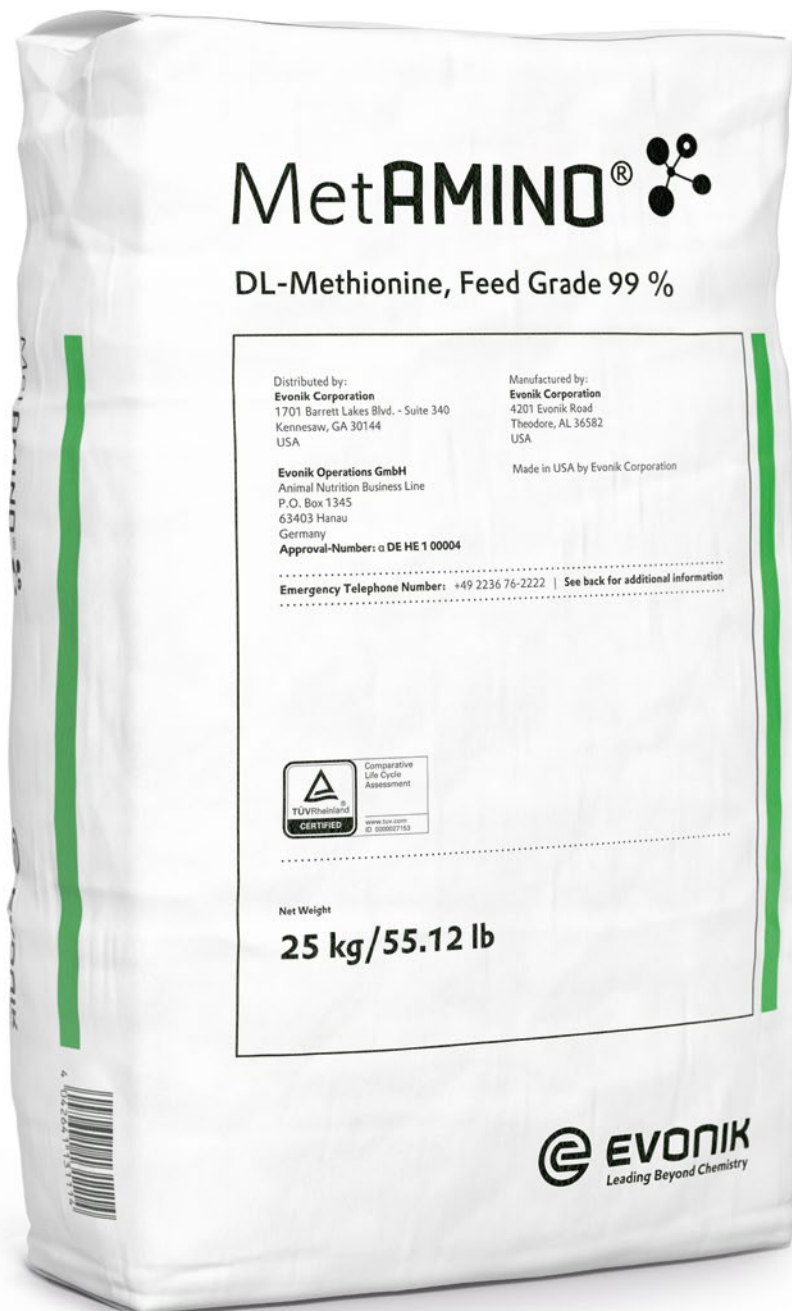


MetAMINO®

Supplemental methionine for optimal livestock performance

Get the most return from your animals with the most widely used methionine source.

MetAMINO® 



MEGATRENDS

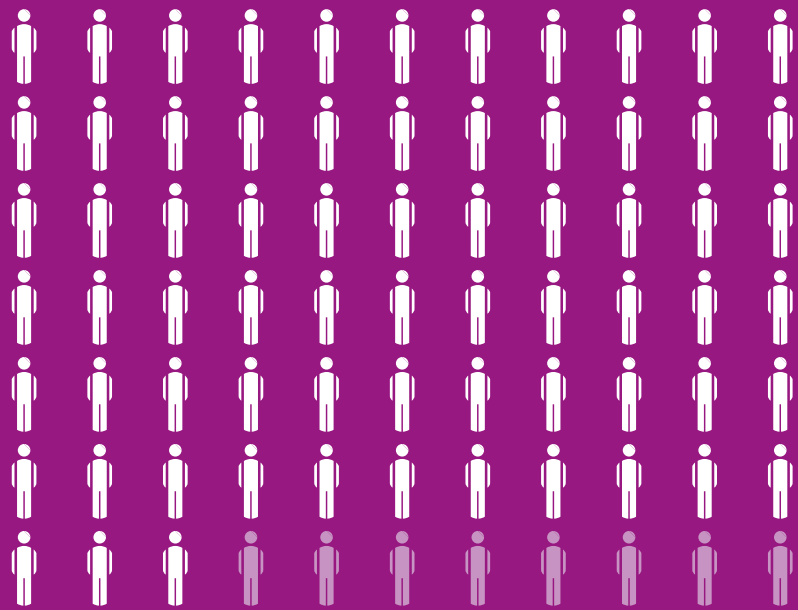
We are what we feed

The world's population continues to grow – and the challenge of securing enough healthy food is growing with it. As meat, fish, eggs and dairy products represent a large share of global needs, the science of animal nutrition has a key role to play in addressing the food challenge. The future depends on innovative, sustainable and efficient feed concepts.

EVERY DAY, 6.4 BILLION PEOPLE EAT AT LEAST 24 GRAMS OF POULTRY PRODUCTS PRODUCED WITH MetAMINO®.

90%

This is about 90% of the world population



POPULATION GROWTH

The UN expects the world population to grow to more than 9 billion by the year 2050. Scientific data show that a nation's demand for meat and other forms of animal protein increases with affluence.



FOOD AVAILABILITY, ACCESSIBILITY AND AFFORDABILITY

Functional feed ingredients and innovative animal nutrition concepts will play a key role in ensuring worldwide food security.



SHORTAGE OF RESOURCES

Across industries, sustainable technologies and methods are needed to avert shortages of clean water and other resources. Nowhere is this challenge more pressing than in the food industry.

3 QUESTIONS

The people who make up Evonik

What is your role at Evonik Animal Nutrition?

I'm responsible for Evonik's amino acids business, focusing on sustainability, efficiency, and cost leadership. One of the key elements of my role is overseeing the global methionine asset strategy to secure Evonik's leading position in methionine worldwide. We ensure supply security for all our customers via our truly global set-up based on production in all regions.

How can MetAMINO® contribute to more sustainable animal farming?

The fact that methionine makes meat production more economical and meat consumption more affordable. It also plays a key role in sustainable livestock production.

What motivates you most in your job?

I'm committed to providing our customers with a consistent and secure supply of high-quality amino acids. In particular, I'm



DR. DIRK HÖHLER

Senior Vice President Essential Nutrition

motivated to help and support the livestock industry in order to meet the demand for the highest quality protein (meat, eggs, milk) for a growing world population.

Your key message

We represent an essential part of the global food protein value chain, and I'm proud to be part of that.

Better feed, better livestock production

Price pressure, consumer demands, regulatory and environmental requirements – raising livestock profitably in today's changing market is challenging. Having reliable, high-quality feed using functional feed ingredients can give farmers an efficiency edge. It not only boosts feed conversion, but also reduces waste output and supports animal health and welfare. The result: higher growth rates and profitability and lower ammonia and nitrogen emissions.

Methionine is a key element in effective functional feeding concepts. Yet not all sources of the essential amino acid are created equal: quality and precise dosability can make all the difference. MetAMINO® is a scientifically proven methionine in a concentrated, easy-to-handle dry form. Its fast and efficient absorption guarantees high nutritional value, while good flowability makes it easy to mix in feed. It allows exceptionally precise dosing, narrower safety margins and lower amounts of crude protein.

BEST QUALITY

Enables advanced feeding concepts

Supports consistent feed performance at minimum safety margins

Meets regulatory requirements and animal needs

BEST PERFORMANCE

Lowers production costs

Boosts yield and uniformity, while lowering mortality

Decreases time to market

BEST HANDLING

Lowers investment costs and maintenance needs

Facilitates easy handling and automated processes

Allows precise dosing and shorter mixing times

Ideal protein diets – less crude protein, more profitability

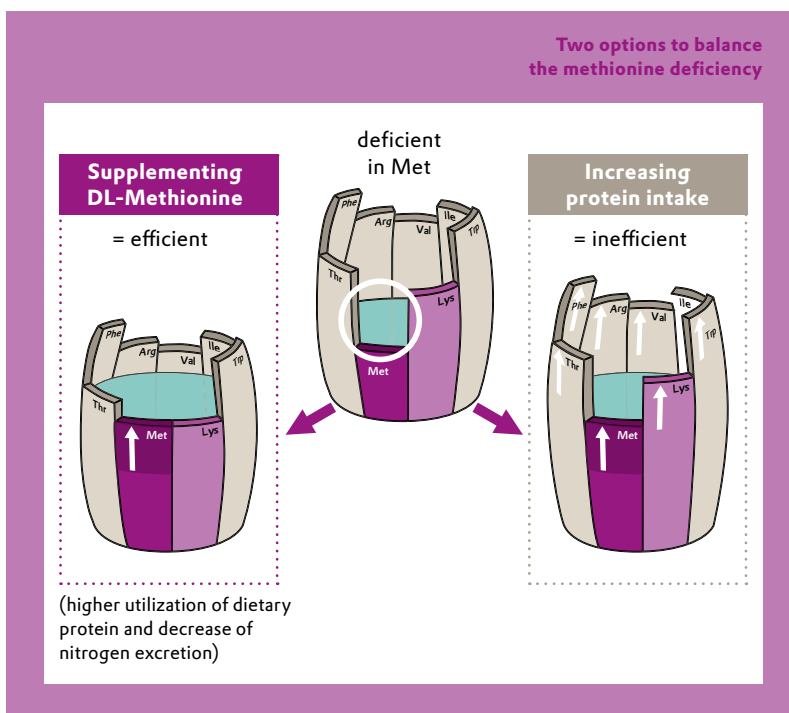
A high-protein feed may guarantee sufficient amino acids for livestock growth, but at a high cost. The game-changing ideal protein concept uses precise amino acid calculations and meets the needs with cost-effective feed additives.

The ideal protein concept is one of the most important advances in animal nutrition. It is based on the fact that animals need a balanced or ideal pattern of amino acids to maximize growth performance and nitrogen retention. All absorbed amino acids in excess compared to the first limiting amino acid are catabolized, increasing nitrogen excretion. The concept takes lysine, which is almost exclusively utilized for body protein accretion, as a starting point. The amount of lysine required, adjusted to the genetic potential of different animals and production conditions, is used as a reference to define the need for other essential amino acids. This ideal ratio is the key to calculating the right amount of amino acids and reducing crude protein. The result: optimized growth performance and maximized nitrogen utilization.

Amino acids vs. crude protein

Crude protein is among the most costly components of livestock feed. Recent price developments have further underscored the fact that formulating diets to meet amino acid recommendations using high levels of intact protein sources is simply inefficient. In addition to high costs, the disadvantages include metabolic stress placed on animals catabolizing and excreting excessive amino acids.

Drawing on scientific findings and decades of hands-on experience, Evonik has established amino acid recommendations for different types of livestock. The resulting reduction in crude protein requirements and targeted use of amino acids – the ideal protein concept – maximizes growth performance and profitability, while lowering environmental impact.



Animal nutritionists have long known that animals do not need crude protein itself, but rather the essential amino acids it contains. Yet high-protein diets were the only way to provide safety margins, ensuring that more than enough of the required amino acids are contained. Today, precise amino acid calculations make it possible to reduce safety margins and fine-tune feed composition. This approach, the ideal protein concept, saves money, boosts animal health and cuts down nitrogen emissions.



Best results in **three steps**



Precise analysis of raw materials is essential for high feed quality. Evonik offers three tools to support the process: AMINONIR®, AMINOProx® and AMINONRG®. The benefit: quick calculations of nutrients and accurate estimations of energy content in feed raw materials.



Nutritionists can accurately design feeds only if they know the animal's needs at different growth phases and the composition of each feed ingredient. For all major species, Evonik offers specific recommendations with AMINODat® 6.3.



Feed is more effective if ingredients are accurately dosed and homogeneously mixed. Evonik's dosing system, AMINOSys®, helps ensure quality while allowing narrower amino acid safety margins for lower cost. More than 600 AMINOSys® customers worldwide can attest to its effectiveness.

MetAMINO® Facts

MetAMINO® is a white, crystalline feed supplement of highest purity – exceeding 99% DL-methionine. The most widely used methionine source in animal nutrition, it is free-flowing and features high bulk density. MetAMINO® can be added to premixes, mineral and compound feeds. Its technical properties guarantee homogeneous mixability and stability against segregation.

PRODUCTION

The feed additives business of Evonik Industries synthesizes MetAMINO® from petrochemical raw materials using patented and proprietary methods. Known as the carbonate process, this proven system is environmentally friendly and results in a high-quality product without the formation of waste salt. It largely avoids airborne and wastewater emissions.

NUTRITIONAL MATRIX

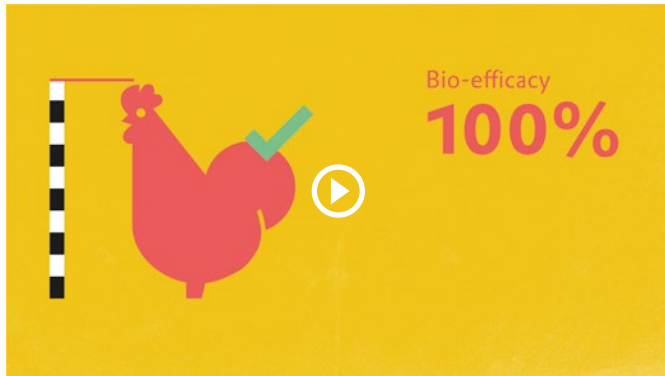
NUTRIENT	MATRIX VALUE	
Methionine content	99.0%	
Digestibility	100.0%	
Crude Protein (N x 6.25)	58.1%	
Metabolizable energy	MJ / kg	kcal / kg
Poultry (estimated)	21.0	5,020
Swine (estimated)	22.0	5,280

SPECIFIC VALUES

Assay (%) min.	99.0
Ash (%) max.	0.5
Loss on drying (%) max.	0.3

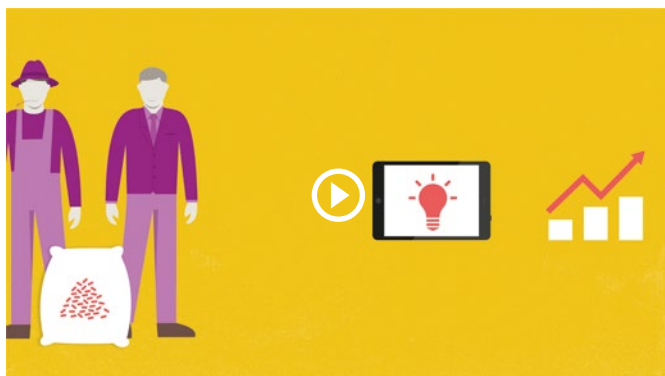
Seeing is believing

We publish explanatory videos about value centric facts to make these complex concepts more understandable.



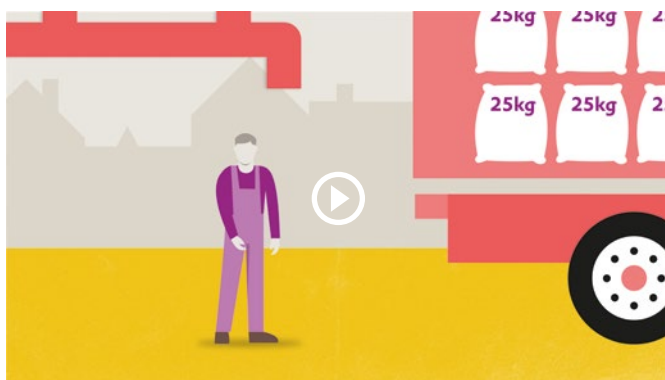
BEST QUALITY

100% bioefficacy and more than 99% purity: Our dry crystalline methionine (DLM), MetAMINO®, supports optimum livestock growth, meat yield and performance. Unlike liquid methionine hydroxy analogue, it adds no unnecessary mass to your feed, resulting in lower metabolic stress on livestock. MetAMINO® not only makes feed optimization easier, it is also backed by an array of AMINO service concepts.



BEST PERFORMANCE

Boost your business performance: Thanks to its higher quality, our dry crystalline methionine (DLM) is more efficient and cost-effective than liquid methionine hydroxy analogue sources. Add our AMINO service concepts and digital tools to the equation and you have everything you need to precisely formulate and dose methionine for lower overall feed costs and higher productivity. This way, feed mills can reduce batch times and accelerate throughput for more profitability.



BEST HANDLING

When it comes to handling, our dry crystalline methionine (DLM) is significantly easier to transport, store and process than liquid methionine hydroxy analogue. With its higher purity and 100% bioefficacy, significantly less MetAMINO® is required than its liquid counterpart, so the volume handled is also lower. Dry DLM also mixes more efficiently with other feed components, which are mainly dry as well. And in contrast to liquid methionine hydroxy analogue sources, MetAMINO® does not form clumps or stick to mixing tools.

Best results – with MetAMINO®

PURITY

100%

DIGESTIBILITY

100%

AVAILABILITY

Worldwide

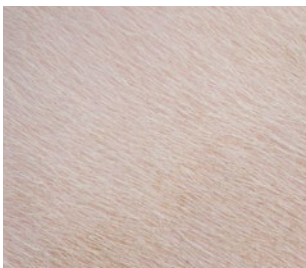
Species

Methionine significantly improves the diets of different species, including poultry, swine and aquatic animals. Livestock production, animal health and the environment can all benefit when feed is supplemented with optimum amounts of high-quality methionine.



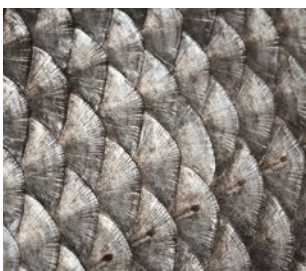
POULTRY

Methionine (Met) is the first limiting amino acid in commercial poultry diets. To precisely meet the Met and total sulfur amino acids requirements, diets are commonly supplemented with DL-methionine (DL-Met). As an essential amino acid, Met is needed as a building block for synthesizing proteins that are incorporated into feathers, body tissues, eggs and also functional proteins such as enzymes. Met also plays important roles as donor of methyl groups, precursor of Cysteine (Cys) and in the synthesis of polyamines and creatine. Supplementing DL-Met improves the amino acid balance of poultry diets and consequently improves growth performance, feed efficiency and nitrogen utilization.



SWINE

The use of DL-Met in swine diets facilitates accurate balancing of Met and Cys levels in line with requirements. Methionine, an essential amino acid, is also needed to supply Cys when dietary Cys is deficient. As an efficient Met source, DL-Met can serve as a methyl donor for DNA methylation, synthesis of polyamine and creatine. DL-Met also supports immune function by supplying Cys, which is used to form glutathione, a major antioxidant involved in immune functions. Supplemental DL-Met reduces dietary crude protein level, which is associated with a reduction in nitrogen excretion and lower feed costs.



AQUACULTURE

Met is often the first limiting amino acid in fish feed. Proven to be as efficient as protein-bound methionine, DL-Met supplementation in fish feed is an effective method to balance diets for amino acids and meet requirements for Met and Met+Cys. Balancing fish feed with supplemental DL-Met significantly improves body weight gain, feed conversion ratio as well as protein utilization. It is also part of an effective strategy to replace fish meal with alternative protein sources as well as to reduce excess dietary protein. This improves sustainability in aquaculture in terms of both economics and environmental impact.

DAIRY FARMING

Met is the first limiting amino acid for milk production. Regular DL-Met cannot be used in ruminants because of their specific digestion system, and has to be protected against microbial degradation in the rumen. With Mepron®, Evonik has met this challenge by coating MetAMINO® with ethyl cellulose. At 85% DL-Met, a bypass of 80% and a digestibility of 90%, Mepron® delivers 612g of metabolizable methionine per kg, the highest quantity of any such product. No other feed ingredient can deliver a unit of metabolically available methionine at lower cost than Mepron®.

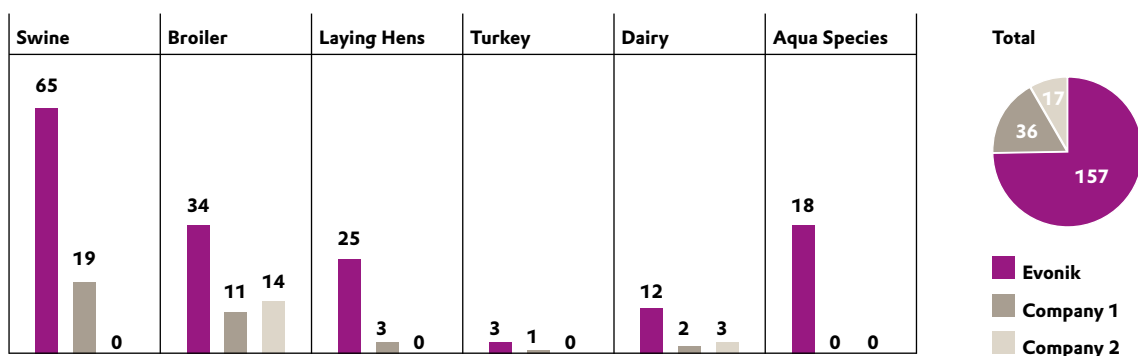
Scientific proof

At Evonik, we are committed to science and how we can harness it to master challenges. This is why research is part of our day-to-day business.



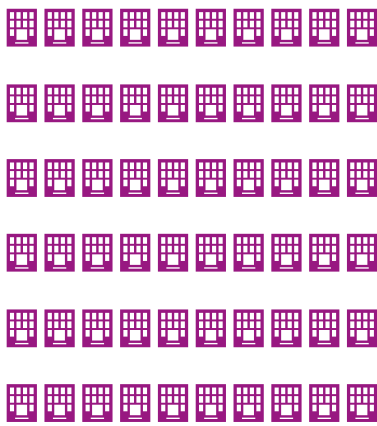
In addition, we publish articles in scientific magazines, the trade press and produce our own customer magazine AMINONews®. We also report commercial trial results via Facts&Figures.

Due to the high number of articles and the continuous publishing rate we are happy to put together a selection of relevant articles according to your needs – simply ask.



Based on SCOPUS search for species and affiliation limited to Articles and Reviews for the years 2012 to 2016

A winning combination



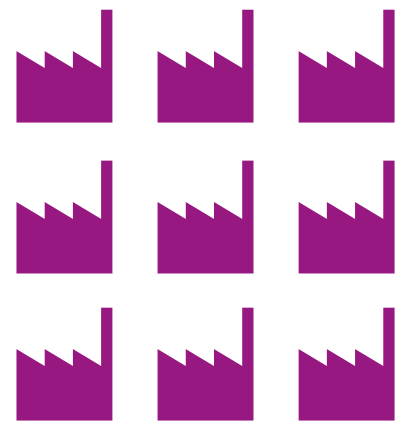
OFFICES IN 60 COUNTRIES

Customers ordering MetAMINO® receive more than a product – we offer a combination of targeted services, digital tools and products. Our experts are at your side with specialized knowledge and experience to help unlock the full value of MetAMINO®. With offices in more than 60 countries, we ensure maximum responsiveness and service quality, guaranteeing availability of our products to customers in over 100 countries. Evonik scientists stay in close contact with universities, research institutes and other members of the scientific community, and share their knowledge in scientific papers and trainings.



ANALYTICAL SERVICE LABS ON 5 CONTINENTS

We have analytical service labs on five continents that provide NIR and wet chemistry services, placing leading analytical capacity for essential amino acids at our customers' disposal. This allows customers to quickly and conveniently assess the components of raw material quality – key information in formulating the best diet for livestock. To enable the implementation of low-protein concepts, we offer a portfolio of essential amino acids and additional healthy nutrition solutions.



PRODUCTION FACILITIES WORLDWIDE

Accurate dosing ensures cost savings and reduces waste. This is especially important for expensive micro ingredients. To support this need, we have developed handling solutions for our products. Combined with other services, this ensures that the animal gets the exact level of amino acids according to the respective growth phase.

With plants on three continents and over 50 warehouses worldwide, we can deliver reliably – on time and in the right quantity. Count on us, not only for an excellent product, but for a whole package that adds up to best results.

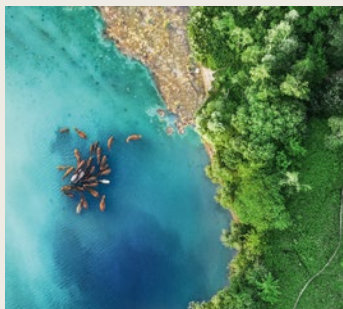


SCIENCING THE GLOBAL FOOD CHALLENGE

The greatest global challenge is to ensure food security. Eight billion human lives depend on it. However, it matters how we source animal protein. That’s why it’s absolutely necessary to act with exceptional care: We need to increase food safety and security, while improving animal health and welfare and reducing the ecological footprint of animal farming. There is only one way to do it right: using science. Only well thought-through, evidence-based solutions can establish a truly sustainable and secure food supply. Our focus is on three areas of action.



**OUR PLANET
NEEDS US TO DO
MORE WITH LESS**



**ANIMAL WELFARE IS
ABOUT MORE THAN
JUST LIVESTOCK**



**ENSURING
FOOD SECURITY
FOR ALL OF US**

IN DIALOGUE

You can reach us in many ways – by email, social media, telephone, or a personal visit. We look forward to serving you.



Check out our video –
We are Evonik
Animal Nutrition.

EVONIK OPERATIONS GMBH
Animal Nutrition Business Line

evonik.click/animalnutrition

**Learn more about
MetAMINO®**

evonik.click/metamino



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