to production costs and impact downstream pricing. Effective marketing and communication of the value-add solutions that the product provides is also essential.

Future food expenditure will be a function of the total food budget available to final consumers, general food production levels and the willingness to pay premium for “health and wellness” foods or food and beverage options that are free from undesired qualities in both the final product and the product’s production process.

Emerging and developing markets, especially those in the Asia-Pacific region, will see the greatest change in total food and beverage expenditure by 2030. The internet and social media have played an important role in transmission and acceleration of the health and wellness trend within developed markets and will continue to facilitate the diffusion or spread of this trend from developed markets to emerging and developing markets, especially among the growing middle and upper classes. A significant opportunity exists for food and beverage operators to grow the health and wellness category in these markets.





### 3. The Opportunity

A number of important changes will be required to meet future protein demand

Each of these changes present a significant opportunity for the global food and agribusiness sector. These opportunities include:

- Redirecting protein back upstream in the value chain;
- Greater use of plant based protein sources; and
- Increasing the use of novel protein sources.







### 3.1. Redirecting Protein Upstream

Globally, up to one third of the food produced for human consumption is either lost or wasted each year- see figure 9 below. This food waste is largely not being utilised in the system, representing the inefficient use of resources and creating a waste disposal problem.

Bringing this waste back into the value chain and using it as protein rich animal feed has many potential economic and environmental benefits. This is happening on a relatively small and ad hoc scale in some developed markets, but could be significantly increased throughout the world. Similarly, making offal and low grade meat and meat materials fit for human consumption is a huge opportunity for developing countries.

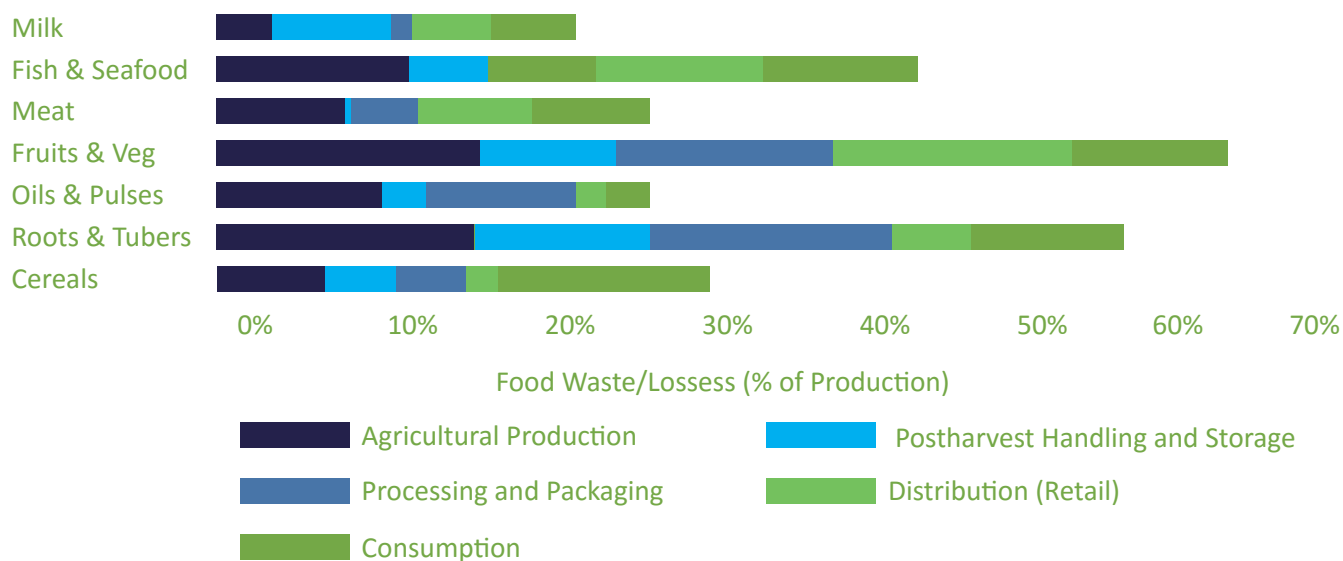


Figure 9 Estimated Food Waste Along the Supply Chain by Food Type (%)

Source: FAO and Farrelly & Mitchell Research

**“** Up to a third of food production is lost as waste, redirecting this waste back into the value chain, where possible, can have significant economic and environmental benefits.







## 3.2. Greater Use of Plant Based Protein Sources


Cutting-edge processes for separation and purification of specific protein components from plants and indeed other protein sources, allow for the wider use of existing plant-derived protein ingredients and the exploration of potential new sources of plant protein. Developing substitute protein sources that are not only nutritionally beneficial but also meet consumers' preferences in terms of taste and texture represents a huge opportunity for the protein industry.

Protein content in most plants is relatively low and devoid of one or more of the nutritionally indispensable essential amino acids. However, the right combinations of different plant-sourced proteins may create nutritionally adequate mixes, where different plant-sourced proteins provide different profiles of essential amino acids. For example, cereals and legumes are complementary for most essential amino acids (depending on the consumer's life cycle stage).

Soy protein, with its relatively high protein content, is an accessible and arguably the most important form of plant-based protein. It is used extensively in the production of meat substitutes and dairy-free milk, yogurt and cheese production.

When soybeans are processed to create protein ingredients, the starting material used by the food industry is in a form known as a defatted soy flake. The process of extracting soy protein from the soy flake is wasteful and yields less than 50% of the protein content from the original flake. Research aimed at increasing protein extraction yields, not only from soybeans but also for other plants, represent a potentially huge opportunity for the protein industry. Soy protein and protein derived from other plant sources can play an increasingly important role in securing the protein supply chain and meeting nutritional needs, especially in regions with limited infrastructure to produce animal protein.

Other plants with significant future potential as alternative protein sources in food manufacturing include peas, almonds, beans, quinoa, lentils, rice, flax, and hemp. These plants have a range of applications as meat and dairy substitutes, in processed foods such as soups, sauces, baked goods, snacks and in nutraceuticals and sports nutrition.

 The right combinations of different plantsourced proteins may create nutritionally adequate mixes, where different plant sourced proteins provide different types of essential amino acids.





### 3.3. Novel Proteins

Waste streams from food processing such as whey protein, by-products from the vegetable oil industries, potato protein or by-products or co-products of biofuels such as distillers' grains or jatropha are expected to offer more opportunities in terms of protein sources and supplies in the face of growing demand.

Proteins from insects are also a potential source for conventional production (mini-livestock) of protein, either for direct human consumption, or indirectly in recomposed foods (with extracted protein from insects) and as a protein source in animal feed.

One of the key selling points of insect derived proteins is that, compared to animal derived crude proteins, it takes significantly less feed and other inputs in order to produce insect crude protein with a similar nutritional content. Thus insect based feed products could become a major competitor to both animal based proteins like fish meal and rendered meals, and plant source crude proteins like soya. Moreover, insects can be reared quickly and easily on organic commercial and domestic waste, with processes that are easily scalable and provide an additional benefit of addressing by-product management.

Algae derived proteins, such as those derived from seaweed- which are currently used in the production of savoury snacks, bakery products, cheese analogues, cereals and condiments and sauces - can be used to mimic the taste and texture of animal products and therefore appeal to a broad base of consumers. This is an area with exciting development opportunities given additional nutritional benefits associated with algae and the potential to produce them using resource efficient closed production systems. The algae sector is attracting high rates of investment, however, the economic viability of large scale production remains a challenge.

Over the longer term, as this technology develops, opportunities will exist in synthetic or lab developed meat proteins. Synthetic or lab developed meat proteins has also been attracting investment e.g. Tyson Foods recently invested in a 5% stake in Beyond Meat, a start-up trying to make lab-grown beef burgers. In the longer term, as the technology behind it develops, exciting opportunities will emerge in this category.

**“ Crude insect proteins are nutritionally similar to animal derived proteins and take significantly less feed and other inputs to produce. ”**






## 4. Future Progress

Increasing the sustainability of the protein supply chain will require continuous incremental improvements to existing structures and operations and multi-sectoral collaboration to aid progress towards a protein secure future.

### Increasing Livestock Biodiversity:

The time is ripe to develop sustainable approaches aimed at enhancing the quality and the variety of foods consumed worldwide. Doing so will go some way towards meeting critical nutrient gaps with regards to protein. One area that needs to be explored further as regards sustainable protein production is the potential of increasing the diversity of animal protein sources.

Animal-derived proteins, mainly meat, milk and eggs, provide high-quality sources of essential nutrients for optimal protein, energy and micronutrient nutrition - especially iron, zinc, and vitamin B12. However, out of the approximately 50,000 known avian and mammalian species, only 40 have been domesticated<sup>2</sup>. Therefore, the world's current animal-sourced proteins are based on quite a narrow range of species. Other sources, such as insects, can make important contributions to dietary protein quantity and quality.

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### Agricultural Policies & Regulation:

Continuous advancements in agri-food innovation and the application of new technologies will require a supportive agricultural policy environment. Opportunities exist through investment in primary and value add agriculture and food production. These need to be supported by government investment in agricultural research and services, innovations in genomics and bio-fortification, and importantly, greater ease in information dissemination between stakeholders.

<sup>2</sup> Wu, et al., 2014. Production and supply of high-quality food protein for human consumption: sustainability, challenges, and innovations, *Annals of the New York Academy of Sciences*, Volume 1321, Reports Pages 1–19.



The identification and implementation of policies and programmes that can ensure that everyone in the world is able to access and afford sufficient dietary diversity, including access to iron and protein-rich foods, like milk, meat, and legumes, remains a challenge. Increasing protein and micronutrient production requires research and development of policies and practices that ensure these foods are affordable, available, healthy and actually consumed rather than wasted along the value chain.

Current agri-food practice is wasteful and inefficient with over 40% of arable land using 75% of fresh water, while producing up to 30% of GHG emissions, degrading land, depleting ground water, and leading to habitat destruction and loss of biodiversity. The industry needs to streamline food production by reducing the need for arable land and eliminating wasteful intermediary steps in cultivation, harvesting, storage, and transportation. Government policy must support rather than hinder this objective.



Figure 10 Agri-Food Interventions for Better Nutrition

Source FAO (2013)



There are multiple opportunities to improve the security of the protein value chain. The most effective approaches will aim specifically to promote the availability, accessibility and consumption of diverse, high quality proteins through actions all along the value chain, from production to consumption. Success needs to be based on a coordinated multi-sectoral approach that harnesses synergies from cross sectors.

Figure 10 outlines potential opportunities and policy tools to improve protein security within an enabling environment characterised by:

- Policy environment and development priorities
- Economic, social, cultural and physical environment
- Health, food safety, education, sanitation, and infrastructure
- Gender roles and environmental sustainability

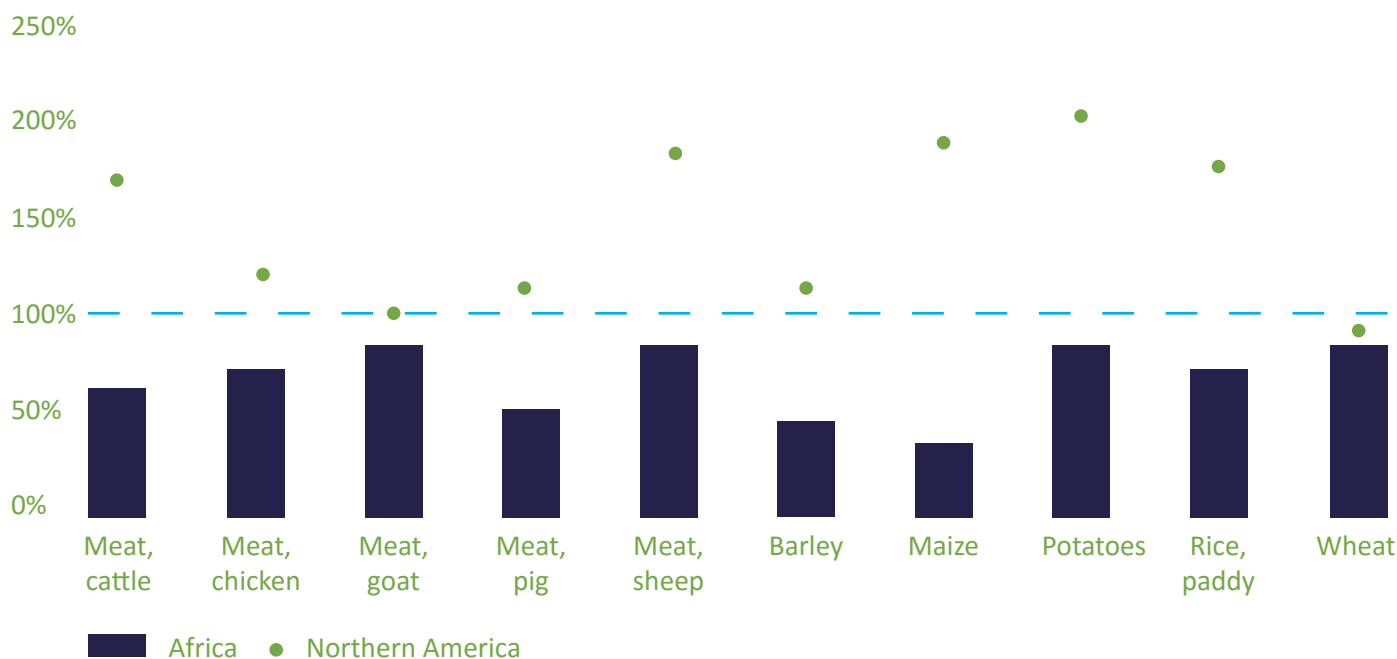
### Improving plant and animal breeding to enhance yields and protein quality:

Africa has an abundance of unexploited agricultural resources which can be developed to increase sustainability in the protein supply chain; Sub-Saharan Africa (SSA) alone accounts for almost a half of the world's uncultivated arable land; has a large, growing and underutilised agri-labour force and vast pools of untapped water resources.

The African agribusiness sector should be primed for take-off. However, the sector faces a number of challenges. The most significant of these revolve around systemisation and capital.

FAO data shows that the productivity levels of crop and animal protein production in Africa remains low- see figure 11. Interventions are needed to improve access to capital and quality seed varieties and animal breeding stock. Improvements are also required in animal husbandry and integrated crop management practices (such as crop rotation, distributing sacks for long-term non-wasteful storage). These changes along with implementing simple steps to promote seed exchanges and improve the local understanding and appreciation of nutritious crop types and animal husbandry techniques will significantly improve the output and consumption of protein-rich foods.





Source Farrelly & Mitchell Research / FAO

Figure 11 Average Yields in Primary Production – A Comparison of North America and Africa with Average Global Yields

### Agri-food Technologies:

The food value chain is on the verge of a second “green revolution”. Advancements in agri-food technology and big data have the potential to strengthen agri-food value chains by increasing productivity and reducing systematic waste. Key emerging technology areas include:

- Genomics and Related Technologies:** A range of technologies have been developed in the life science and molecular biology fields with significant potential in the livestock and crop production sectors. These include next-generation sequencing (NGS), whole-biome sequencing, gene editing and synthetic biology. These technologies will be used to improve breeding performance and increase productivity and quality at a lower cost to the environment.





- **Microbiota:** Advances in computer processing and NGS allow greater study of microbiota, enhancing our understanding of their role in the food chain and allowing for the better management of how they interact with their environments. Doing so will facilitate the development of new products and services for human nutrition and health and help improve the performance of the livestock and feed sectors.
- **Digital Technologies:** The large scale adoption of nanotechnologies, drones, micro-satellites and robotic systems connected via “the internet of things” has significant potential to increase productivity and reduce waste along the supply chain. Digital technologies will support the strengthening of management systems through enhanced access and use of data. In addition, they will enable the further automation of tasks such as milking, herd management, feeding, identification of oestrus, weed and plant disease management.
- **Food Processing Technologies:** The food industry will continue to benefit from advancements in technologies that perfect the fractionation, preservation and formulation of novel food products. In addition, technologies like 3D printing and robotics combined with smart data and nutrigenomics will facilitate the development of new value add products targeting the specific needs of individual consumers or consumer segments.

These technologies have the potential to transform business models and indeed entire value chains. However, the industry is only at the frontier of applying these advancements. The continued application of this technology in developed markets and its introduction in the less developed world will be largely influenced by consumer acceptance and government regulations and support.





## 5. Final Perspectives

**Human health depends on the consumption of dietary protein with adequate amounts and proper ratios of all amino acids.**

The high nutritional quality of animal protein and the fact that it is the sole source of some physiologically essential amino acids and dipeptides mean that continuation and extension of livestock and poultry production is a must. The importance of securing the protein supply chain has never been more pronounced. Increasingly, informed consumers want more protein in their diets, produced in a sustainable and ethical manner and that maximises health benefits.

At the same-time, demand for animal derived proteins is increasing due to population growth and economic development and urbanisation in the emerging and developing markets. This is and will continue to exert pressure on the protein supply chain.

At present, there is concern that the demand for animal-sourced proteins will not be met in the near future. Additionally, current animal production practises are at a low efficiency and environmentally unsustainable. So, what strategies can we suggest for the resolution of these problems.

- Both consumers and food manufacturers (in their food ingredients) need to select and combine plant-sourced proteins that have enhanced concentrations of essential amino acids.
- Targetted and improved communication of the availability and nutritional benefits of high quality plant and animal proteins.
- Bio-fortification is the application of plant breeding and agronomic practices to increase the concentrations of essential nutrients in staple food crops. Primary producers need to bio-fortify staple food crops with vitamins and minerals.
- Commercial food fortification is the addition of vitamins and minerals to foods during processing. Fortification of milk with vitamin D began in the 1930s, and iron, thiamine, riboflavin, and niacin were added to cereal flours in the 1940s. Fortification has been a successful strategy for reducing micronutrient malnutrition in developed countries, but only recently has it been implemented in many developing countries. Likewise, addition of one or more limiting or functional amino acids (e.g., lysine, arginine, glycine, and taurine) to food can improve human health and growth.





## 6. Key Conclusions & Recommendations

While the global protein industry is expected to grow, there are underlying challenges for companies looking to profit.

Our analysis tells us that innovation is key and the companies who will succeed in this market will be the ones that are in tune with technological innovations and have incorporated consumer insights into their products.

The creation of a protein secure future will require:

- Making the improvement of the nutritional quality of food crops a definitive goal for plant breeding programmes across the globe. The focus should be on those nutrients that are limited in the diets of people in areas with poor resources. These nutrients include nutritionally essential amino acids, especially lysine and the sulphur amino acids, iron, zinc, and B-carotene, a precursor of vitamin A.
- The promotion of sustainable agricultural practices allied with a supportive policy environment.
- Enhancing the efficiency of livestock and poultry production through mechanism-based means, such as optimising the proportion and amounts of both nutritionally essential and nonessential amino acids in diets, to stimulate protein synthesis and inhibit protein degradation in tissues.
- Sustainable agro-biodiversity to ensure sufficient production of food proteins at low cost, particularly for smallholder farmers.
- The promotion and support of agricultural research that will help to develop food crops with enhanced nutritional quality. Approaches should include both conventional plant breeding and genetic engineering.
- Facilitating the expansion of commercial and home fortification techniques to regions where protein and micronutrient malnutrition is common.
- Continuing to explore radical innovations in the production of animal proteins, such as insect protein and synthetic meat production.
- Support enhanced cooperation and collaboration among manufacturers aiming to produce new products and differentiate their offering.







# About us

Farrelly & Mitchell empower some of the world's most ambitious companies and agencies to make the right decisions. With expert insight, local market intelligence and airtight recommendations, we build and implement sustainable strategies that allow our clients to restructure, transform and grow.

We have the hands-on industry experience and expertise, which we combine with local market insight and contacts to help our agribusiness, food and beverage clients to increase profits and improve efficiencies.

## What makes us different?

We go above and beyond traditional consultants. As an international management consultancy, we specialise in the global food and agribusiness industry, with a particular focus on the implementation or execution of our recommendations. So we are committed to working with our clients, not just in the development or planning phase of a project, but importantly in its full implementation.

## Food an agribusiness specialists

We understand food and agribusiness; we built our experience in this sector, and we employ the best global talent to provide in-depth solutions by addressing real problems sustainably and creating new opportunities for clients.

For the past decade, we have worked with clients across the globe and generated measurable results. We have worked on mandates across every link of the food and agribusiness value chain from large-scale farming operations to food or beverage manufacturing, distribution, retail and hospitality.

Each member of our team of over 200 experienced consultants has worked in industry at an operational and executive level.

We work globally with significant experience in Europe, Middle East and African markets.

## Why partner with Farrelly & Mitchell?

Our team has worked at operational and strategic levels all over the European, Middle Eastern, and broader international food, beverage and agribusiness sectors. We have seen projects through from paddock to plate.

We understand the opportunities presented by the growth of the food, beverage and agribusiness sectors, in the Gulf region and across the globe. We work with primary producers, manufacturers, distributors and retailers.

If you are you looking to grow or expand your business, improve efficiency or quality control, or are buying or selling a business, get in touch, and let Farrelly & Mitchell become your project partners.

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