



Custom Premix Solutions

Better nutrition,
built around you.

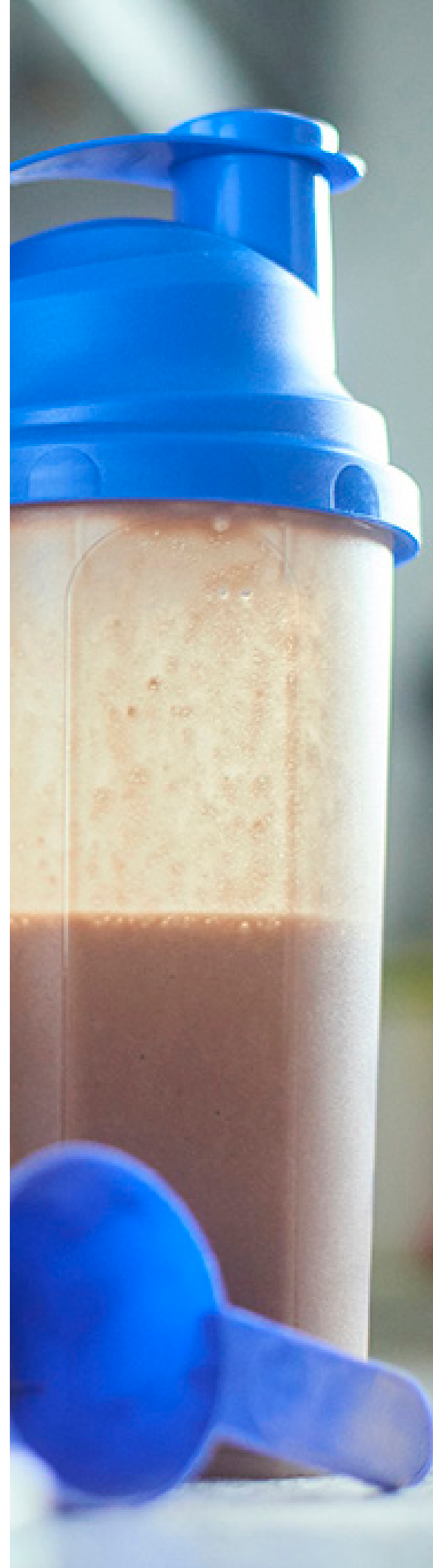
 **Glanbia**
Nutritionals

Custom Premix Solutions

Our custom premix solutions are built around you. We have the solutions and expertise to bring you value throughout the entire premix process. Whatever your stage of product development, for whatever application, we have a custom premix solution that's right for you. Use this guide to explore key nutrients needed for all stage of life's journey and why Glanbia Nutritionals is the solutions partner best positioned to help you succeed.

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Nutrients for Life



Nutrients for Life: What We Are Missing and Why Fortification Is Important

Consuming a healthy, balanced diet with the right amounts of all the essential nutrients is fundamentally important to keeping the body running smoothly.

However, a large number of consumers - in underdeveloped and developed countries - are falling short on certain nutrients. While the pandemic is driving many consumers to take steps to improve their health, it's important that food and supplement manufacturers offer products with the nutrients they need most.

The Latest Dietary Guidelines for Americans

Every five years, the U.S. government puts forth revised Dietary Guidelines for Americans, which contains up-to-date nutrition guidance based on the latest research. The newest version, the Dietary Guidelines for Americans 2020-2025¹, is characterized by its practical, holistic approach designed to encourage a shift toward good nutrition habits through small, simple changes.

The four overarching guidelines are:

1. Follow a healthy eating pattern at every life stage
2. Customize and enjoy nutrient-dense food and beverage choice to reflect personal preferences, cultural traditions, and budgetary considerations
3. Focus on meeting food group needs with nutrient-dense food and beverages, and stay within calorie limits
4. Limit foods and beverages with added sugars, saturated fats, and sodium

As well as offering guidelines, the Dietary Guideline Advisory (DGA) Committee also highlights nutrients of concern. Micronutrients, such as vitamins and minerals, are non-caloric nutrients that the body requires in very small amounts to function properly. Essential micronutrients—the micronutrients the body can't produce or produces in insufficient amounts—must be consumed through diet or supplementation.

Nutrients of Public Concern

Nutrients of concern are often essential micronutrients selected by the DGA Committee for special attention. A nutrient of public concern is defined as a nutrient that is under-consumed by Americans and whose under-consumption is associated with negative health effects. While true vitamin and mineral deficiencies are rare in developed countries, research indicates consuming sub-optimal amounts of essential vitamins and minerals is linked to fatigue, dehydration, or a compromised immune system.

Essential micronutrients—the micronutrients the body can't produce or produces in insufficient amounts—must be consumed through diet or supplementation.

For many of us, these essential nutrients may be at a higher risk of deficiency based on current dietary patterns. In the latest guidelines, calcium, vitamin D, and potassium have all been identified as nutrients of public concern. Here is a look at the micronutrients in that group and the effects deficiency may have.

Calcium: The most abundant mineral found in the body, calcium is known for a variety of functions, such as:

- Development and maintenance of bones
- Muscle contraction
- Blood pressure regulation
- Nerve signaling
- Blood clotting
- Secretion of hormones

Since calcium stored in the bones is released into the bloodstream as needed, inadequate calcium intake poses the risk of depleting the bones' reserves, leading to soft or brittle bones and fractures. While calcium fortification typically relies on calcium carbonate or tricalcium phosphate, innovative ingredients like milk calcium complex offer a balanced complex of seven key minerals at similar levels found in bone.

Vitamin D: Another powerhouse nutrient that's been gaining recent attention by consumers for its role in healthy immune function, vitamin D's many roles in the body include:

- Immune system regulation
- Calcium absorption
- Nerve and muscle function
- Bone growth
- Glucose metabolism
- Reduction of inflammation

Since vitamin D is synthesized in the skin in the presence of the sun's UV rays, those with limited sunlight exposure are at risk for deficiency, as well as seniors, breastfed infants, and people with dark skin. Vitamin D's close relationship with calcium means inadequate vitamin D can have

the same negative effects on the bones as a calcium deficiency. According to a recent study by the International Food Information Council, 56% of US consumers are actively trying to consume vitamin D.²

Potassium: A mineral and electrolyte present in the body tissues that is essential for cellular function, specific functions of potassium in the body include:

- Muscle contraction
- Nerve signaling
- Regulation of blood pressure
- Carbohydrate metabolism
- Protein synthesis
- Maintenance of pH and water concentrations in the blood

A special relationship exists in the body between potassium and sodium. Potassium has the ability to flush sodium out of the body and reduce the effects that sodium has on blood pressure. This is especially significant considering the typical American diet is high in salt and exceeds the recommended intake limits for sodium.



Beyond Nutrients of Concern

While those may be highlighted by the DGA Committee, there are many more micronutrients that may pose concern for certain demographics. Some of those include **iron, iodine, vitamin A, and zinc**, among many others. Just look at these stats shared by the Centers for Disease Control³:

- One in six US women is **iron** deficient during pregnancy; deficiency is higher among non-Hispanic Black people and Hispanic people. Iron is critical for motor and cognitive development. Children and pregnant women are especially vulnerable to the consequences of iron deficiency.
- Fewer than one in five US women take a prenatal vitamin containing **iodine** during pregnancy. Iodine is required during pregnancy and infancy for the infant's healthy growth and cognitive development.
- Globally, **vitamin A** deficiency affects an estimated 190 million preschool-age children. Children with vitamin A deficiency face an increased risk of blindness and death from infections such as measles and diarrhea.
- Over 17% of the population is at risk for **zinc** deficiency due to dietary inadequacy globally; up to 30% of people are at risk in some regions of the world. Zinc promotes immune functions and helps people resist infectious diseases, including diarrhea, pneumonia and malaria. Zinc is also needed for healthy pregnancies.

Fortification with Custom Premixes

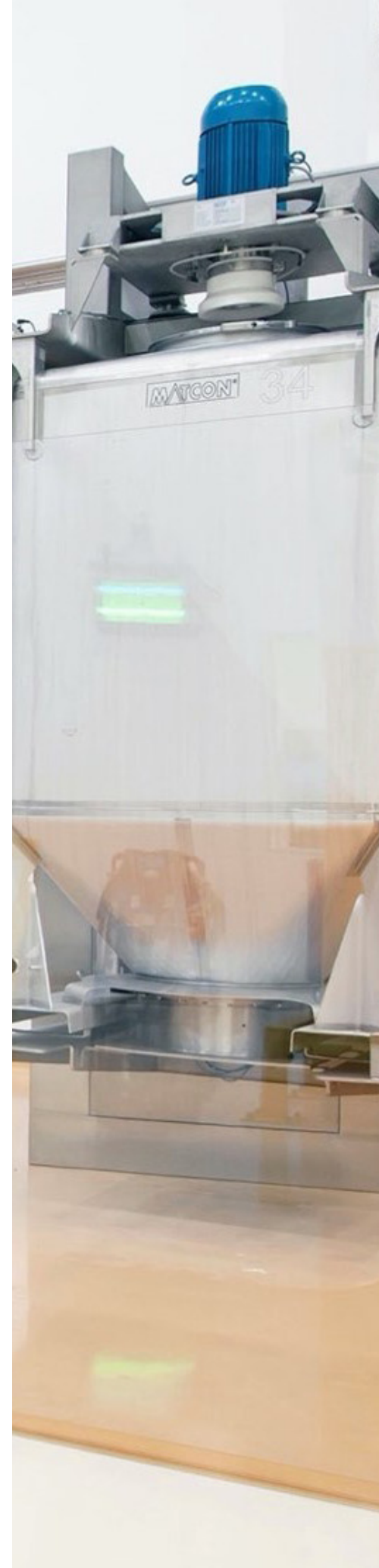
Fortification has proven to be one of the fastest, least expensive, and most efficient methods to shore up deficiencies in the diet. The value of food and beverage fortification cannot be overstated. Additionally, consumers today expect more from their foods than ever before.

“Functional foods” are defined by the International Food Information Council (IFIC) as “foods or food components that may provide benefits beyond basic nutrition.” These include ready-to-mix and ready-to-drink beverages, energy and sports drinks, and foods fortified with nutrients and/or probiotics like nutrition bars, gels, or snacks. Fortified food and beverages continue to grow by leaps and bounds. According to their 2021 survey, over half of US consumers are either trying to consume or trying to be aware of fortified foods.⁴

Custom premixes give food manufacturers the power to do all of that in a way that is efficient and cost-effective. Nutrient premixes, like those made by Glanbia Nutritionals, are custom-designed blends of ingredients often associated with health benefits, such as vitamins, minerals, antioxidants, fibers, and more. Using them makes good business sense for food manufacturers. Keep reading to learn more about what to look for when choosing a premix supplier.

References

1. U.S. Department of Agriculture and U.S. Department of Health and Human Services. Dietary Guidelines for Americans, 2020-2025. 9th Edition. December 2020. Available at [DietaryGuidelines.gov](https://www.dietaryguidelines.gov).
2. International Food Information Council (IFIC), 2021 Food & Health Survey, March 2021.
3. Centers for Disease Control and Prevention. Micronutrient Facts. December 2020. Retrieved from <https://www.cdc.gov/nutrition/micronutrient-malnutrition/micronutrients/index.html>.
4. International Food Information Council (IFIC), 2021 Food & Health Survey, March 2021.





Selecting a Custom Premix Solution Partner

Selecting a Custom Premix Solution Partner

Custom premixes combine precise proportions of nutrients specifically designed to suit your unique food product.

This allows you, the manufacturer, to add functional ingredients to a food product in precisely the right quantity and the proper chemical form at exactly the right moment during your production process. While you could fortify your products with individual nutrients, using custom premixes saves you time and money, helps reduce inventory and waste, and minimizes order processing.

Ingredients

With custom premixes, manufacturers can optimize their products, combining multiple ingredients into a single blend to deliver a product with maximum benefits. A vitamin and mineral premix supplier with deep knowledge of ingredients, nutrients, their physical and chemical attributes, and how they interact can guide manufacturers in creating their products. Prior to determining a premix formula, several factors should be considered, including how much space the ingredients take up, whether or not they are visually appealing and/or palatable, whether they are stable or not, how they will interact with other ingredients, and what forms they are available in, such as oil, trituration, or powder.

The supplier's understanding of processing enables them to select the correct addition points of a custom premix and to understand what can affect the stability of the nutrients under various processing conditions.

Typically, a custom formulation is designed to meet your specific nutrient and application requirements, which often requires deeper collaboration with the R&D and innovation teams. It can include a combination of vitamins, minerals, bioactive ingredients, functional ingredients like fibers and gums, amino acids, proteins, or botanicals. Including other nutrients in custom premixes can save manufacturers time and money. The custom premix supplier's role includes maintaining a comprehensive range of raw materials and sourcing raw materials from qualified suppliers. Thus, the manufacturer limits the number of raw materials they need to purchase, as well as the number of vendors they work with, eliminating time-consuming steps in the production process, streamlining production, and simplifying end-product quality control.



Formulation

It takes more than a warehouse of raw materials and a blender to formulate custom premixes correctly. In order to create products that offer nutritional benefits, a manufacturer has to consider cost requirements, taste, and quality and consistency expectations.

To create a high-quality premix that achieves the manufacturer's goals requires knowledge of daily values and recommended daily intakes, ingredients' functionalities, interactions between ingredients, and the physical attributes of the nutrients. For instance, some are coarse granules while others are fluffy, light particles. These attributes pose challenges when integrating the nutrients into a homogeneous formulation.

When used in fortified food, beverage, or supplement products, functional ingredients must be added in precise quantities, in the right chemical form, and at the right point of the production process. Because every food product and process is unique, there is no single formula to satisfy every need. Using custom premix formulations made by a supplier with scientific expertise, strong understanding of nutrition science, and regulatory knowledge allows manufacturers to create customized, high-quality, shelf-stable formulations that are optimized for specific nutrition applications. This simplifies product development and reduces risk.



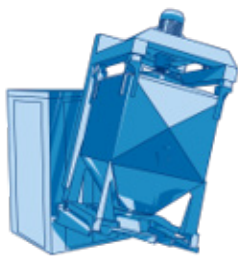
Technology

When creating custom formulations, a premix supplier leverages key blending principles—including the order in which nutrients are added or how certain ingredients are preprocessed—to boost quality and lower costs. They can also identify the best style of blending (such as high shear or low shear) and what ancillary equipment is recommended (screening, milling, or pre-blending) to accommodate special handling properties of ingredients.

To create a homogeneous blend, parameters like particle size distribution and stability must be taken into account without introducing variables that could compromise the taste, texture, or appearance of the end product. Mitigating these variables is done through technologies ranging from microencapsulation, micronization, trituration, and granulation. Microencapsulation can be utilized to mask strong, undesirable flavors of certain additives, for instance. Micronization or agglomeration can be used to decrease or increase particle size. These capabilities allow the manufacturer to incorporate a range of ingredients in a formulation.

Suppliers also should possess the capability of running pilot trials to study interactions that affect stability, off-odors, or taste—or any other technological issues. This will accelerate product innovation. Working closely with reliable ingredient suppliers can help formulation scientists and manufacturing engineers choose the best ingredient form and make on-the-go adjustments during the manufacturing process to ensure product quality. Using robust blending principles and state-of-the-art serial dilution tools, premix suppliers with application expertise and innovation centers can play an important role in developing healthful blends to accelerate product innovation.

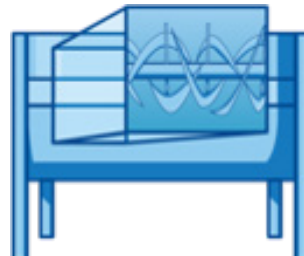
Our Custom Premix Solutions Blender Range



IBC Blenders



V-Blenders



Ribbon/Paddle



Offset Tumble

Customer and Industry Commitment

Developing a long-term relationship with a custom premix supplier can help manufacturers reach their goals, whether those are in product formulation, growth of market share, new product development, or long-term strategy. The ultimate goal of fortification is enhancing human health and nutrition around the world, and suppliers that lead the way in developing quality products and ingredient systems for the food and supplement industries lead the charge.

Custom-Designed to Fit Your Product and Process

By reducing the number of high-quality raw materials you need to purchase, as well as the number of vendors you need to work with, custom premixes also eliminate time-consuming steps in your production process, streamline production, and simplify end-product quality control.

Using a custom nutrient premix saves your business money, too, by reducing waste; reducing the need to purchase, ship, and warehouse individual nutrients; and reducing quality control costs. Formulation experts offer valuable advice, helping you create a blend that delivers maximum benefit.

With the expert product development support and technical guidance you get when you work with a custom premix supplier—from custom blend formulating to ingredient sourcing, evaluation, and testing through to the final premix blending—you'll save time and money and know that your product quality is always on target.





The Value We Offer

The Value We Offer

Glanbia Nutritionals offers premix solutions built around you.

We maintain a comprehensive range of raw materials to successfully respond to a range of ingredient needs and formulate optimized premixes that deliver maximum benefits. With over 2,000 qualified ingredients procured and supported by a global supply chain, we have the solutions and expertise to bring you value throughout the entire premix process. Whatever your product development goal, we've optimized our solutions to help make that goal more obtainable.

Unrivaled Experience



Our unrivaled industry experience is an asset to you. Glanbia Nutritionals brings an unmatched level of knowledge and know-how to every premix project through extensive industry experience since 1942. With over 1,200 premix customers globally and over 3,500 unique formulas developed annually, we have a deep level of experience and understanding from the simplest solutions to the most detailed and complex premixes.

Our seasoned global research and development locations and resources are designed to support your product formulation needs across the world. With 350+ years of combined experience in the North American, European, and Asia Pacific regions, we have the on-the-ground resources your global business requires.

1939

Watson Inc. was founded under Watson Flour Company in Long Island, N.Y.

1960

Edible Films, the first water-soluble edible packaging for premixes, was developed

2001

Seltzer opened a new premix manufacturing facility in Carlsbad, CA

2006

Seltzer acquired by Glanbia plc

2009

Glanbia opens new premix facility in Springfield, MO

2019

Watson acquired by Glanbia plc

1942

Watson begins producing vitamin and mineral premixes

1981

Seltzer was founded as an ingredient distribution business in Carlsbad, CA

2004

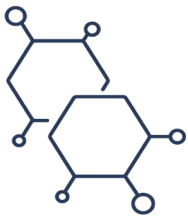
Glanbia acquires a premix facility in Orsingen-Nenzingen, Germany (Kortus Food Ingredients Services)

2007

Glanbia completes new premix facility in Suzhou, China

2012

New state-of-the-art premix facility opened in Orsingen-Nenzingen, Germany



Formulation Optimization

Our industry-leading R&D scientists have vast knowledge about how to optimize formulations to perform their best across a broad range of product applications. Our experts consider a comprehensive list of product attributes for every formulation. The chemical and physical properties of each micro- and macronutrient are considered to ensure the most homogeneous premix for your application.

We also offer a portfolio of optimized nutrients created through our TechVantage[®] Functionally Optimized Nutrient Technologies, in-house technologies used to improve the functionality of nutrients in your food, beverage, and supplement products. Our Functionally Optimized Nutrients portfolio covers a wide variety of ingredient categories, including:

- Vitamins
- Minerals
- Botanicals
- Amino Acids
- Sweeteners
- Carbohydrates
- Fats and oils
- Fibers
- Acids

Our NutraShield[®] microencapsulation, GranulPlex[®] granulation and UniTrit[®] trituration technologies allow for improved functionality including:

- Stability
- Taste & odor masking
- Delayed release of actives
- Improved solubility
- Extended shelf life
- Improved flow
- Improved compression
- Prevention of ingredient interactions
- Reduced water migration

In each of these technology areas, our application knowledge is broad. We provide technical support across a wide range of product categories to aid in the development and optimization of your products. Application testing allows us to ensure your formulations meet all necessary requirements.

Our Application Areas of Expertise

Dairy & Dairy Alternatives

- Yogurts
- Ice creams
- Beverages



Sports Performance

- Powder drink mixes
- Bars
- Beverages
- Gels



Active & Healthy Lifestyle

- Gummies
- Tablets
- Capsules
- Chewables
- Effervescent



Early Life

- Powder formulas
- Snacks
- Beverages



Functional Beverages

- Protein
- Juice
- Meal replacement
- Energy

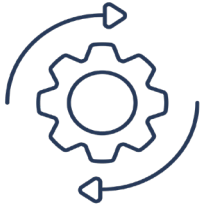


Snacks

- Bars
- Cookies
- Snack bites



Simplified Processes



At Glanbia Nutritionals, we move at the speed of life. Simplifying your finished product manufacturing so you can get to market faster, we provide support for every step of your new product development journey.

From application development and market validation to managing complex formulation requirements, science validation, and tech service quality and testing validation, we manage your premix projects from start to finish, turning the complexities into simple solutions. Additional streamlining capabilities include:

- Nutrient optimization: stability, masking and functional improvements
- Allowing for manufacturing consistencies among all of your locations
- Precision blending: equipment sized right for each job to achieve homogeneous blends while reducing lots and cost
- Managing complex global supply chains, including sourcing, regulatory issues and documentation
- Reducing your financial risk: less internal sourcing, carry less stock and raw material write-offs



Our customized premix solutions streamline your quality control process by delivering one product SKU with one set of documents.

Proactive Ideation

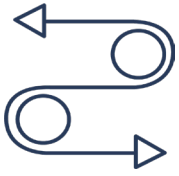


We work to proactively bring new ideas to you. Access to an extensive portfolio of ingredient technologies and robust set of assets, allows us to bring you new ideas or help to improve your existing formulations. Collaboration with Glanbia Nutritionals allows you to amplify your expertise, go from concept to shelf fast and make products that win in the market.

Our full service R&D and collaboration model is critical to giving you a cutting edge to stay ahead of your competition. We offer:

- Custom ingredient development
- Clinical research support
- Intellectual property patents
- Nutrient profiling
- Application research
- Market research
- Regulatory insight

Simplified Sourcing



Glanbia Nutritionals provides you with simplified sourcing solutions as your single source partner. Our built-in supplier redundancies ensure your ingredients are always available with consistent quality standards across the globe. Our nearly

60-person global procurement team supports your ingredient sourcing across the globe.

We're Built Around You

At Glanbia Nutritionals, there is a custom premix solution right for you. Whatever your stage of product development, for whatever application, we have a premix solution for you.

Nutrient Premixes: A custom formulation designed to meet your specific nutrient and application requirements that often requires deeper collaboration with our R&D and innovation teams.

All N[®] Premix Formulas: A portfolio of premixes pre-formulated with active ingredients, ready to use as they are or as a starting point that can be customized for new product formulations.

There is no single formula to satisfy every need. At Glanbia Nutritionals, we design premixes to suit your unique product requirements. Our seasoned R&D staff takes the time to optimize your formulation by offering the best solutions to complement your product.

Our Application Areas of Expertise

Cereals

- Hot
- Cold
- Extruded



Bakery

- Breads
- Tortillas
- Desserts
- Crackers
- Crusts



Personal Care

- Lotions
- Creams



Clinical Nutrition

- Tablets
- Capsules
- Meal replacements



Dressings, Sauces & Spreads

- Salad dressing
- Dipping sauces
- Food spreads



Animal & Pet

- Powder
- Tablets
- Treats
- Kibble





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