Sustainable and profitable swine production

PRODUCTS & SERVICES FOR PIG FARMING

EVONIK
Leading Beyond Chemistry

MEGATREND: Population growth

THE UNITED NATIONS ESTIMATES THAT THE WORLD'S POPULATION WILL REACH 8 BILLION IN 2025, AND THAT ROUGHLY 1.8 BILLION PEOPLE WILL BE LIVING IN COUNTRIES OR REGIONS WITH ABSOLUTE WATER SCARCITY (FOOD AND AGRICULTURE ORGANIZATION OF THE UN, 2017).

As the population grows, the world's per capita consumption of meat, fish, eggs and dairy products rises with it. This trend is further driven by increasing affluence in developing countries. Although agricultural production efficiency has vastly improved over the past few decades, its environmental impact in terms of emissions to land and air from increased animal protein production have become unsustainable.

Pork, the world's second-most consumed meat, will continue to play a huge role in meeting demand for animal protein. More sustainable pig-farming methods are urgently needed.

WORLD PORK PRODUCTION IN 2018

112.6
million tons

WORLD PORK PRODUCTION EXPECTED IN 2050

143.0
million tons

PORK PRODUCTION IN CHINA IN 2018

54.2
million tons

Source: USDA, Indexmundi., carcass weight equivalent, 2018*

PORK DEMAND

With total worldwide production of around 113 million tons in 2018, pork accounts for a huge proportion of animal protein intake. Annual global production is expected to rise by 10 % over the next decade and reach 143 million tons by 2050.

MAIN PORK PRODUCERS

China is the world's largest producer of pork, with around 54 million tons produced in 2018. The European Union and the US are a distant second and third, respectively. The 10 largest pork-producing countries account for almost 94 % of total global production.

RISING TO THE CHALLENGE

As pork production increases, the need to reduce its environmental impact will become even more acute. In addition, there is growing regulatory and consumer demand for sustainable and healthy livestock production. Pig farmers are under pressure to adapt their methods, while at the same time remaining competitive.

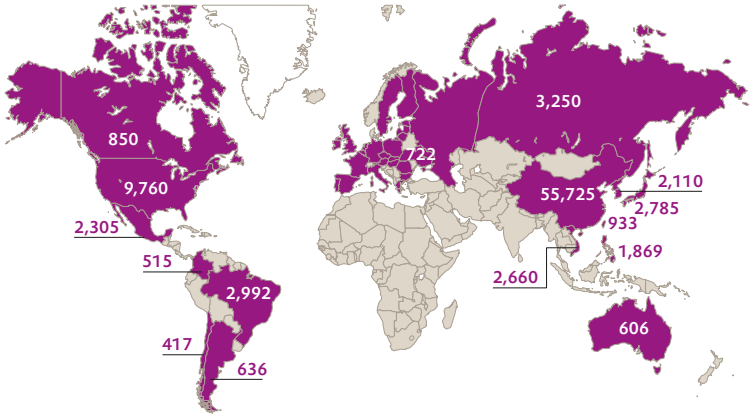
NEW TRENDS IN THE MEAT VALUE CHAIN

Consumers increasingly want to know exactly what they are eating and where it came from. In the case of meat, this also means knowing whether it was produced according to their values and beliefs, for example, regarding animal welfare.

These expectations are best met with recognized brands and labels of approval guaranteeing adherence to certain farming standards and practices. Prohibiting antibiotics as growth promoters is a prime example of rising transparency demands. Regulatory authorities and consumers are increasingly concerned about the overuse of antibiotics and multidrug-resistant bacterias.

To meet the market requirements while at the same time maintaining or increasing productivity, pig farmers need to look for new and innovative methods and technologies. High-performance feed additives and solutions that leverage digitalization and big data management can be highly effective in this context.

Figure 1: Worldwide pork consumption (in 1000 tons) 2018



Source: Indexmundi 2019

Automation and digitalization can help increase production efficiency, raise or ensure quality, increase output and lower safety margins.

CHALLENGES AND SOLUTIONS in pig farming

HOLISTIC NUTRITION IS THE KEY TO HEALTHY AND EFFICIENT PORK PRODUCTION.

IDEAL PROTEIN DIETS

Reducing nitrogen excretion and ammonia emissions to the environment is a top priority in pork production. A high level of dietary crude protein (CP) is the main cause of excessive nitrogen excretion in pigs. Formulating ideal protein diets with reduced dietary CP levels supplemented with crystalline amino acids is an effective way to reduce nitrogen excretion without compromising performance, provided the diet is adequately balanced regarding amino acids and energy. Increased availability of amino acids such as lysine, methionine, threonine, tryptophan, valine and isoleucine allow swine nutritionists to reduce dietary CP levels even further. On average, a 1 %-point CP reduction results about 9 % reduction in nitrogen excretion, which significantly contributes to the reduction of ammonia emissions. It also decreases diarrhea incidence, improving animal welfare as well as conditions for employees and the environment.

A further reason to avoid high CP diets is that increased undigested protein reaching the hindgut can promote proliferation of pathogenic bacteria such as E. coli. Bacterial fermentation of undigested protein produces potentially toxic substances such as ammonia and amines that can increase incidence of diarrhea in weaned pigs and reduce growth. Lowering dietary CP greatly reduces ammonia emissions, with 1 %-point CP reduction resulting in about 12 % reduction in ammonia. This improves the air quality of the barn and reduces diarrhea incidence, contributing to improved animal welfare.

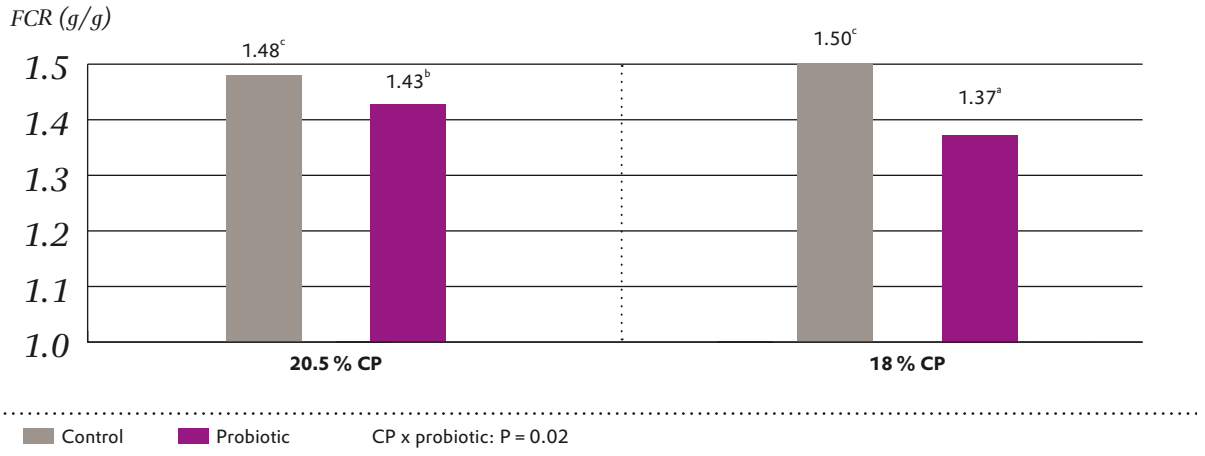
DEMAND FOR ALTERNATIVES TO ANTIBIOTICS

Weaning is a stressful time for pigs, often associated with low feed intake, depressed growth and increased diarrhea incidence. Antibiotic growth promoters (AGPs) in piglet diets are effective in reducing the incidence of diarrhea, but market and regulatory trends call for alternatives to AGPs. It is now well accepted that lowering dietary CP and supplementing with amino acids can reduce the production of harmful microbial metabolites such as ammonia and amines in the hind gut and, in turn, diarrhea incidence.

Probiotics are living microorganisms that maintain and restore balanced gut microflora and have beneficial effects in the digestive tracts of the animals. Recent research has shown that reducing dietary CP and supplementing with probiotics can result in reduced toxic metabolites. The approach promotes the intestinal barrier function, decreasing post-weaning diarrhea incidence and improving the performance of weaned piglets (Bhandari et al, 2010; Garcia et al., 2014; Tang et al., 2019). These results (see figure 2) suggest a synergistic effect of low protein diets with probiotics. A combination of a low-protein diet and probiotics may be an effective alternative to the use of antibiotics in weaned pig diets.

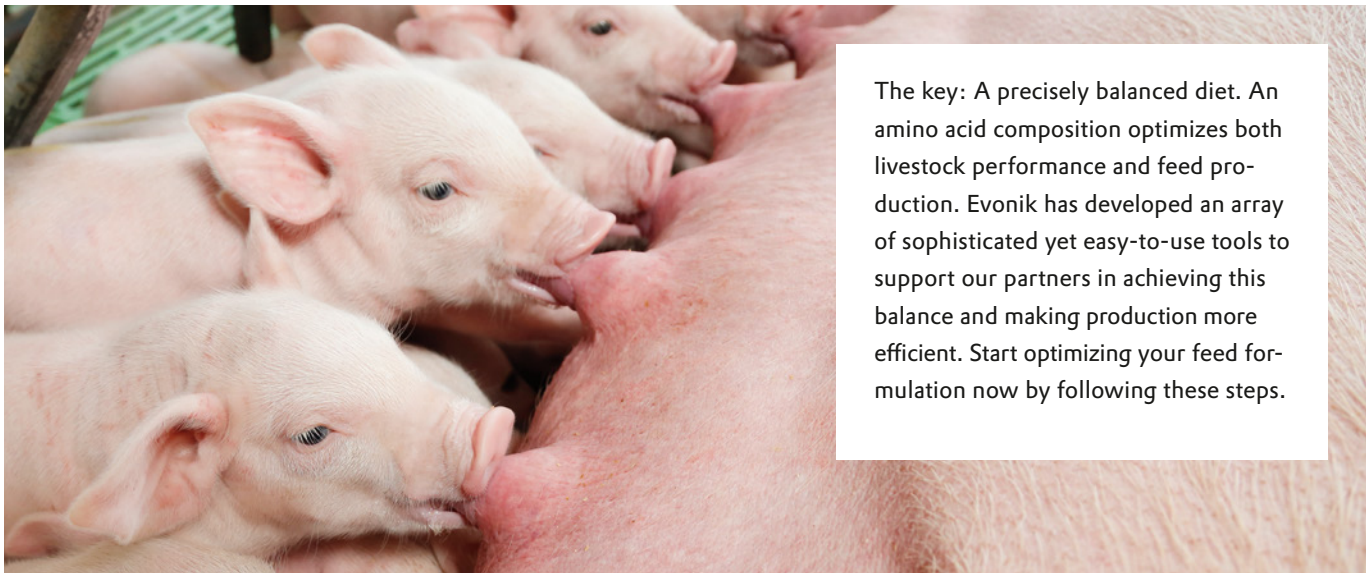
Considering that fat is the first nutrient affected during the diarrhea process, the use of omega-3 fatty acid sources could have beneficial effect on the gut health of piglets. Supplementing omega-3 fatty acids, i. e. EPA and DHA, is associated with anti-inflammatory effects. Maintaining a dietary omega-6 to omega-3 fatty acid ratio of 4:1 or 5:1 has been shown to attenuate inflammation and counteract reduced performance of weaned pigs.

Figure 2: Feed conversion ratio (FCR) became more efficient when probiotic was added to the low protein diets in weaned pigs (d 0–14; Tang et al., 2019)



PRODUCTS & SERVICES

For efficient, transparent and sustainable swine production



The key: A precisely balanced diet. An amino acid composition optimizes both livestock performance and feed production. Evonik has developed an array of sophisticated yet easy-to-use tools to support our partners in achieving this balance and making production more efficient. Start optimizing your feed formulation now by following these steps.

Steps to profitable and more sustainable swine production

1

SET NUTRITIONAL TARGETS

Nutritional requirements of pigs can be affected by many factors including age (body weight), breeds, health and environment. Setting an adequate nutritional target is the starting point of any cost-efficient feed formulation. Protein is one of the most expensive components in any diet and deserves specific attention. Evonik's AMINO*Pig* software takes out the guesswork and lets you quickly and easily derive the right amino acid recommendation for your pigs. It provides SID amino acid and net energy recommendations for pigs in different phases to meet your production conditions.

AMINO*Pig*®

2

EVALUATE YOUR RAW MATERIALS

Once you know what your animals need for optimum growth, you can combine your feed ingredients in suitable amounts to meet those nutritional requirements. The AMINO*Dat*® database records the amino acid profile of more than 140 raw materials from

around the world. Using these data, you can identify the optimum amount of each ingredient for your feed formulation.

To take this precision to a higher level and account for variability of raw materials between batches, Evonik offers AMINO*Lab*® and AMINO*NIR*®. Our AMINO*Lab*® service provides raw-material analysis using wet-chemistry methodologies at one of our quality-controlled facilities around the world. AMINO*NIR*® uses near infrared (NIR) technology to deliver fast, onsite and offsite analyses of your input material.

AMINO*Dat*® 5.0

AMINO*Insight*®

AMINO*Lab*®

AMINO*NIR*®

3

BALANCE THE DIET

Pigs need the right balance of amino acids for optimum growth and profitable performance. Lysine is the first limiting amino acid in typical swine diets: if the dietary lysine level is deficient, other amino acids cannot be utilized to full potential. The amino acid imbalance leads to lower deposition of protein and higher nitrogen excretion, contributing to increased environmental pollution. Optimum pig performance can be achieved by supplying all amino acids in the feed according to the ideal protein concept.

Biolys®

ThreAMINO®

TrypAMINO®

MetAMINO®

ValAMINO®

AMINO*NIR*® RED

HEAT-RELATED NUTRIENT VARIABILITY

To deactivate anti-nutritional factors (ANFs), heat is applied during the processing of protein feedstuffs. However, heating can destroy and reduce availability of amino acids due to the Maillard reaction. The standardized ileal digestibility (SID) of amino acids may overestimate their availability in over-processed ingredients. In response, Evonik has developed the rapid NIR-based method to estimate the degree of heat damage as well as to correct the SID of amino acids in selected feedstuffs, including soy and corn DDGS. Using the corrected SID values for heat-damaged soybean meal in diet formulation can help you avoid impaired pig performance.

4

BOOST PERFORMANCE WITH PROBIOTICS

Efficient livestock production is a balancing act of nutrition, gut health and animal welfare, especially when reducing or eliminating the use of antibiotics as growth promoters. Challenges related to prevalence of pathogens, unfavorable environmental conditions and poor ingredient quality can negatively impact the intestinal microbial balance in animals, leading to poor gut health and reduced performance. Exposure to subclinical levels of disease, diarrhea incidence and poor digestive capacity of weaned pigs can impair feed utilization efficiency, growth and welfare.

Evonik has developed probiotic solutions that restore balanced gut microflora and improve gut health. Our probiotic portfolio includes Ecobiol® (*Bacillus amyloliquefaciens CECT5940*), GutCare® (*Bacillus subtilis DSM 32315*), GutPlus® (*Bacillus subtilis DSM 32540*) and Fecinor® (*Enterococcus faecium CECT 4515*). Evonik's probiotics have been proven in research and commercial facilities. The result: enhanced overall health and performance.

Ecobiol®

Fecinor®

GutCare®

GutPlus®

5

ENSURE PRECISION IN DOSING AND FEED HOMOGENEITY

Efficient handling of amino acids from bags, big bags or bulk silos in the feed mill is essential in producing consistently high-quality feed. Weighing and transport processes need to be fine-tuned to achieve short batch cycles and high output. Well aligned, state-of-the-art hardware and software solutions can enable the required precision in micro-ingredient handling and dosing.

Evonik provides comprehensive engineering and commissioning support to ensure you achieve these goals. The AMINO*Sys*® equipment range includes flexible solutions for fully automated direct dosing or for conveying from bulk silos to existing micro- ingredient systems. The result: efficient production and a homogenous final feed product.

AMINO*Sys*®

AMINO*Batch*®

AMINO*Batch*® *WPT*

RELY ON THE SWINE EXPERTS

Experts from Evonik Animal Nutrition have been conducting scientific research and developing innovations in close contact with livestock producers, universities and research institutes since the 1980s. The knowledge created is shared in technical publications such as AMINO*News*® and Fact & Figures, in scientific papers and customer training formats. Evonik also regularly publishes recommendations for supplementing with amino acids as well as standardized ileal digestibility of amino acids in raw materials in swine feeds.

Evonik's swine nutrition and health specialists support swine producers around the world with technical consulting on applying the most advanced nutritional concepts. These include low CP, amino acid-fortified diets and utilizing the synergistic effects of low CP diets with probiotics and other feed additives. With products and services from Evonik, pig farmers achieve more efficient and sustainable production and maximum profitability.

ALWAYS UP TO DATE

Beastly good information at your fingertips: AMINO*News*® provides you with the latest findings in the science of animal nutrition and is now also available for mobile use. Just scan the QR code and access it.

EXPERIENCE
that matters

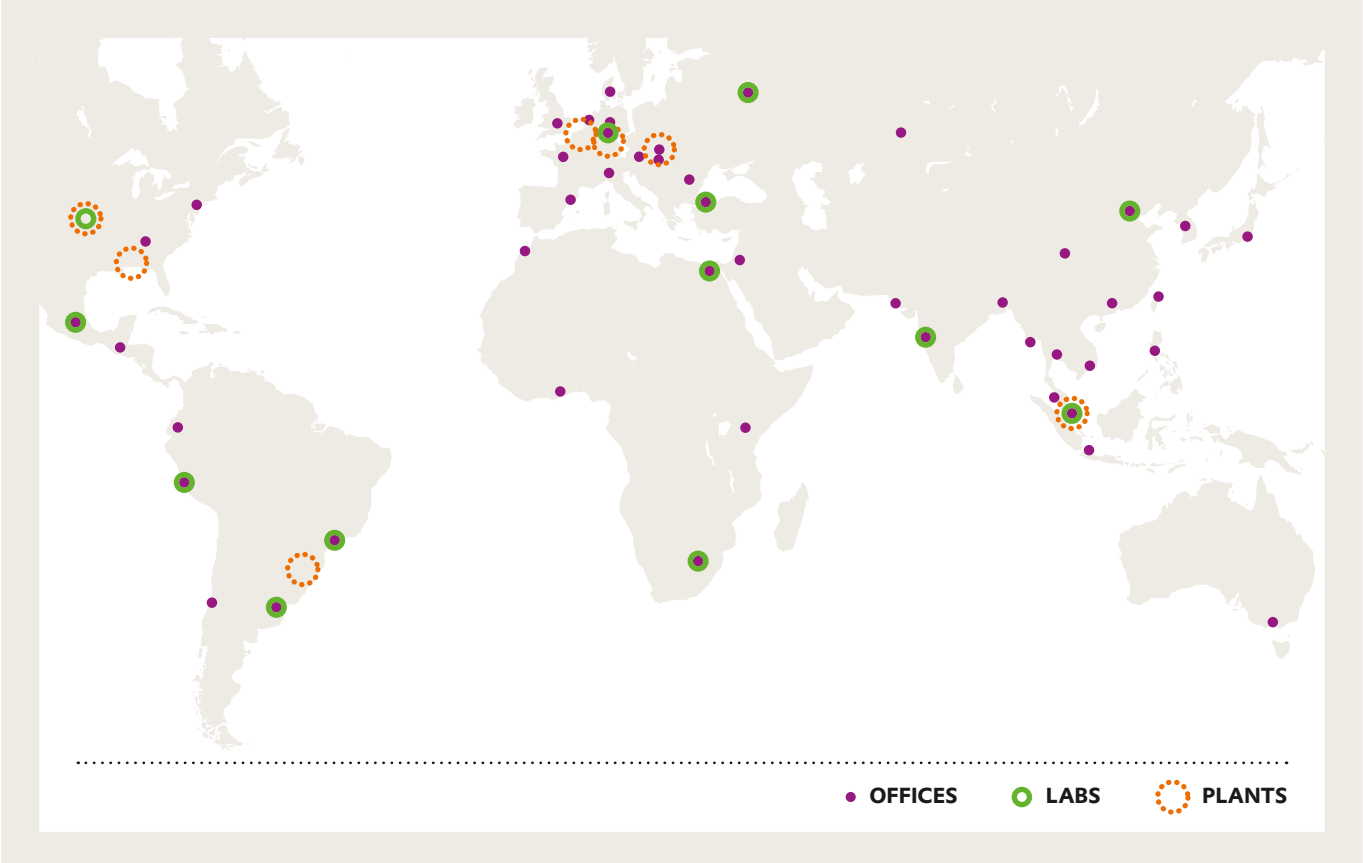
Customers ordering our products receive more than just feed additives – we also offer a combination of customized solutions, services and digital tools. Our experts are available onsite with specialized knowledge and experience to help unlock the full value of your business.

With offices in more than 50 countries, we ensure maximum responsiveness and service quality, guaranteeing availability of our products to customers in over 100 countries.

We have more than 10 labs on five continents that provide NIR and wet-chemistry services, placing leading analytical capacity for amino acids and other nutrients at your disposal. This ensures quick turnaround and accurate assessments of your raw material quality, enabling you to formulate consistently high-quality and cost-efficient feed. With our portfolio of essential amino acids and other advanced nutrition solutions, we place you in a position to implement more efficient and sustainable diet concepts, such as ideal protein, and support you in your antibiotic-free strategy.

To avoid waste of relatively costly micro-ingredients, we have developed handling solutions that maximize dosing accuracy. You can reduce safety margins while still guaranteeing sufficient amounts of amino acids to meet livestock needs.

With manufacturing 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.



Evonik at a glance

Evonik is one of the world leaders in specialty chemicals. The company is active in more than 100 countries around the world and generated sales of € 13.1 billion in 2019. Evonik goes far beyond chemistry to create innovative, profitable and sustainable solutions for customers. More than 32,000 employees work together for a common purpose: We want to improve life, today and tomorrow.

The focus of the business of the Nutrition & Care division is on health and quality of life. It develops differentiated solutions for active pharmaceutical ingredients, medical devices, nutrition for humans and animals, personal care, cosmetics, and household cleaning. The Animal Nutrition business line is one of Evonik's key end markets.

EVONIK ANIMAL NUTRITION

Evonik Animal Nutrition is a highly reliable, globally operating provider of science-driven products and services for sustainable and efficient production of meat, fish, eggs and milk. The organization is marked by scientific excellence and sensitivity to the needs of our customers and society.

OUR MISSION

We use science to improve sustainability, health and efficiency along the food chain to feed growing populations with animal protein for generations to come.

WHAT WE STAND FOR

Our unique combination of scientific excellence and customer-centered products and services sets us clearly apart. Our customers know they can count on us, because everything we do is firmly rooted in proven science and implementation expertise.

IN DIALOG

So many ways to reach us – whether via e-mail, telephone or a personal visit. We look forward to serving you.

Check out our LinkedIn company page for the latest news.

#EvonikAnimalNutrition

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