

# Essential amino acid for effective feeding concepts.

A lysine source for animals to get a guaranteed effective feed diet, while lowering the ecological footprint.


**Biolys®**



MEGATRENDS

# We are what we feed

The world's population continues to grow – and so does the challenge of securing enough healthy food. Since 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.



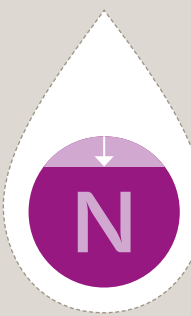

**BETTER FEED MEANS BETTER FOOD**

We're aware of humanity's challenges and strive to improve global animal protein production. Our knowledge, based on science and experience, guides us. Animal nutrition impacts livestock farming's environmental footprint. Fortunately, we understand food production's science and environmental impact better than ever. Precise knowledge of livestock nutrition enables us to develop products that enhance animal health and performance.

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**REDUCED GROUNDWATER POLLUTION WITH BIOLYS®**

.....



**-9%**

1 percentage points crude protein (CP) reduction in pig diets – 9 percent less nitrogen (N) excretion to the environment

This broad range of offerings helps the food industry meet the challenges of today and tomorrow. For example, groundwater pollution from livestock waste is a rising concern. Biolys® helps producers lower crude protein content of their feed. A 1% drop in dietary protein reduces nitrogen in manure and ammonia emissions by 9%. Biolys® also decreases water consumption, resulting in less manure volume.

## 3 QUESTIONS

### The people who make up Evonik

#### 1. What is your role at Evonik?

I am responsible for the technical and marketing activities of Evonik Animal Nutrition in North America.

#### 2. How can Biolys® contribute to a more sustainable animal farming?

By providing a balanced diet with Biolys® supplementation, it is possible to meet the animal's needs in the most efficient way. Biolys® is produced through fermentation with the resulting L-lysine and a nutritionally rich biomass being the basis of the product. Sustainable raw material and energy supply of our two production sites in Blair (USA) and Castro (Brazil) further contribute to the low carbon footprint of Biolys®.

#### 3. What motivates you most in your job?

Working with science-based and high-quality products to fulfil the industry needs. Based on science, we help producers feed the world.



**“We strive to provide the upmost technical services and high-quality, cost-effective, and sustainable solutions to our customers”**

**ANITA MENCONI**

*Regional Technical  
& Marketing Director*

# Better feed, better livestock production

Price pressure, consumer demands, regulatory and environmental requirements – raising livestock profitably in today's changing markets is challenging. Consistently using high-quality feed with functional feed ingredients can give farmers an advantage in efficiency. Feed additives not only boost feed conversions; they also reduce waste output and support animal health and welfare. The result: higher growth rates and profitability, lower ammonia and nitrogen emissions.

Lysine is a key element in effective feeding concepts. Yet not all sources of the essential amino acid are created equal: Biolys® contains a minimum of 62.4 percent L-lysine in the form of sulfated salt and coproducts from the fermentation process which are valuable for nutrition. Biolys® has been tested and validated in many trials with poultry, pigs, and fish under a variety of production conditions, growth stages, and management systems. Excellent flowability makes it easy to mix in feed. It allows exceptionally precise dosing, lower safety margins, and reduced amounts of crude protein in the feed formulation.

# Ideal protein diets – less crude protein, higher profitability

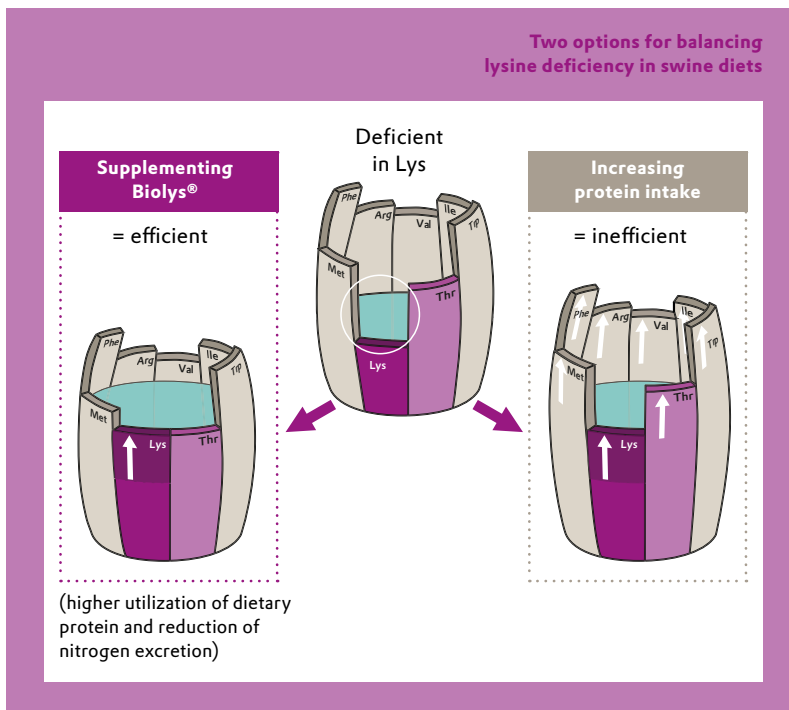
A high-protein feed may guarantee sufficient amino acids for livestock growth, but at a high cost. The game-changing ideal protein concept uses precise amino acid specifications to meet the needs of essential nutrients with cost-effective feed additives.

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 of the first limiting amino acid are catabolized, increasing nitrogen excretion and using expensive energy, diverting it away from growth. 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 standardized ileal 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 – maximize 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 specifications make it possible to reduce safety margins and fine-tune feed compositions. This approach, the ideal protein concept, saves money, 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 this process: AMINONIR®, AMINOProx®, and AMINONRG®. The benefit: quick predictions of nutrients and accurate calculation 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 AMINOChick®, AMINO-Pig® and other IT tools.



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

# Biolys<sup>®</sup> Facts

Biolys<sup>®</sup> serves to provide an adequate supply of the essential amino acid lysine. Additionally, it contains nutritionally valuable coproducts from the fermentation process.

## PRODUCTION

Biolys<sup>®</sup> is produced by a fermentation process. Major parts of the production process are patented. Biolys<sup>®</sup> can be processed in feeds by any technical procedure. It is stable during pelleting and other hydrothermal treatments up to 130°C (266°F). With respect to dosing accuracy, its lysine content of 62.4 percent is particularly advantageous for achieving homogeneous distribution at low supplementation rates.

## NUTRITIONAL MATRIX

	Biolys <sup>®</sup>	
L-lysine	62.4	
Digestibility	100%	
Energy		
Swine	18.30 MJ DE/kg	4,375 kcal DE/kg
	17.36 MJ ME/kg	4,150 kcal ME/kg
	13.02 MJ NE/kg	3,112 kcal NE/kg
Poultry	16.72 MJ ME/kg	3,997 kcal ME/kg
Crude Protein (%) (%N x 6.25)	79	
Phosphorus (%)	0.12	
Other amino acids (%)		
Methionine	0.06	
Cystine	0.04	
Met + Cys	0.10	
Threonine	0.20	
Tryptophan	0.06	
Arginine	0.42	
Isoleucine	0.19	
Leucine	0.33	
Valine	0.30	

# A positive impact on both business and the environment



## ABOUT OUR PRODUCTION SITES

**Biolys® is produced at the Evonik sites Blair (US) and Castro (Brazil). Both plants are located in the midst of corn-producing regions. Here, our highly motivated teams convert corn-derived dextrose into Biolys®, using biotechnological processes.**

### DRIVE PROFITABILITY

Biolys® is made from corn sugar and provides an effective and reliable source of lysine for the compound feed industry. It supports performance due to high lysine concentration, high energy, and additional amino acids from the biomass. Adding AMINO-branded service concepts and digital tools to the equation results in precise feed formulations and dosing of lysine, leading to overall lower feed costs and higher profitability. This way, feed mills can reduce batch times and accelerate throughput for greater profit.

### CUT COSTS

Boosting business profitability is easy when using Biolys® and benefiting from high lysine concentration plus valuable coproducts from fermentation. Because of the additional phosphorus, nutritive amino acids, energy, lipids, and carbohydrates of the biomass, Biolys® is more efficient and cost-effective than lysine HCl sources. If this information

is incorporated accurately into the raw material matrix of the feed formulation software and the rations calculated by means of least cost optimization, Biolys® is preferred over lysine HCl in all poultry and pig diets.

### FACILITATE PROCESSING

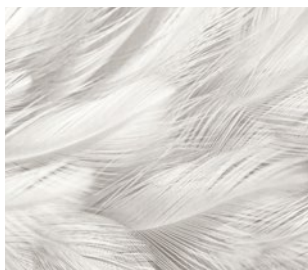
Biolys® is made by state-of-the-art fermentation and downstream technologies leading to excellent handling and processing properties. Biolys®, the innovative form of feed grade L-lysine, is available as a free-flowing granulate with a high bulk density. The particle size distribution secures optimum homogeneity in feed. Biolys® is a true champion for efficient animal nutrition.

### IMPROVE SUSTAINABILITY

Since 2021, Evonik has managed to reduce the CO<sub>2</sub> emissions from this production process by roughly 20 percent, leading to the lowest carbon footprint for lysine available on the market.

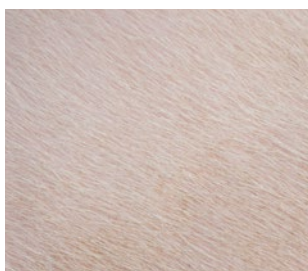
# Species

**Supplemental lysine significantly improves the diets of various species, including poultry, swine, and aquatic animals. Livestock production, animal well-being, and the environment can all benefit when feed is supplemented with optimum amounts of high-quality lysine.**



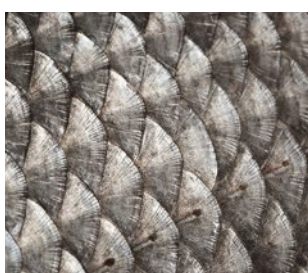
## POULTRY

Lysine (Lys) is the second limiting amino acid in commercial poultry diets. Lysine is an essential amino acid (AA) required for protein synthesis and thus necessary for optimizing growth performance, egg production, and carcass yields. In addition, dietary Lys level is routinely used as the basis for expressing the requirements of all other essential amino acids in the ideal protein concept. Therefore, properly meeting the Lys requirements in poultry diets is of utmost importance. For this, supplemental Biolys® allows improvement of the amino acid balance of poultry diets while improving growth performance and feed efficiency and reducing nitrogen excretion.



## SWINE

In typical swine diets, Lys is the first limiting amino acid. Thus, to ensure maximum protein deposition, Lys needs to be supplied to meet the requirements of pigs. While body protein synthesis is the primary use, dietary Lys is also utilized for carnitine synthesis and obligatory oxidation. The most common sources of Lys are L-lysine-HCl and L-lysine sulfate (Biolys®). Numerous studies have proved that the bioavailability of Lys in Biolys® and L-lysine-HCl are not different in pigs. Dietary supplementation with Biolys® reduces dietary crude protein level, which is associated with a reduction in nitrogen excretion and lower feed costs.



## AQUACULTURE

Lysine is commonly the second limiting amino acid, after methionine, in fish and shrimp feed. Biolys® supplementation in aqua feed formulations allows nutritionists to be flexible with raw material selection and reduce diet cost, while balancing the diets for lysine. Balancing fish feed with supplemental Biolys® results in significant better commercial KPIs. It is also part of an effective strategy for replacing fish meal with alternative, less expensive protein sources as well as reducing excess dietary protein levels. Such a strategy supports the sustainability of aquaculture in terms of both economics and environmental impact.



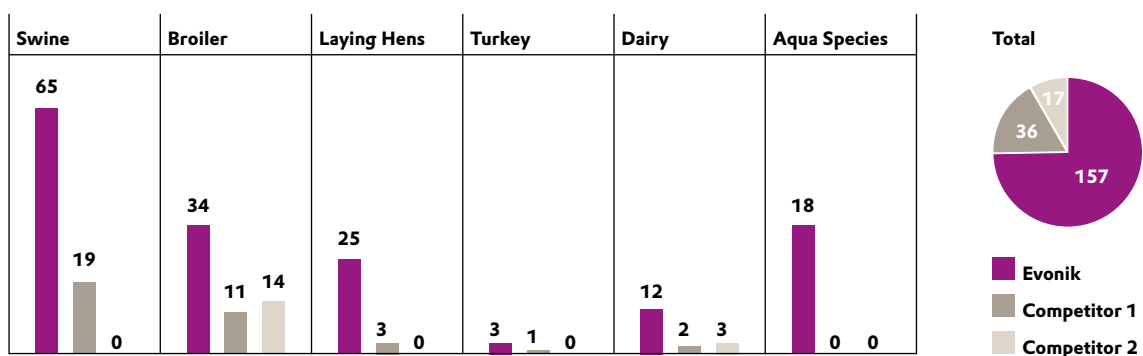
# Scientific support

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



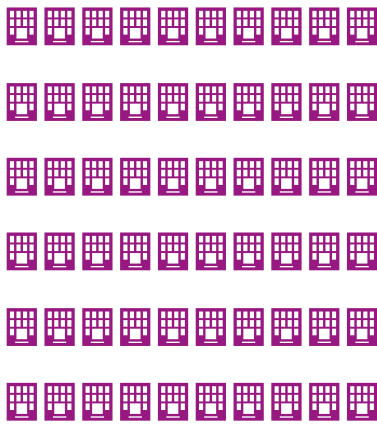
In addition, we publish articles in scientific journals and the press, and produce our own customer magazines AMINONews® and AMINOTec®. We also report commercial trial results via Facts&Figures.

Due to the high number of publications generated by Evonik 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



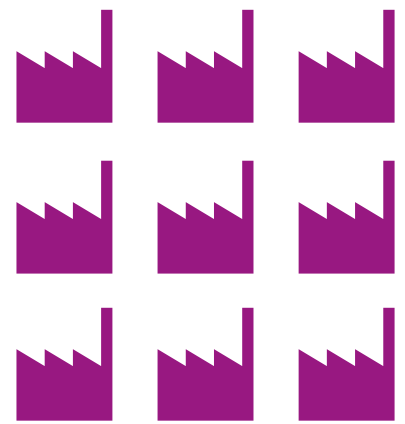
## OWN OFFICES IN 60 COUNTRIES

Customers ordering Biolys® receive more than a product – we offer a combination of targeted services, digital tools, and products. Our experts provide specialized knowledge and experience to help unlock the full value of Biolys®. 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.



## 13 LABS ON 5 CONTINENTS

We have 13 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. Customers can count on us not only for an excellent product, but for a whole package that adds up to best results.

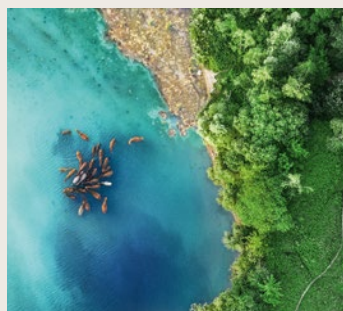


# SCIENCING THE GLOBAL FOOD CHALLENGE

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**  
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06/2023

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