

# Ingredients for Pet Nutrition and Health

DSM Product Catalog





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# DSM – Purpose-led. Performance-driven.

## ***Who we are***

Royal DSM N.V. is a global purpose-led, science-based company active in nutrition, health and sustainable living.

Our purpose is to create brighter lives for all. We achieve it by using all the scientific and innovation power at our disposal to tackle some of the world's greatest challenges — creating value for customers, shareholders, our people and society at large.

We're open and collaborative, embracing diversity everywhere. We are caring and daring. We have the courage to rethink the system and create opportunities for everyone. We want to redefine how we live and work to create a more sustainable, prosperous, and fairer society.

Ultimately, we aspire to be a company for all, creating value for our stakeholders — customers, employees, shareholders, and society at large — and building a stronger legacy and brighter future for generations to come.

## ***Our brand promise***

**BRIGHT SCIENCE. BRIGHTER LIVING™.** This sums up who we are, what we stand for and what we aim to achieve.

These four words are the shorthand for our mission, our beliefs and our behaviors — a promise that we make to the world in which we operate.

Bright Science refers to the unique way in which we combine life sciences and materials sciences disciplines, technologies and talents. We partner with customers and other stakeholders — then we share ideas, insights and inspiration to create innovative and sustainable solutions that address the key challenges facing society today.

Brighter Living refers to our commitment to creating products and solutions that make a positive difference in people's lives. We are constantly seeking new ways to improve quality of life, and we seek to make a positive contribution to the lives of people today and generations to come.

# Making sustainability stick

*To make the world a brighter place, we need to pull together, which is why our business strategy is based on the Sustainable Development Goals (SDGs) agreed upon by the United Nations – and five in particular.*



## **Ending hunger, achieving food security and improved nutrition, and promoting sustainable agriculture**

We improve nutrition for those who most need it – at the base of the economic pyramid – through fortified foods and micronutrients, delivered through our Nutrition Improvement and Africa Improved Foods initiatives – as well as long-standing partnerships with the World Food Programme and the independent nutrition think-tank, Sight and Life.



## **Ensuring healthy lives and promoting well-being for all at all ages**

Our health, nutrition, biomedical and high-performance materials are boosting health in all age groups – for example, by reducing salt and sugar levels in processed foods, and cutting carbon emissions from chemical manufacturing processes. Our First 1,000 Days program supports mother and child health. Our DSM Life-Saving Rules protect our people from harm; and the DSM Vitality program promotes their good health.



## **Ensuring access to affordable, reliable, sustainable modern energy for all**

At DSM, we are making affordable, renewable energy a reality for all through materials technology that boosts solar power, and biofuels made from plants such as corn. Our Bright Minds Challenge has nurtured bold renewable energy innovations such as new lithium extraction methods.



## **Taking urgent action to combat climate change and its impacts**

Inside DSM, we continue to advocate responsible action on climate change with our stakeholders and are increasing the use of renewables in our energy mix – and reducing our carbon footprint – in partnership with RE100.



## **Ensuring sustainable consumption and production patterns**

Thermoplastics used in automotive parts such as oil pans and car lighting are reducing weight – and waste. Our Niaga® Technology enables products such as carpets to be 100% recyclable. We are taking a big bite out of food waste through products such as Pack-Age® – a packaging solution for meat and cheese that extends shelf life. DHAgold® is an algae-derived DHA omega-3 for companion animals, a truly sustainable source of high-quality DHA omega-3 without contributing to overfishing the world's ocean. Meanwhile, our Brighter Living Solutions are created to minimize waste across the value chain.

**DSM's 20.2-MW solar project**, located on 66 acres near Belvidere, New Jersey, is the largest net-metered solar installation in the state and the second largest on the East Coast. The on-site solar generation facility is comprised of 62,000+ solar panels and is estimated to produce 25,000,000 kWh of renewable electricity annually. The newly expanded solar field is part of DSM's commitment to doing well by doing good for communities and the environment. DSM has a goal to source 100% renewable electricity for its global operations.



# Supporting customers and pets

*At the forefront of DSM Pet Nutrition is our commitment to our customers demonstrated through:*

- **Innovation and research:** DSM strives to continually bring innovative products and delivery systems to the marketplace through cutting-edge research aimed at advancing the industry and helping bring nutritional solutions to support a long, healthy pet life.
- **Ongoing customer support:** At DSM, we believe in working collaboratively to deliver pet nutrition solutions that are as unique as each of our clients. With our market insights, high-quality ingredients and customized services, we aspire to deliver ingredients and customer service second to none.
- **Technical expertise and education:** As a leading manufacturer of vitamins and vitamin premixes, DSM nutritionists developed the Optimum Vitamin Nutrition (OVN™) program to help ensure pets receive the full value of vitamin fortification from a safe and reliable source.





***The OVN™ program is based on the knowledge that:***

- Vitamins are involved in most metabolic functions, so an improper inclusion in pet food can result in compromised health.
- Establishing precise Optimum Vitamin Nutrition for dogs and cats is very challenging and can be affected by many factors. These factors include, but are not limited to, animal species, life stages, life styles, individual variation, the forms and bioavailability of the vitamin, nutrient interactions in food and the body.
- OVN™ guidelines help pet nutrition product formulators keep current with advancements in vitamin nutrition, following, but not limited by, NRC, AAFCO and FEDIAF guidelines.
- The OVN™ program only uses vitamins and premixes from DSM, in compliance with global regulations and providing full traceability.



# Nutritional ingredient production

## *Integration underpins superior quality standards*

DSM Nutritional Products operates nine bulk manufacturing and formulation sites across Europe, the United States and China. These sites produce the majority of DSM's nutritional ingredients, which are sold either as straight products or as premixes and vitamin concentrates.

Our products are micro-ingredients whose functionality is specific and whose impact can be enormous. It is therefore imperative to manufacture, package, store and ship them in accordance with the highest quality standards. Whether provided as straight products in bulk or as premixes tailored to individual customer needs, our products always meet the most stringent quality requirements. We work to a unique global quality standard. This is rooted in the official regulations that give us our license to operate and is supplemented by our own internal quality systems. Full backward integration allows us to ensure quality at every step of the supply chain. We deliver to our customers via a dedicated logistics network based on three main distribution centers. These are located in Venlo (NL), Belvidere (USA) and Singapore.

## *U.S. production facilities*

### **1 Naperville, IL**

Hydroxy-Vitamin D destined for feed applications is produced at this site near Chicago.

### **2 Freeport, TX**

Freeport, Texas, is the location of a site specializing in the production of beta carotene and intermediates for other carotenoids.

### **3 Belvidere, NJ**

Located adjacent to the Delaware River in New Jersey, this is the production site for arachidonic acid and formulations of various vitamins including vitamin E for food applications. The site also includes a premix facility for food applications.

## *Global production facilities*

### **4 Dalry, UK**

Located in Ayrshire, Scotland, the site is involved in the production of vitamin C and related derivatives and also the production of Panthenol and Ca-Panthenate.

### **5 Novozymes, DK**

Novozymes has been DSM's Feed Enzymes Alliance partner for more than 10 years, researching, producing and formulating all different enzymes for the animal nutrition markets across the globe.

### **6 Village Neuf, France**

Formulations of several vitamins and carotenoids are produced at Village Neuf which is also the production site for STAY-C stable vitamin C forms for feed applications. The site also includes a premix unit for food applications and the DSM Research Center for animal nutrition.

### **7 Grenzach, Germany**

Located adjacent to the Rhine in southern Germany, this site primarily focuses on the production of water-soluble B vitamins, vitamin D and vitamin C derivatives. In addition, intermediates used in the production of carotenoids are produced.





**8 Sisseln, Switzerland**

Sisseln is the production site for several carotenoids and vitamin A. Other operations include the purification and formulation of omega-3 fatty acids, the formulation of several vitamins for various applications and the custom synthesis of pharmaceutical intermediates. Sisseln is also home to our pilot plant and development center.

**9 Lalden, Switzerland**

Located high in the Swiss Alps, Lalden is a production facility for intermediates used in the syntheses of vitamin E and A at Sisseln. The site also specializes in the manufacture of aroma intermediates.

**10 Xinghuo, China**

The Xinghuo site is located close to Shanghai. It is specialized in the formulation of vitamin E for feed applications and also includes a premix production facility for food and feed applications.

# Premixes and blending

## Product services where customers need them

DSM has a comprehensive global network of plants with over 40 of these dedicated to the production of feed premixes. Throughout these plants, our goal is simple: to be the most trusted source of nutritional ingredients for your pet food brand.

As a worldwide leader in nutritional ingredient production, DSM follows a strict quality control process — our 5Q Values program — in compliance with food safety standards.

5Q Values are designed to provide exceptional control of product quality and consistency for both single ingredients and premixes.

While we manufacture products across the globe, quality and safety are consistent and ensured at every point in the manufacturing process due to 5Q Values.

Each DSM Nutritional Products Animal Nutrition & Health North America facility has implemented a food-safety plan in compliance with the U.S. Food Safety Modernization Act (FSMA), which includes five components:

1. cGMP regulations (current Good Manufacturing Practice)
2. Food safety plan with hazard analysis
3. Sanitary transport standards
4. Foreign supplier verification
5. Supply chain control

**5Q VALUES** Ensuring a higher standard of quality

DSM has developed a robust quality program aimed at making our products the strongest link in your supply chain. As a manufacturer of 11 of the 13 vitamins, and other nutritional ingredients for both human and animal consumption, DSM's process for manufacturing, logistics and final product is built on transparency you can trust.

## Quality Certifications

DSM carries multiple quality certifications recognized globally in food safety and manufacturing excellence.



# U.S. premix production



DSM North America facilities are quality- and safety-oriented premix blend sites. In addition to compliance with ISO 9001, FAMI-QS requirements and cGMP, our premix blend sites employ many tools to promote quality throughout management, production and customer-related activities. Hazards are identified by Hazard Analysis and Critical Control Point (HACCP). Some of these tools include, but are not limited to: continual improvement, the supplier qualification program, quality assurance and quality control, quality documentation and process validation in designated areas.

## *U.S. production facilities*

❶ 616 Dayton Avenue, Ames, IA

❸ 495 Jackson Concourse, Pendergrass, GA

❷ 5101 Rondo Drive, Fort Worth, TX

❹ 395 Waydom Drive, Ayr, ON Canada



# Nutritional ingredients

*DSM produces an extensive portfolio of nutritional ingredients for use in pet food products and supplements, including minerals, vitamins, carotenoids, and long-chain polyunsaturated fatty acids.*

*These products deliver a wide range of health benefits to all pet species. Vital for the efficiency of a broad array of functions in the body, the DSM ingredient range contains all the vitamins, minerals, fatty acids and carotenoids crucial to support all biological systems for healthy, thriving, long-living pets.*



## Vitamins

### Vitamin A

Necessary for vision, growth, and tissue differentiation. Important for keeping skin, eyes and inner linings of the body healthy; important for immune response. Vitamin A is also needed for the maintenance and growth of teeth, nails, hair, bones and glands.

### Vitamin D

Helps the body maintain and utilize the levels of calcium and phosphorus needed to build strong bones and teeth. Recent studies have shown additional benefits such as supporting immune health, weight management.

### Vitamin E

Helps protect cell membranes, maintain the immune system, prolong the life of red blood cells, maintain a healthy circulatory system and improve vitamin A use. Important for the health and proper functioning of body tissues. Is an antioxidant, neutralizing free radicals.

### Vitamin K

Essential for the clotting of blood and may help maintain bone health.

### Vitamin C, Ascorbic Acid

Aids in the production of collagen, which provides support to muscles, vascular tissues, bones, and cartilage. Aids the absorption of iron and helps support teeth and gum health. Is an important water-soluble antioxidant. Enhances the immune response and helps support cardiovascular and eye health.

### Vitamin B1, Thiamine

Helps the body use its major source of energy, carbohydrates. Thiamine is also essential for proper muscle coordination, the maintenance of peripheral nerve tissue, and for normal growth.

### Vitamin B2, Riboflavin

Helps the body transform proteins, fats, and carbohydrates into energy. Helps maintain healthy skin and eyes and is also necessary for building and maintaining body tissues.

### Vitamin B3, Niacin

Niacin and niacinamide are essential for fat synthesis, protein metabolism, and the conversion of food to energy.

### Vitamin B5, Pantothenic Acid

Essential for the formation of certain nerve-regulating substances and hormones. It is also required for metabolism of proteins, fats, and carbohydrates.

### Vitamin B6, Pyridoxine

Necessary for energy metabolism, the formation of certain proteins, and the use of amino acids. It also helps the nervous system to function properly and is essential to a healthy immune system and heart health.

### Vitamin B9, Folic Acid

Required for the formation of red blood cells, certain body proteins, and genetic materials for the cell nucleus. Emerging science suggests it may play an important role in supporting cardiovascular and brain health.

### Vitamin B12, Cyanocobalamin

Necessary for the formation of DNA and the production of healthy red blood cells. Helps maintain the nervous system and is essential to maintaining mental function. Vitamin B12, along with B6 and folate, is essential to heart health.

### Vitamin H, Biotin

Necessary for synthesizing fatty acids and breaking down protein and carbohydrate molecules. Helps in the maintenance of the thyroid and adrenal glands, nervous system, reproductive tracts, and skin.

## Carotenoids

### **β-Carotene (ROVIMIX®)**

β-carotene is an important source of vitamin A, converted into vitamin A as required. The additional health-promoting effects of β-carotene include antioxidant functionality supporting cells, tissues, and organs from free-radical damage and as a contributor to the robustness of the pet's immune system.

### **Astaxanthin (CAROPHYLL® Pink)**

Besides pigmentation, astaxanthin is a carotenoid that is recognized as being one of the most powerful antioxidants found in nature. Other health benefits associated with astaxanthin include eye health and immune function support.

## Nutritional lipids

### **Omega-3 from Algae**

DHA omega-3 derived by algal fermentation containing docosahexaenoic acid (DHA) and eicosapentaenoic acid (EPA), fatty acids that support cardiovascular, eye, and brain health (e.g., memory), and supporting joint, skin, and coat health.

### **Omega-3 from Fish**

Highly refined and deodorized fish oils containing both eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA).



## Minerals and trace elements

### Examples of important minerals and trace elements

#### **Selenium (Se)**

Selenium is an antioxidant that protects cell membranes.

#### **Iodine (I)**

Iodine is essential for proper thyroid gland function.

#### **Copper (Cu)**

Copper is involved in energy production, connective tissue formation, iron metabolism, normal red blood cell formation, normal nervous system function, neurotransmitter synthesis and metabolism, melanin formation for pigmentation of hair and also has an antioxidant function as part of super oxide dismutase.

#### **Manganese (Mn)**

Manganese contributes to the formation and quality of the bones and joint cartilage while also playing an active role in the functioning of the mitochondria.

#### **Zinc (Zn)**

Zinc is involved as a coenzyme in many cellular enzyme systems and impacts carbohydrate, lipid, protein and nucleic acid metabolism. It is crucial for collagen and keratin synthesis contributing to skin integrity and coat quality. It is also needed by the immune system and plays an important role in reproduction.

#### **Iron (Fe)**

Iron is an essential component of the oxygen-carrying hemoglobin in the red blood cells and intramuscular myoglobin, helps support immune function, and is an integral part of many important enzymes systems including those supporting energy production, DHA synthesis, and functionality as a cellular antioxidant.



# Knowing pet product technologies

*Understanding how different pet product technologies influence the application of nutritional ingredients*

## Wet products

Wet food styles include loaf (pâté) and chunk-in gravy foods and treats. Initially, meat and other ingredients are mixed with or without heat for various periods of time. This mixture is either placed in a container, sealed and cooked at a high temperature or cooked using a steam tunnel, formed into chunks, sealed in a container with gravy, and cooked again at a high temperature. For this application, nutritive ingredients need to be resistant to moisture, oxidation, enzymes, and extreme changes in temperature throughout manufacturing. Finally, the finished product color must not be adversely affected plus remain shelf stable for 24 months.

*The pet food market is characterized by a wide variety of different product forms. This occurred because ingredient forms were developed to support changes in formulation, process conditions, and packaging.*

*Specially formulated nutritive and functional ingredients are often the key to the successful development of foods, treats, and supplement products. As a leader in nutritional ingredient form development, DSM offers a comprehensive range of ingredients suitable for the full range of manufacturing processes and formulation options our customers use to create products with distinct points of differentiation.*

## Extruded products

Extrusion, one of the harshest processing technologies, is used to produce food and treat products. This process typically requires ingredients to be exposed to high temperatures, pressure, moisture, shear, rapid expansion, and a drying step. For this application, nutritive ingredients need to be resistant to rapid changes in temperature, pressure and moisture, heat, shear, and oxidation throughout manufacturing plus remain shelf stable for 18 to 24 months.

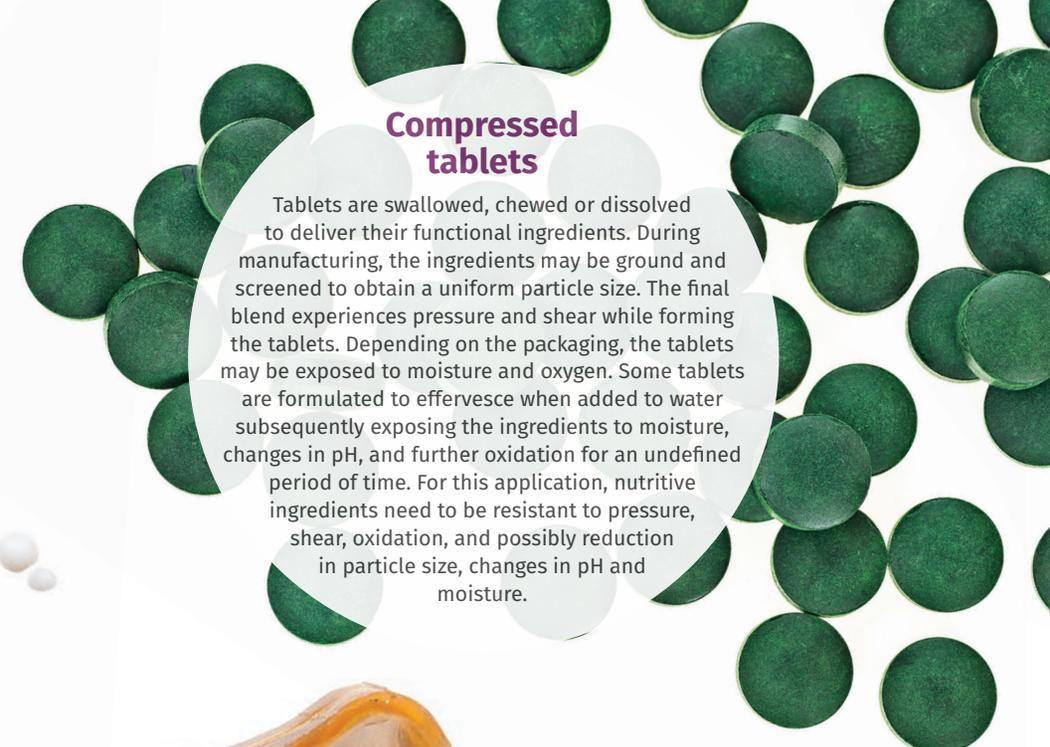
## Baked products

Food, treat, and flaked products are manufactured using baking. Initially, dough is formed exposing the ingredients to moisture and sometimes enzymes. The formed dough is heated to the desired degree of cook and dryness. For this application, nutritive ingredients need to be resistant to heat, moisture, enzymes, and oxidation throughout manufacturing plus remain shelf stable for 18 to 24 months.



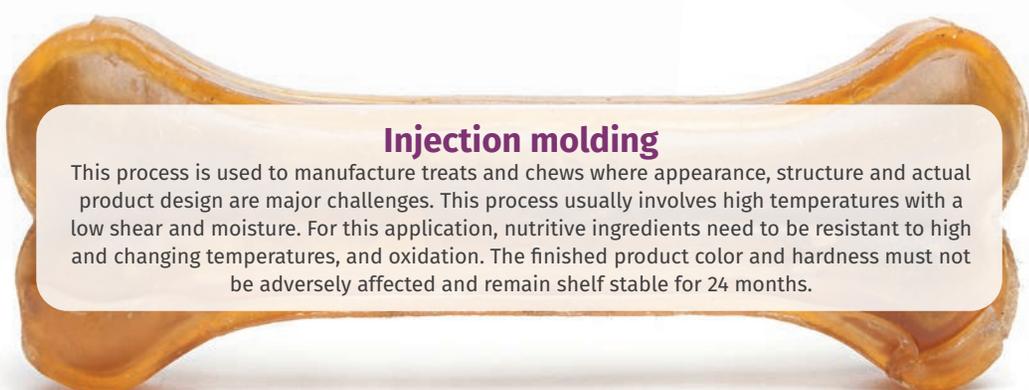
## Milk and fatty liquids

High fat (oil) paste and liquid products such as lubricants for the gastrointestinal tract to aid mobility and control hairballs. During manufacturing, these types of fatty liquids often experience high shear during mixing and homogenization, high temperatures during sterilization, and unwanted enzyme activity. For this application, nutritive ingredients may need to be resistant to UV light, oxidation, shear, high and rapidly changing temperatures, enzyme activity, display high miscibility and emulsification properties during manufacturing plus remain shelf stable for 3 to 24 months without causing sedimentation or other negative product attributes.



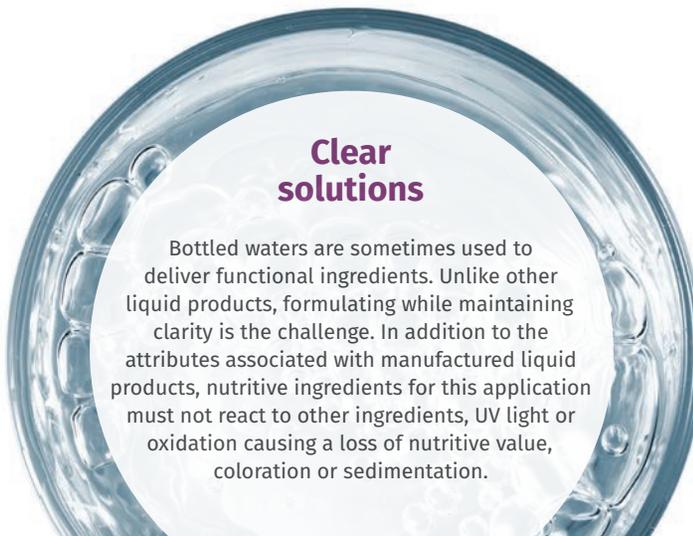
## Compressed tablets

Tablets are swallowed, chewed or dissolved to deliver their functional ingredients. During manufacturing, the ingredients may be ground and screened to obtain a uniform particle size. The final blend experiences pressure and shear while forming the tablets. Depending on the packaging, the tablets may be exposed to moisture and oxygen. Some tablets are formulated to effervesce when added to water subsequently exposing the ingredients to moisture, changes in pH, and further oxidation for an undefined period of time. For this application, nutritive ingredients need to be resistant to pressure, shear, oxidation, and possibly reduction in particle size, changes in pH and moisture.



## Injection molding

This process is used to manufacture treats and chews where appearance, structure and actual product design are major challenges. This process usually involves high temperatures with a low shear and moisture. For this application, nutritive ingredients need to be resistant to high and changing temperatures, and oxidation. The finished product color and hardness must not be adversely affected and remain shelf stable for 24 months.



## Clear solutions

Bottled waters are sometimes used to deliver functional ingredients. Unlike other liquid products, formulating while maintaining clarity is the challenge. In addition to the attributes associated with manufactured liquid products, nutritive ingredients for this application must not react to other ingredients, UV light or oxidation causing a loss of nutritive value, coloration or sedimentation.



## Dry mixes and powders

Dry mixture products range from supplements to milk replacers. Dry blends require ingredients that can be dispersed readily throughout the mixture, not prone to particle segregation/separation and are chemically stable. Some are designed to be added to liquids and must be readily soluble or miscible. For this application, nutritive ingredients usually need to be uniform in particle size and density, chemically and heat stable, have a low propensity to create an electrostatic charge, not attract moisture plus resist oxidation through manufacturing and storage. The finished product color must also not be adversely affected.

# Leveraging nutrient form technologies

To differentiate products on retailers' shelves, there is an increased demand for a wide range of ingredients with different matrices, textures, colors, shapes and nutritional functionality. DSM is meeting the demand while considering key factors in:

- External factors
- Product form requirements
- Formulation technologies

## External factors

Vitamin	Temperature	Oxygen	Humidity	Light	pH Acid	pH Alkaline
Vitamin A	++	++	+	++	+	●
Vitamin D <sub>3</sub>	+	++	+	+	●	+
Vitamin E-Acetate	●	+	●	●	●	+
Vitamin K <sub>3</sub>	+	+	++	+	++	++
Vitamin B <sub>1</sub>	+	+	+	●	●	++
Vitamin B <sub>2</sub>	●	●	+	+	●	+
Vitamin B <sub>6</sub>	++	●	+	●	●	●
Vitamin B <sub>12</sub>	++	+	+	+	●	●
Pantothenic Acid	+	●	+	●	+	+
Nicotinic Acid	●	●	●	●	●	●
Biotin	+	●	●	●	●	●
Folic Acid	++	●	+	++	++	●
Vitamin C	++	++	++	+	●	+

● Stable    + Slightly Sensitive    ++ Very Sensitive

## Product form requirements

	Heat Stable	Moisture Stable	Shear Tolerant	Resistant to Oxidation	Not Adversely Affected by Enzyme Activity	Low Coloration and/or Small Particle Size	Compression Tolerant	Resistant to UV Light	Proper Solubility or Miscibility
Extrusion	✓	✓	✓	✓					
Baking	✓	✓	✓	✓	✓				
Restoring/Steaming	✓	✓	✓	✓	✓	✓			
Fresh/Frozen		✓	✓	✓	✓				
Injection Molding	✓	✓	✓	✓	✓				
Dry Mixing/Powder	✓		✓	✓		✓			
Tableting/Compression	✓		✓	✓		✓	✓		
High Fat Liquid	✓	✓	✓	✓	✓	✓		✓	✓
Low Fat Liquid/Milk	✓	✓	✓	✓	✓	✓		✓	✓
Clear Water	✓	✓	✓	✓		✓		✓	✓

### Bioavailability

The nutrient should have a chemical structure which is fully metabolized and the product formulation should provide protection but release the nutrient upon ingestion.

### Stability

The ingredient must remain stable “as is” or in blends and premixes. Therefore, the ingredient must be adequately stabilized in a chemical and/or product form which, when stored, transported, milled, or mixed, maintains its activity. The product form must be resistant to activity loss due to environmental factors such as temperature, moisture, and oxygen.

### Uniformity

The particle size and size distribution determine how well the nutrient is dispersed throughout the finished product, impacting the nutrient activity per serving. A uniform product minimizes the tendency for nutrients to segregate when mixed and transported with other micro-ingredients, allows adequate flow through equipment during production and reduces dust formation when handled.

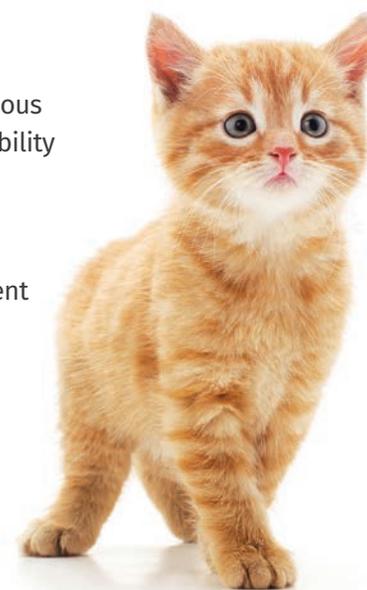
### Consistency in potency

For reliable dosing of a nutrient in production, potency must be consistent both particle-to-particle and lot-to-lot. The availability of appropriate dilutions supports the accuracy of dosing during production.

### Dissolution behavior

The form of the nutrient dictates its aqueous (water) or non-aqueous (fats or oils) solubility or miscibility.

These physical characteristics influence the distribution of the functional ingredient in the final pet product, its color, texture and/or shelf life.



# Production of ingredient forms

**Production:** Functional ingredients such as vitamins or carotenoids are produced either by chemical synthesis, by fermentation, by extraction (often from a natural source) or by a combination of these technologies.



**Modification:** Once the basic functional compound is produced, it may be further processed to develop a more stable chemical form, using processes such as crystallization of an organic salt, esterification and phosphorylation.



**Formulation:** To achieve specific product characteristics, the ingredients then undergo a formulation process. Such formulation creates highly specified nutrient forms optimally equipped to meet pet food specifications.



## Formulation technologies

### Adsorbates

Suitable carriers such as silica particles are prepared for absorbing mainly fat-soluble nutrients. Adsorption has the advantage of delivering an economically attractive dry form of an intrinsically stable nutrient, and results in a free-flowing powder with good mixability, flowability and dust characteristics.

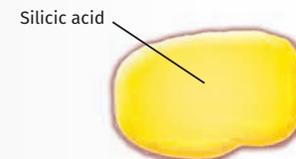


Vitamin in crystalline form

### Crystalline grades

Nutrient compounds are chemically modified to form organic salt which, after drying, is not further formulated but used “as is.”

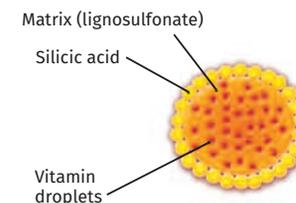
Optionally, crystalline material can be coated with ethyl cellulose which slows any possible detrimental influence of other ingredients present in the formula.



Vitamin adsorbed on silicic acid

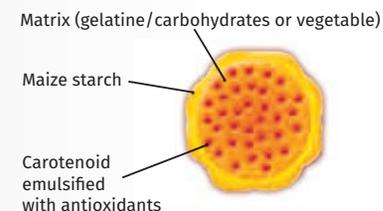
### Spray-dried powders

Spray-drying is applied for many of the water-soluble nutrients to enhance stability, handling and distribution. The nutrient compound is added into a dextrin solution. The solution is spray-dried into a powder, which offers a variety of advantages including stabilizing the nutrients and delivering them in a digestible matrix.



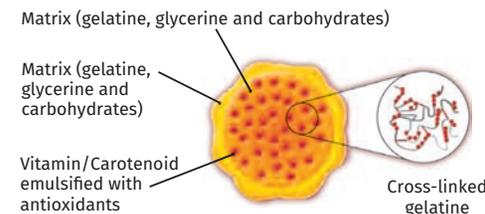
### Beadlets

In beadlet technology, nutrient compounds are emulsified in a gelatine, starch and glycerine matrix, with an antioxidant sometimes added to increase stability. The emulsion is then sprayed to form beadlets which are coated with corn starch to absorb excess moisture. Moist beadlets are dried to produce the finished beadlet. Micronization of the often oily functional ingredient allows the production of stable, yet dispersible beadlets for clear liquids.



### Cross-linked beadlet

Additional chemical bonds are introduced to create a hardened beadlet most commonly referred to as a cross-linked beadlet. A chemical reaction occurs which creates cross-linked bonds thereby creating a more rigid structure. This technology provides excellent stability and is used to protect nutrients in high-temperature applications.



# North American Petfood Portfolio



## Nutritional Lipids

Product Name	Product Description	Dog		Cat		Horse	Bird	Fish	Dry	Wet	Injection Molding	Tablet	Powder	Milk	Water
		Puppy	Adult	Kitten	Adult										
<b>Omega-3 Fatty Acids From Algae</b>															
DHAGold®	Fine Dry Flakes of Microalgae		✓						✓						
<b>Omega-3 Fatty Acids From Fish</b>															
MEG-3® 30% TG Oil	Marine Fish Oil	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	
MEG-3® 30% Powder	Microencapsulated Marine Fish Oil Powder	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓		✓	✓

## Carotenoids

Product Name	Product Description	Dog		Cat		Horse	Bird	Fish	Dry	Wet	Injection Molding	Tablet	Powder	Milk	Water
		Puppy	Adult	Kitten	Adult										
<b>B-Carotene</b>															
ROVIMIX® B-Carotene 10%	Beadlet, Stabilized	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
ROVIMIX® B-Carotene 10% P	Cross-Linked Beadlet, Stabilized	✓	✓	✓	✓	✓	✓	✓	✓		✓				
B-Carotene 10% CWS	Beadlet, Cold Water Dispersible	✓	✓	✓	✓	✓	✓	✓		✓	✓		✓	✓	✓
B-Carotene 10% B	Cross-Linked Beadlet	✓	✓	✓	✓	✓	✓	✓	✓						
<b>Astaxanthin</b>															
CAROPHYLL® Pink 10% CWS	Beadlet, Cold Water Dispersible								✓						

## Fat-Soluble Vitamins

Product Name	Product Description	Dog		Cat		Horse	Bird	Fish	Dry	Wet	Injection Molding	Tablet	Powder	Milk	Water
		Puppy	Adult	Kitten	Adult										
<b>Vitamin A</b>															
ROVIMIX® A 1000	Cross-Linked Beadlet, Stabilized	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓				
ROVIMIX® AD3 1000	Cross-Linked Beadlet, Stabilized	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓				
ROVIMIX® A 500 WS	Spray-Dried Powder, Water Dispersible	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓
Vitamin A Palmitate 1.0 mL/g	Oily Solution (Peanut Oil), Stabilized with Tocopherol	✓	✓	✓	✓	✓	✓	✓						✓	✓
Vitamin A Palmitate 1.7 mL/g	Oily Liquid, Stabilized with Tocopherol	✓	✓	✓	✓	✓	✓	✓			✓			✓	
Dry Vitamin A Acetate 500 B	Beadlet, Tablet Grade	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓		
Dry Vitamin A Palmitate Type 250 S/N	Spray-Dried Powder, Starch Based	✓	✓	✓	✓	✓	✓	✓			✓		✓	✓	

## Fat-Soluble Vitamins (cont.)

	Product Description	Dog		Cat		Horse	Bird	Fish	Dry	Wet	Injection Molding	Tablet	Powder	Milk	Water
		Puppy	Adult	Kitten	Adult										
<b>Vitamin D<sub>3</sub></b>															
ROVIMIX® D <sub>3</sub> 500	Spray-Dried Powder, Water Dispersible	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓
ROVIMIX® AD <sub>3</sub> 1000/200	Cross-Linked Beadlet, Stabilized	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓				
Vitamin D <sub>3</sub> 1.0 mLU/g	Oily Solution, Stabilized with Tocopherol	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓
Dry Vitamin D <sub>3</sub> 100 SD/S	Spray-Dried, Cold Water Dispersible, Stabilized with Tocopherol	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
<b>Vitamin E</b>															
ROVIMIX® E 50% Adsorbate	Vitamin E Oil Adsorbed on Silicon Dioxide	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓		
ROVIMIX® E 50% SD	Spray-Dried Powder, Water Dispersible	✓	✓	✓	✓	✓	✓	✓		✓	✓			✓	✓
Dry Vitamin E 50% CWS/S	Spray-Dried Powder, Water Dispersible	✓	✓	✓	✓	✓	✓	✓			✓			✓	✓
Dry Vitamin E 50%, Type SD	Spray-Dried Powder	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓		
Dry Vitamin E 75 HP	Beadlet, High Potency	✓	✓	✓	✓	✓	✓	✓				✓			
Mixed Tocopherols 70 IP	Liquid Antioxidant, Natural Source, Non-GMO	✓	✓	✓	✓	✓	✓	✓		✓	✓			✓	
Mixed Tocopherols 95	Liquid Antioxidant, Natural Source	✓	✓	✓	✓	✓	✓	✓		✓	✓			✓	
Mixed Tocopherol 30%	Dry Antioxidant, Natural Source	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

## Water-Soluble Vitamins

	Product Description	Dog		Cat		Horse	Bird	Fish	Dry	Wet	Injection Molding	Tablet	Powder	Milk	Water
		Puppy	Adult	Kitten	Adult										
<b>Vitamin B1, Thiamine</b>															
ROVIMIX® B1	Fine Crystalline Powder	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Thiamine HCl	Fine Crystalline Powder	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓
Thiamine Mononitrate	Powder	✓	✓	✓	✓	✓	✓	✓	✓	✓					
Rocoat® Thiamine 33⅓%	Coated Powder	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓			

## Water-Soluble Vitamins (cont.)

	Product Description	Dog		Cat		Horse	Bird	Fish	Dry	Wet	Injection Molding	Tablet	Powder	Milk	Water
		Puppy	Adult	Kitten	Adult										
<b>Vitamin B2, Riboflavin</b>															
ROVIMIX® B2 80-SD	Spray-Dried Powder	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Riboflavin Tablet Grade	Tablet Grade	✓	✓	✓	✓	✓	✓	✓			✓				
Riboflavin Universal	Powder	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓
Rocoat® Riboflavin 33⅓%	Coated Powder	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓			
<b>Vitamin B3, Niacin</b>															
ROVIMIX® Niacin	Fine Crystalline Powder	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓		
ROVIMIX® Niacinamide	Fine Crystalline Powder	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Rocoat® Niacinamide 33⅓%	Coated Powder	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓			
<b>Vitamin B5, Pantothenate</b>															
ROVIMIX® CalPan	Spray-Dried Powder, Water Dispersible	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Calcium D-Pantothenate	Spray-Dried Powder	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
<b>Vitamin B6, Pyridoxine</b>															
ROVIMIX® B6	Fine Crystalline Powder	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓
Pyridoxine Hydrochloride	Crystalline Powder	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓
Rocoat® Pyridoxine Hydrochloride 33⅓%	Coated Powder	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓			
<b>Vitamin B9, Folic Acid</b>															
ROVIMIX® Folic 80 SD	Spray-Dried Powder, Water Dispersible	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Folic Acid	Powder	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
<b>Vitamin B12, Cobalamin</b>															
Vitamin B12 1% Feed Grade	Crystalline Powder Dilution	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
Vitamin B12 Crystalline	Crystalline Powder	✓	✓	✓	✓	✓	✓	✓	✓	✓				✓	✓
Vitamin B12 0.1% WS	Crystalline Powder Dilution	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓
<b>Vitamin H, Biotin</b>															
ROVIMIX® Biotin	Spray-Dried Powder, Water Dispersible	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
ROVIMIX® Biotin HP	Spray-Dried Powder, Water Dispersible	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
D-Biotin	White Crystalline Powder	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓		
Bitrit-1 Type A	Triturate, Powder	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓

## Water-Soluble Vitamins (cont.)

	Product Description	Dog		Cat		Horse	Bird	Fish	Dry	Wet	Injection Molding	Tablet	Powder	Milk	Water
		Puppy	Adult	Kitten	Adult										
<b>Vitamin C, Ascorbic Acid</b>															
ROVIMIX® Stay-C® 35	Spray-Dried Powder, Heat Stable	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓		
ROVIMIX® C-EC	Ethcellulose-Coated Powder	✓	✓	✓	✓	✓	✓	✓		✓		✓	✓		
Stay-C® 50	Spray-Dried Fine Powder, Heat Stable	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓		✓	✓
Ascorbic Acid	Crystalline Powder	✓	✓	✓	✓	✓	✓	✓						✓	✓
Ascorbic Acid Fine Powder	Fine Powder	✓	✓	✓	✓	✓	✓	✓			✓		✓		
Ascorbic Acid Fine Granular	Fine Granular Powder	✓	✓	✓	✓	✓	✓	✓				✓	✓		
Calcium Ascorbate	Powder	✓	✓	✓	✓	✓	✓	✓		✓	✓			✓	✓

## Minerals

	Product Description	Dog		Cat		Horse	Bird	Fish	Dry	Wet	Injection Molding	Tablet	Powder	Milk	Water
		Puppy	Adult	Kitten	Adult										
<b>Mineral Preparations</b>															
MICROGRAN™ Co 5% BMP	Free-Flowing, Micro Granules	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
MICROGRAN™ Se 1% BMP	Free-Flowing, Micro Granules	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
MICROGRAN™ Se 4.5% BMP	Free-Flowing, Micro Granules	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
MICROGRAN™ I 10% BMP	Free-Flowing, Micro Granules	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓



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