



Matching today's expectations.  
Natural ingredients for healthy piglets.

**beneo**  
connecting nutrition and health

# Natural ingredients for healthy piglets.

Today, piglets are weaned at a much earlier stage than in the past. As this is a very stressful period for piglets, it's important to get them the right feed in order to make the switch from milk to solid feed as smoothly as possible. Animal distress and intestinal problems can be avoided by giving the optimal feed. The different challenges this entails can be met with the specially designed ingredients from BENEÓ's animal nutrition range.

It is key to ensure optimal gut health after weaning. Where in the past antibiotics were employed to support digestive health, public concern around food safety and antibiotic resistance closed the door to this option. A good alternative is the use of prebiotic fibres for improved growth and gut health of young piglets. Vital Wheat Gluten and rice ingredients can also help to come to a healthy and well-functioning gastrointestinal tract.

In order to stimulate good growth in piglets, their feed needs to taste good and be easy to digest. Premium vegetable protein sources and highly digestible carbohydrates are perfect to ensure sufficient intake of valuable nutrients and energy. Good palatability further promotes voluntary feed intake by the piglets and helps to boost the performance of the animals.



# High-quality vegetal protein sources.

BENEO Vital Wheat Gluten is a vegetal protein source that is not limited to the nutritional benefit of amino acid content. With a high protein content of over 80%, Vital Wheat Gluten is one of the most concentrated vegetal protein sources and a perfectly sustainable alternative to animal protein. In addition, it has a higher true digestibility than many of the commonly used vegetal protein concentrates.

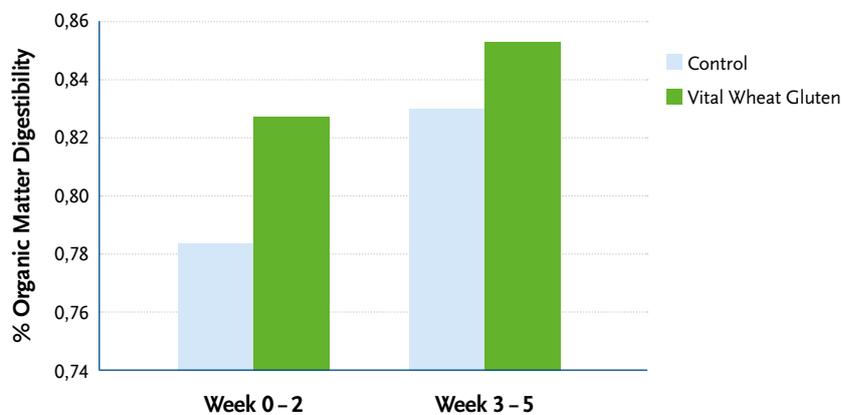
Vital Wheat Gluten has the special property that it forms a viscous matrix when in contact with water, increasing the viscosity of the digesta. In turn, this leads to a prolonged retention time and improves the digestibility of organic dry matter as shown in figure 2.

The amino acid profile of Vital Wheat Gluten is given in figure 1. As with sows' milk, Vital Wheat Gluten is rich in proline and glutamic acids. This can have a positive effect on gut health and feed efficiency. On the other hand, lysine supplementation is required if high dosages are used in piglet diets.

Fig. 1: The balanced amino acid profile of wheat gluten.

Amino acid (% of protein)										
	Arg	Gin/Glu	His	Ils	Lys	Met	Phe	Pro	Thr	Val
Wheat gluten (WG)	3.30	36.09	1.77	3.41	1.58	1.94	5.76	11.82	2.57	3.76
WG/SM (%)	73%	185%	75%	90%	23%	92%	158%	100%	63%	71%
Sows' milk (SM)	4.50	19.54	2.36	3.78	6.68	2.10	3.65	11.79	4.07	5.32

Fig. 2: Replacing fish meal with wheat gluten can improve digestibility in freshly-weaned pigs.



# Ingredients for optimal gut health after weaning.

When the piglet is weaned, it must abruptly adapt from highly digestible and palatable liquid milk from its mother (consumed at equal intervals throughout the day) to a solid dry diet that tastes differently and is tough to break down. As a consequence, initial feed intake after weaning is usually reduced. There is a risk of the piglet becoming malnourished with a reduced transient growth rate. This impaired feed intake additionally has an effect on the gut development and health. To support gut development and health, BENE0 offers three ingredients: prebiotic fibres, glutamine (Vital Wheat Gluten) and rice ingredients.

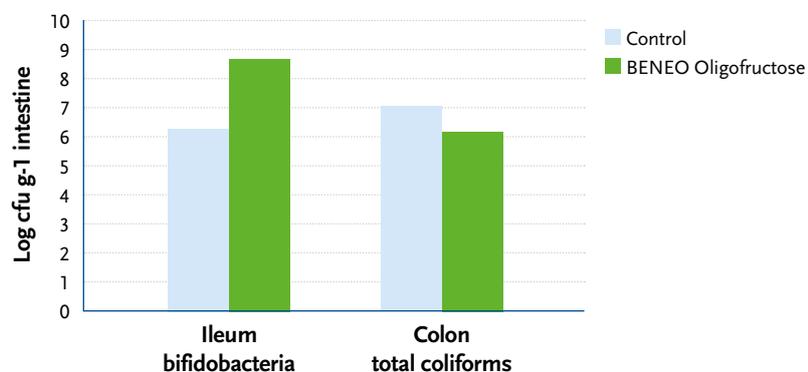
## Prebiotic fibres for balanced microflora.

The use of chicory-derived prebiotics is widely known in human diets. In animal nutrition, inulin and oligofructose prove beneficial for both intestinal health and zootechnical performance.

Prebiotics are fibres that can't be broken down by the piglet's intestinal enzymes. Unlike other fibre sources, they are fermented by a limited number of bacteria, namely Bifidobacteria and Lactobacilli. The selective stimulation of these bacteria strains inhibits the growth of pathogens such as E. coli. In that sense, prebiotics will lead to healthy intestinal flora. This clear effect on bacterial composition in the gut is illustrated in the graph below.

**Especially after weaning, when intestinal flora is disturbed because of the enormous switch in diet composition and physiology, BENE0 prebiotics can support the young piglet in developing a healthy bacterial colonisation.**

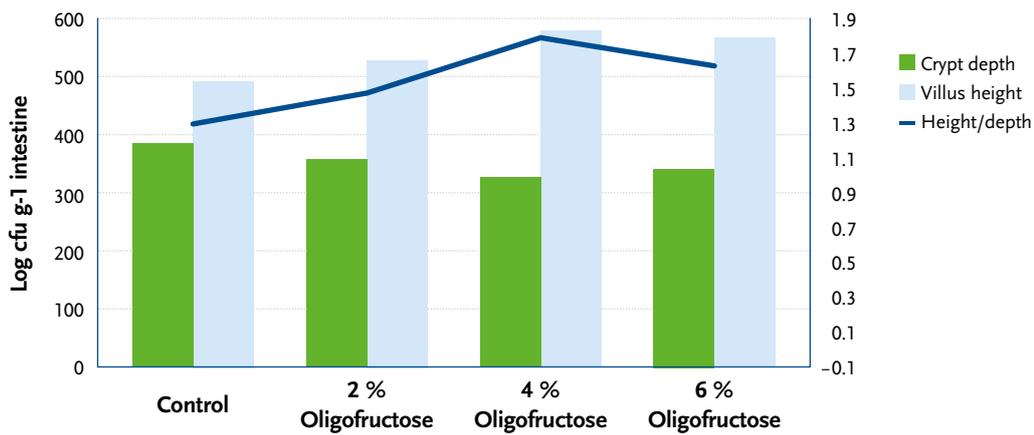
**Fig. 3: Adding 0.2% oligofructose to the diet improves microflora.**



The inclusion of prebiotics can be an alternative strategy to the use of in-feed antibiotics. As fermentation of inulin and oligofructose produces short chain fatty acids, this has an acidifying effect on the luminal environment. This strengthens the pH barrier with a reduced pathogen contamination as a consequence.

Short chain fatty acids are widely known as a primary energy source for mucosal cells. Fructans are therefore beneficial for gut development. Various researchers have reported an increase of villus height and crypt depth when inulin or oligofructose is added to the diet, indicating an increase of absorption surface. The reduced pathogenic pressure in combination with a better nutrient absorption explains the positive effect on zootechnical parameters.

**Fig. 4: Oligofructose improves intestinal absorption capacity.**



Oligofructose improves villus and the villus height to crypt depth ratio at the jejunal mucosa.





### Glutamine, fuel for gut mucosa cells.

Vital Wheat Gluten is an important source of glutamine, with over 35% of crude protein content being made up of this amino acid. Glutamine is widely recognised as a direct energy source for the gut mucosa cells. Despite the fact that glutamine is not an essential amino acid, it becomes vital after periods of stress. Various researchers have reported the beneficial effect of glutamine on the recovery of mucosal tissue after a stressful period. Just like short chain fatty acids, glutamine will contribute significantly to the development of the absorption surface in the gut, enhancing nutrient absorption and digestibility.

This makes it of the highest importance in the case of weaned pigs that experience low feed intake (and thus low intake of dietary glutamine) and rapidly deteriorating gut health (due to the stress factors associated with the process of weaning). There is a **proven positive effect of glutamine on the recovery of piglets after E. coli infection.**

### Rice ingredients help to reduce diarrhoea.

Rice has always been considered to have a nutraceutical function in alleviating the incidence of diarrhoea and reducing dehydration. The resistance of piglets against post-weaning colibacillosis diarrhoea is increased with the inclusion of rice in the diet. **A weaning diet based on rice results in drier faeces and lower E. coli scores compared with wheat-based diets.**

Rice contains specific polysaccharides that can stimulate the Complement System and thereby have an immune-stimulating function. This “Unknown Health Factor” has benefits in feeding animals that have to cope with digestive stress, and **this inclusion of rice in a diet helps animals to adapt to disease challenges of the environment.**

# High-digestible carbohydrates as direct energy source.

After weaning, the main energy source for the piglet switches from rapidly digestible carbohydrates and fat from the sow's milk to a more starch-based diet containing more complex carbohydrates. This is reflected in the enzymatic activity of the piglet, which changes from mainly fat digestion towards carbohydrate digestion. Therefore, nutritionists focus on the use of high-digestible carbohydrates.

**BENEO offers two unique ingredients that are highly suitable as energy sources for piglets: low glycaemic sugar syrup and highly digestible rice ingredients.** With the combined use of low glycaemic sugars and rice starches, the nutritionist can fine-tune the energy profile of the feed according to the piglets' requirements. The combination of these carbohydrates will lead to a fully digestible, yet balanced energy provision.

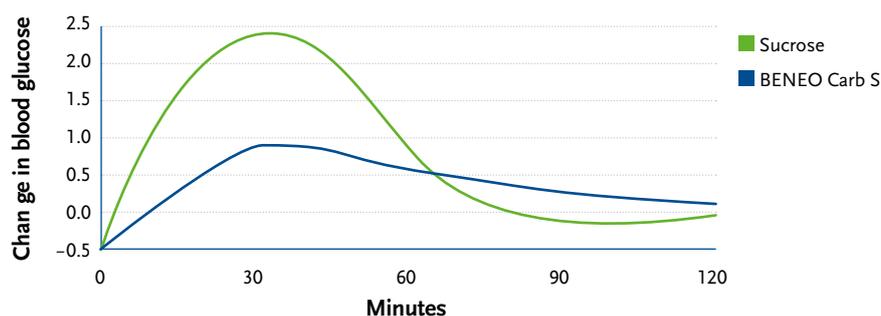
## Low glycaemic sugar syrup.

Sugars can be divided into two groups based on their glycaemic effect: low glycaemic sugars and high glycaemic sugars. Low glycaemic sugars are taken up more slowly and give a lower blood glucose response than glycaemic sugars, as is shown in the figure below. BENEO Carb S is a unique sugar syrup as it holds a high content of these low glycaemic sugars. Even though this sugar syrup is taken up more slowly, it is proven to be fully digested in the small intestine of pigs. These characteristics ensure a balanced and prolonged energy supply in line with the needs of the piglet. Since satiety is controlled by blood glucose levels, feeding BENEO Carb S may also result in a higher feed intake with higher performance as a consequence.

Furthermore, BENEO Carb S can be used to improve the organoleptical profile of the feed due to its sweet honey-like taste which is very appetising for the pigs. This increased palatability of the diet can **stimulate feed intake after weaning** and improved daily growth as result.

The amount of sugars in BENEO Carb S is about 100% on a dry matter basis, making it a very pure ingredient. Ash levels in the product do not exceed 0.5%. It therefore has a low impact on osmotic pressure in the large intestine, **decreasing the risk of intestinal disturbances.**

Fig. 5: Effect of (low glycaemic) sugars on blood glucose.



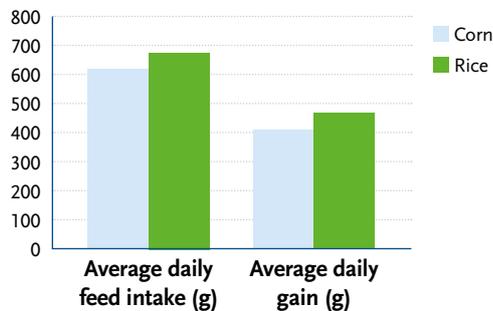
## Highly digestible rice starch for a quick recovery.

Compared to other starch sources, rice starch is characterised by its very small granular size. This small structure ensures good accessibility for digestive enzymes and results in a high digestibility of the starch. The high digestibility and the absence of anti-nutritional factors make rice flour an interesting energy source for young animals. **The high amount of easily accessible energy can help young animals to recover more quickly after stressful events such as weaning.**

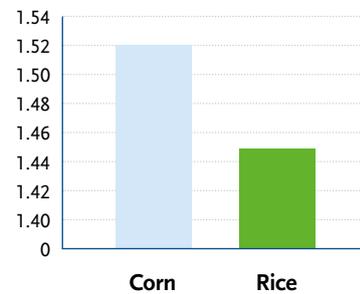
Depending on the variety, rice can contain higher or lower amounts of amylose. This has a strong impact on the rate at which the rice starch is broken down and absorbed as glucose in the blood. Not only does the amylose: amylopectin ratio have an influence on starch digestion rate, heat treatment also has an important impact. Increased starch gelatinisation leads to a higher starch digestion rate.

These digestive characteristics make rice an exceptional ingredient. This together with the organoleptical profile makes it an adequate ingredient for young piglets, stimulating feed intake.

**Fig. 6: Rice starch improves zootechnical performance of weaned piglets.**



**Fig. 7: Feed conversion ratio in piglets.**



# Convincing across all parameters.

The right selection of premium ingredients is the key to successful piglet nutrition. BENEО offers high-digestible products that provide both energy and amino acids, to achieve maximum growth after weaning.

Via the use of our selective ingredients, both the gut structure and microflora can be positively influenced. This will support the young piglet in the development of a good digestive system. Such a strategy with a combined effect of easily accessible nutrients and an optimised gut structure has been proven to boost young piglets' performance and helps overcome the nutritional challenges of the weaning process.

Fig. 8: BENEО's application matrix.

Product	Highly digestible ingredients for optimal energy	Concentrate protein source	Optimising gut health
Vital Wheat Gluten		***	***
BENEО Prebiotics			***
BENEО Carb S	***		
Rice flour	***		**



## Always at your side: Profit from our interdisciplinary expertise.

Our experience entails valuable insights in various areas. No matter if your question concerns process technology, if it is marketing related or if it is about legislation and regulations. With nutritionists, marketers, regulatory professionals, technical food engineers and a competent sales force throughout the world, there is always a BENE0 expert who can help you. It's the combination of advanced ingredients and specialist knowledge together with access to a global network of experts that makes BENE0 a unique business partner.

## Also interested in other ingredients? Discover our complete range now.

BENE0-Animal Nutrition offer a broad range of natural ingredients with nutritional benefits. The product range comprises vegetable proteins, digestible carbohydrates and prebiotic chicory-derived fibres. BENE0-Animal Nutrition extends BENE0's unique expertise in human food to the world of pet food, animal feed and aquafeed.

BENE0 specialises in the production and commercialisation of functional feed ingredients and is a business unit of the Südzucker Group. Learn more about BENE0 ingredients online: [www.beneo.com](http://www.beneo.com)



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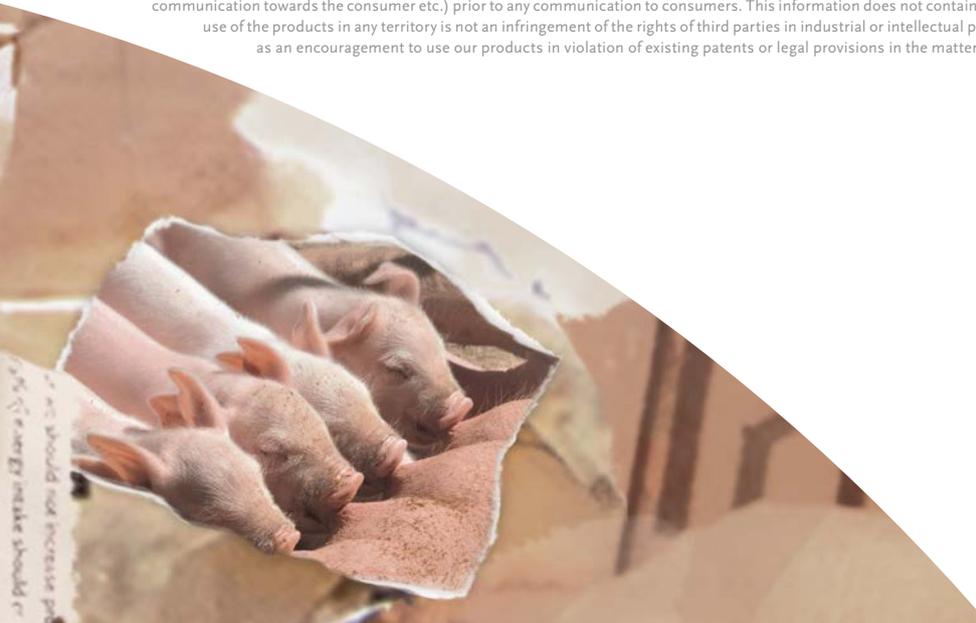
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## What can we do for you?

If you have any questions about our BENEEO ingredients, please don't hesitate to contact us.  
We will be happy to help you.

### **BENEEO-Animal Nutrition**

Aandorenstraat 1

B-3300 Tienen (Belgium)

Phone +32 (0) 16 801 582

Fax +32 (0) 16 801 592

[contact@beneo.com](mailto:contact@beneo.com)

[www.beneo.com](http://www.beneo.com)

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