



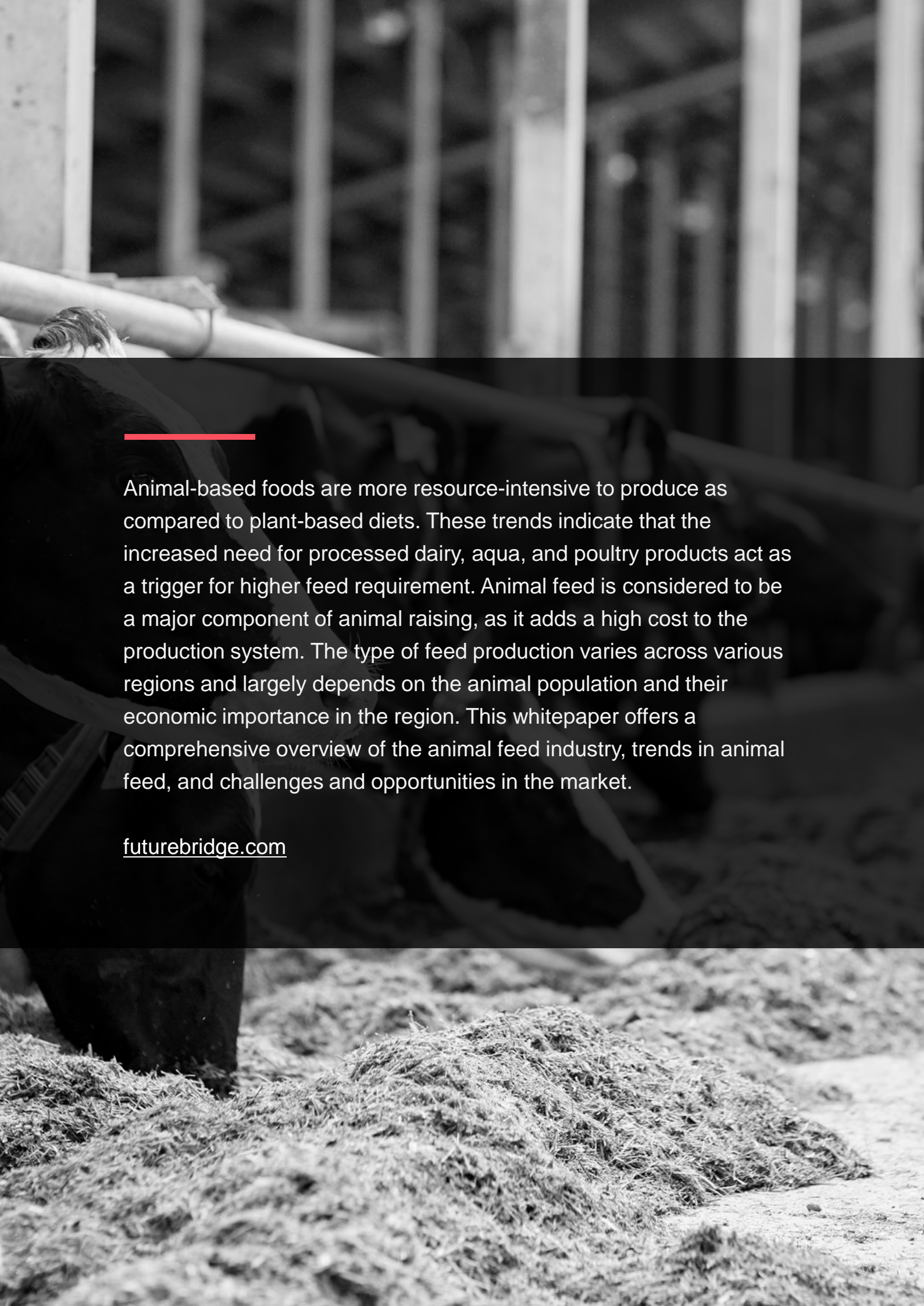
WHITE PAPER

June 2019

# Animal Health & Nutrition – Evolving Trends & Future Outlook

FutureBridge





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Animal-based foods are more resource-intensive to produce as compared to plant-based diets. These trends indicate that the increased need for processed dairy, aqua, and poultry products act as a trigger for higher feed requirement. Animal feed is considered to be a major component of animal raising, as it adds a high cost to the production system. The type of feed production varies across various regions and largely depends on the animal population and their economic importance in the region. This whitepaper offers a comprehensive overview of the animal feed industry, trends in animal feed, and challenges and opportunities in the market.

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## Introduction

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According to a new United Nations report, the global population is increasing rapidly and is projected to reach 9.8 billion by 2050. The majority of the population increase is expected in Sub-Saharan Africa (SSA), China, and India. The population growth will lead to an increase in per capita milk and meat consumption. This trend is presently observed in China, India, and countries in the European Union. Animal-based foods are more resource-intensive to produce as compared to plant-based diets. These trends indicate that the increased need for processed dairy, aqua, and poultry products act as a trigger for higher feed requirement.

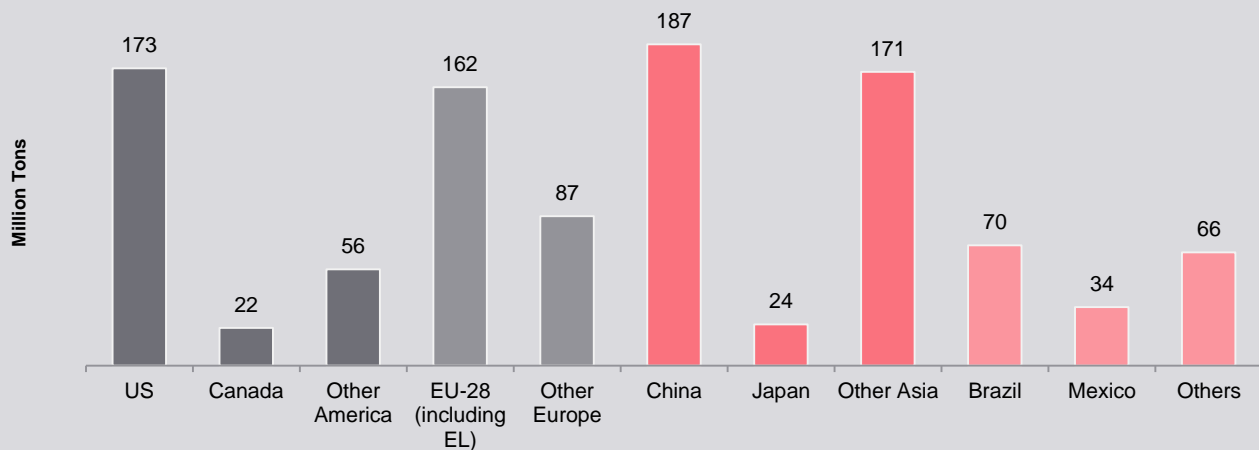
Various technologies and techniques have enabled productivity improvements to ensure abundant food supply in several countries worldwide. However, meeting the nutritional requirements of the increasing global population has re-emerged as a key challenge. According to the data consolidated by Birmingham Food Council in January 2016, it is estimated that by 2050, the caloric demand will increase by 70% and crop demand for human consumption and animal feed will increase by at least 100%.

## Overview of the Global Feed Industry

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Animal feed is produced in more than 130 countries, globally. Different animal species are raised across these countries for various purposes, including meat, milk, protein, etc. Feed is considered to be a major component of animal raising, as it adds significant cost to the production system. The type of feed production varies across various regions and largely depends on the animal population and their economic importance in the region. Feed requirement of animals also varies with the purpose of raising it, including meat, egg, and milk production. The feed industry makes a significant contribution to the economic and nutritional well-being of millions of people worldwide.

The global animal feed production exceeded the estimation with a total of 1.07 billion metric tons in 2017. The industry witnessed a growth of 2.57% in 2017, relatively high over 2016. The animal feed industry has grown 13% over the last 5 years, which translates to average growth of 2.49% per annum. The growth has been supported by increased consumption of meat, milk, and eggs, which is manifested by the increased feed production for pigs, broiler industry, and dairy industry.

**EXHIBIT 1: Global Compound Feed Production in 2017**

Source: FEFAC – Alltech

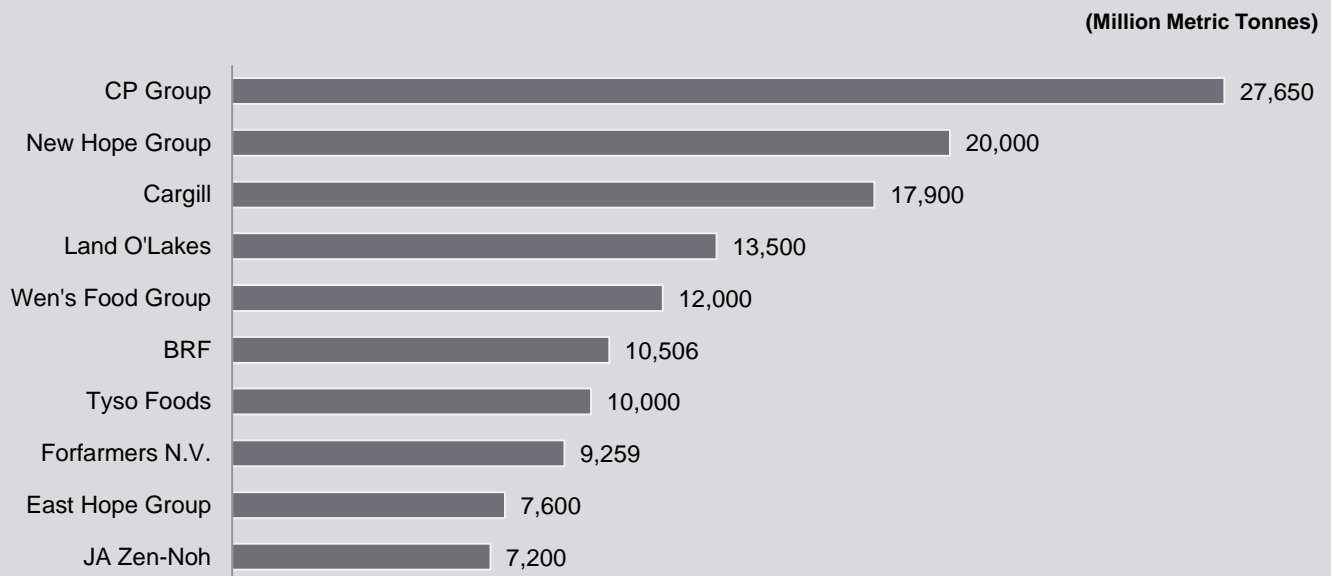
**TABLE 1: Region-Wise Animal Feed Production (Million Tons)**

Region	2017	2012	% Change
Africa	39.1	30.3	29%
Asia-Pacific	381.1	356.5	7%
Europe	267.1	208.4	28%
Latin America	160.7	137.0	17%
Middle East	27.0	25.4	6%
North America	194.6	188.1	3%
<b>Total</b>	<b>1,069.7</b>	<b>945.8</b>	<b>13%</b>

Source: Alltech Global Feed Survey, 2018

The renewed interest of global leaders in pork production led the way for the production of pig feed in 2017. China, the world's largest market, witnessed an increase in pig feed production. Similarly, the pig feed market in Russia grew as the government policy favors internal production and import displacement. In addition, several small countries, particularly those in Africa, such as Tanzania, Kenya, Mozambique, Uganda, and Namibia, demonstrated increased pig feed production.

The beef feed production demand in Latin America, Africa, and Europe declined by approximately 1%. Increasing consumer preference to white meats, such as chicken, pork, and fish, has led to the global downtrend of beef production.

**EXHIBIT 2: Top 10 Global Animal Feed Companies, 2016**

Source: WATTAgnet.com

## Need for Balanced Nutrition

The maintenance of adequate nutritional requirement is important in sustaining acceptable performance, growth, and health of neonatal, growing, finishing, and breeding animals. Essential nutrients can be broadly categorized into six classes, i.e., proteins, carbohydrates, fats, minerals, vitamins, and water. Feed ingredients are critical to ensure that manufactured diets meet the targeted nutritional needs of animals. Thus, the role of each feed ingredient is significant, as these ingredients have different functions that drive biological activities in the animal body. Generally, corn is the greatest source of carbohydrates, and soy meal is the preferred protein source. Vitamins, proteins, and minerals are regulatory nutrients.

Although basal diets provided to animals contain nutrients, they may not be sufficient to meet the nutritional requirements of animals. An optimal nutritional program (compound feed) should ensure adequate intake of amino acids, carbohydrates, minerals, fatty acids, and vitamins, which rectifies deficiencies in basal diets. The compound feed contains an optimum mixture of raw materials and additives, specifically formulated to address the requirements of the target animal. The dietary supplementation includes several nutrients (e.g., arginine, glutamine, and conjugated linoleic acid), which help regulate gene expression, feed efficiency, key

metabolic pathways to improve fertility, immune function, meat quality, and pregnancy outcome. A proper balance of protein, vitamins, and nutritionally important minerals is necessary for an efficient nutrition program to be productive and economical.

The feed timing and the way of feeding also play an important role in the efficient maintenance of animal nutrition. The concept of 'precision feeding' is gaining importance as an effective method to reduce feed intake.

### **Precision Feeding**

Precision feeding can be a highly effective tool in enabling a reduction of feed intake per animal while maximizing individual growth rates. It enables the provision of the right amount of feed, in the right nutrient composition, at the right time, for each animal, individually.

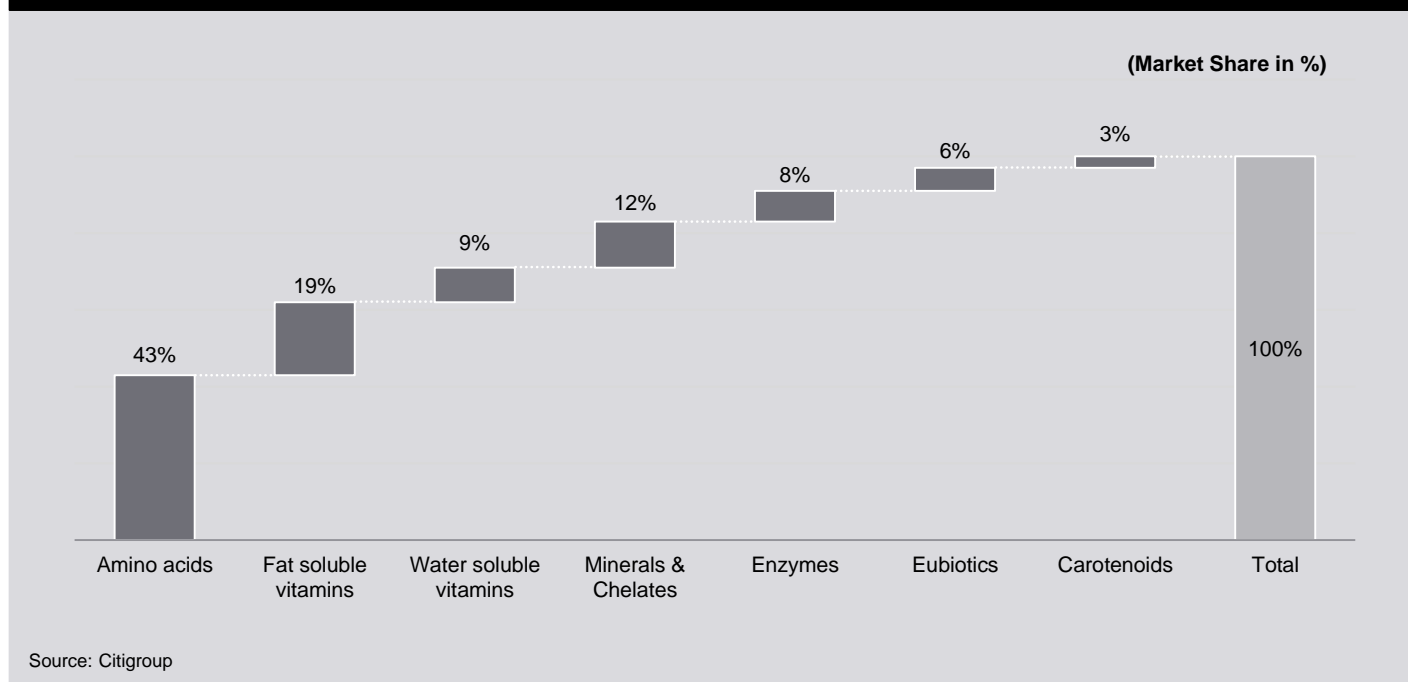
The smart feeding technique in livestock animals can reduce 13% of emissions, which could further be reduced by the widespread implementation of precision feeding. The technique can also reduce emissions below the current levels while fulfilling the nutritional demand.

## **Trends in Animal Feeds**

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Animal feeds contain various additives that are essential for animal nutrition. These additives help improve the quality of feed, and thus, improve animal performance and health. Feed additives are generally incorporated in the diets to stimulate production performance and improve the overall health and welfare of animals. In intensive production systems, nutritional requirements of animals can be met through supplementation of the limiting nutrients in a concentrated form, so that they can produce large quantities of products rapidly. Feed additives are materials used to enhance the effectiveness of nutrients, thereby promoting animal growth and increasing feed quality and palatability.

The global feed additives market was valued at \$12 billion in 2017, driven by efficiency gains and growth rates. The most commonly used feed additives are amino acids, antibiotics, vitamins, antioxidants, enzymes, mycotoxin detoxifiers, prebiotics, probiotics, minerals, binders, pigments, flavors, and sweeteners.

**EXHIBIT 3: Global Feed Additives Market****Amino Acids**

Amino acids are the most important component of animal nutrition; they play a crucial role in health, transport, metabolism, repair, and other important body functions. Several amino acids are involved in various processes; often, some essential ones cannot be synthesized internally. L-lysine, L-threonine, and L-tryptophan are a few of the main fermentative amino acids for animal nutrition. These are essential for animal growth, as they help maximize the efficiency of conversion from grain to protein. Methionine is the key limiting amino acid for poultry, whereas for swine and cows, lysine is the rate limiting amino acid. The common feed ingredients, such as soy and corn, are deficient in methionine.

**Vitamins**

Vitamins are organic substances that are essential for the vital growth and development of animals. They are added to animal feed in the form of premix and serve to be an indispensable nutrient assisting in the normal metabolic processes of animals. In certain cases, vitamins are also ingested as pro-vitamins, which are converted to vitamins by animals. A majority of animals cannot synthesize vitamins, and therefore, vitamins are added as supplements in animal feed. Feed additives also include vitamin-like substances, such as betaine, inositol, and L-carnitine.

**Feed Enzymes**

The increased cost of feedstuff has led to the widespread use of feed enzymes, such as phytases in poultry and swine diets, and carbohydrates, amylases, and



proteases mainly in poultry feeds. Incorporating phytases stimulate the feed intake in pigs and poultry. By providing a nutritionally adequate diet, feed enzymes can help in:

- Degradation of anti-nutritional factors, e.g., phytate and indigestible soluble carbohydrates
- Direct increase in the dietary energy value based on higher nutrient digestibility
- Increased digestibility of amino acids

### **Probiotics**

Probiotics are predominantly included in the commercial animal feeds; they alter the gastrointestinal flora, and thus, improve animal health and productivity. Probiotics in animal feeds can provide improvement in growth, reduction in mortality, and improvement in feed conversion efficiency. The notable effects of probiotics are observed in newborn animals or those that have been treated with antibiotics, as they help prevent enteric diseases, boost weight gain, and improve feed conversion rates. Probiotics with multi-strain preparations are preferred, as they are a highly efficient additive in animal feeding. The efficacy of probiotics depends on the survival rate and stability of strains, dosage, frequency of administration, and the health and nutritional status of the animal.

### **Prebiotics**

Prebiotics are food or dietary supplement products that confer a health benefit on the host associated with modulating the microbiota. Prebiotics provide their beneficial properties to host by selectively stimulating the growth and/or activity of one or a limited number of non-pathogenic bacteria that produce Short Chain Fatty Acids (SCFA).

Considering the health benefits of probiotics and prebiotics, several commercial feeds contain both, which are generally known as synbiotics. Some of the commercial feed formulas that contain synbiotics in the nutrition of livestock are Biomin IMBO, DigestAid, PoultryStar, Synbiotic Poultry, etc.

### **Carotenoids**

Carotenoids are naturally occurring pigments that add color to several meat products. These are also used as antioxidants and pro-vitamins.

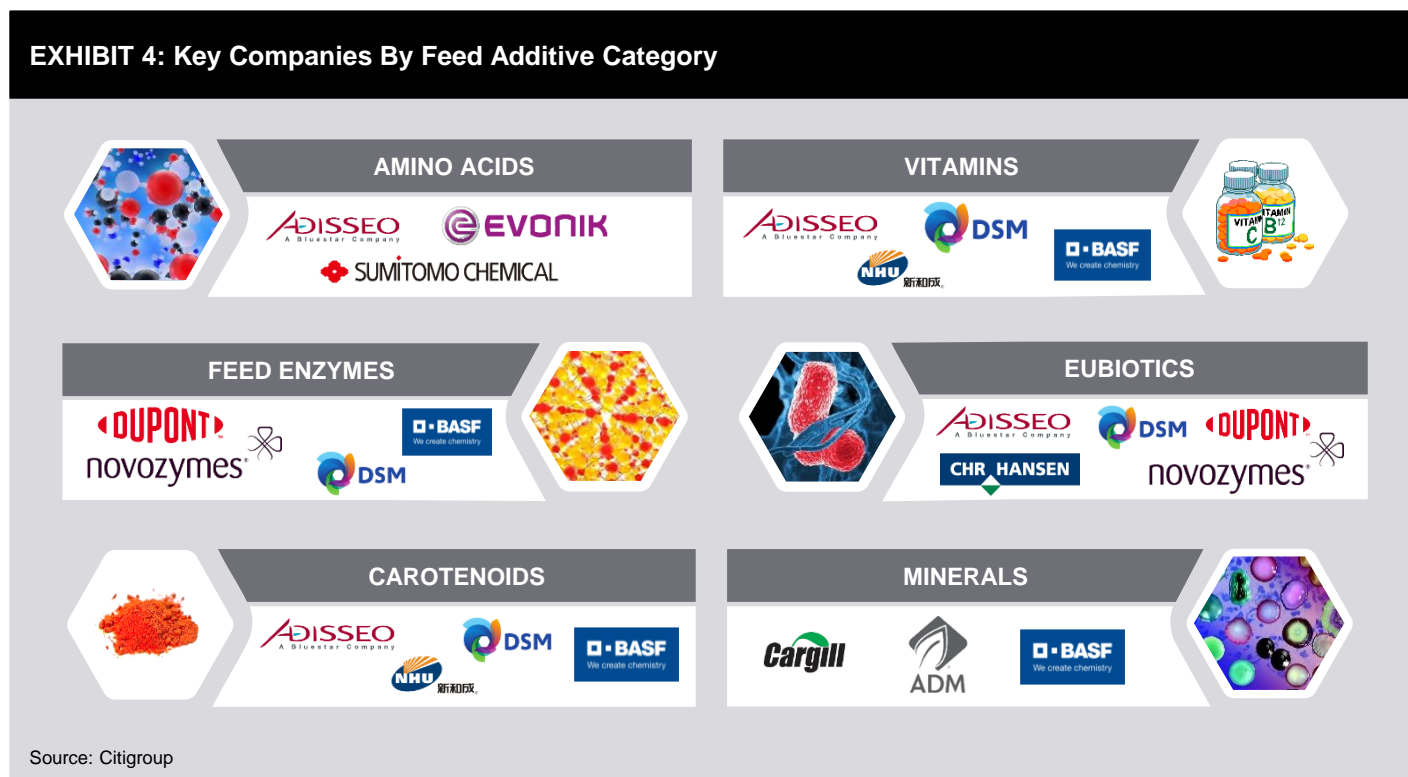
### **Minerals**

Minerals are considered as an essential element in the feed strategy for monogastric animals, such as pigs, poultry, and horses. The inclusion of minerals in aquaculture and pet food diets are known to extend health benefits.



Inorganic salts such as oxides and sulfates when added directly into feed are poorly absorbed by the animal. Presently, organically-bound trace elements, such as glycinate, are commonly used in animal feeds due to their high bioavailability.

#### EXHIBIT 4: Key Companies By Feed Additive Category



## Challenges and Opportunities

Increasing population has laid immense pressure on natural resources and on the prices of food products. Customer demands are growing with reference to quality, freshness, and sustainability of products. In addition to the ever-changing market dynamics, there is margin pressure, price volatility, evolving consumer demands, and continuous investment in technology and innovation.

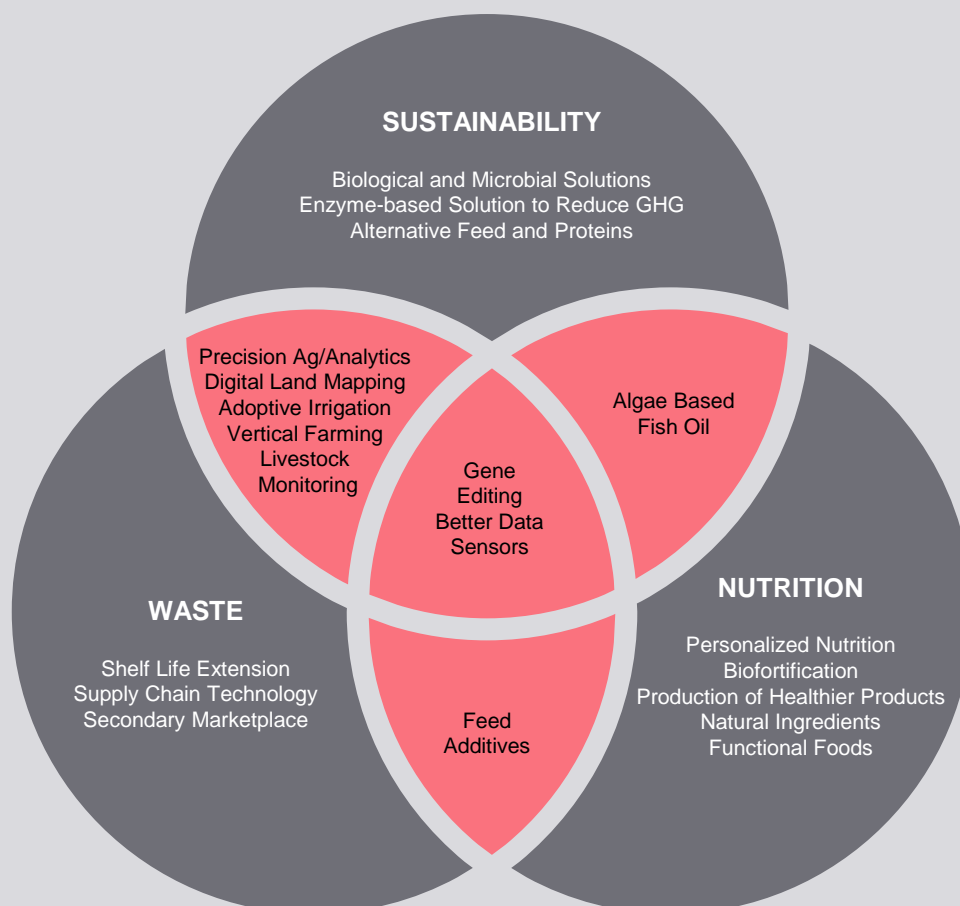
With increased emphasis on animal health & nutrition, the animal feed industry is moving towards the adoption of Antibiotic Growth Promoters (AGPs) alternatives. The industry is also focused on improving the feed conversion ratio, determining alternative feed sources, and reducing waste. There is a growing concern on the environment with increased Greenhouse Gas (GHG) emissions, eutrophication issues, and use of genetically modified feed.

Livestock requires a considerable amount of natural resources. Currently, it consumes one-third of the global arable land, 8% of available freshwater, and 15% of CO<sup>2</sup> emissions.

Novel solutions to improving animal feed have emerged with the development of new technologies, innovations in the feed sector, and continuous research activities that focus on productivity and efficiency. The trend indicates increased research in the areas of genomics, microsystems, nanotechnology, and Information and Communications Technology (ICT).

Some of the opportunities and challenges of the animal feed industry are represented below:

### EXHIBIT 5: Mapping Opportunities According to Challenges



Source: Citigroup

Even though technologies are available, the acceptance and implementation of animal-based food products by consumers still remain a challenge. New animal feed solutions need to be affordable and easy to implement from small to large-scale livestock production systems.

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