

Phospholipids – essential active substances to assist metabolism

The current situation in pig production is fraught with uncertainty and new challenges. Numerous laws and regulations such as reduction of the use of antibiotics, and also sustainability topics, are changing production methods at breathtaking speed.

by Christian Cordts,
Berg and Schmidt, Germany.
www.berg-schmidt.de

Against this background, safe and efficient feeding strategies are becoming more and more important in order to ensure that feed production and agricultural production in general remain profitable.

Optimum digestibility of the nutrients in the feed and provision of all the essential nutrients are crucial for the health and performance of pigs.

Homogeneity of the feed mixture, stability of the feed and efficacy of the additives are the basic requirements for high-class feed mixes at all stages of pig production.

There are various ways of achieving the necessary performance. Phospholipids – more commonly known as lecithins – are an effective additive for use in feed production: highly successful, and with a

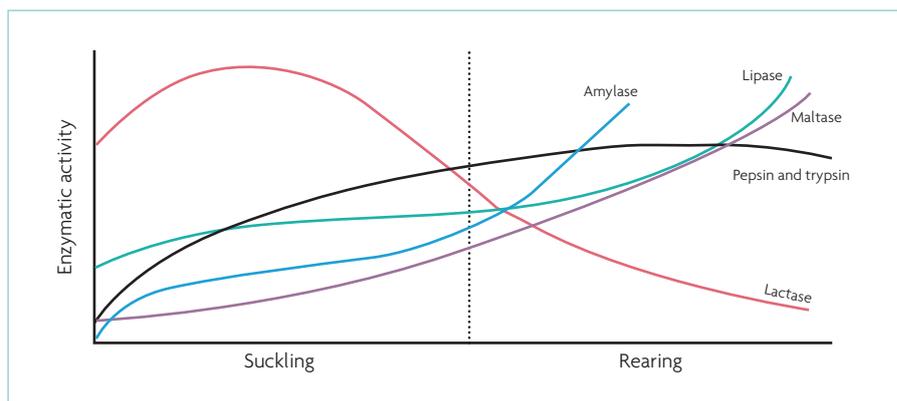


Fig. 2. Activity of the digestive enzymes during piglet rearing (according to Kirchgessner et al. 2008, 12th edition; Animal Nutrition).

wide range of applications. Feed manufacturers have a choice of high-class phospholipid complexes in powder form, based on soy, sunflower seeds or rape.

Lecithin is obtained by the refining of vegetable oils, as a valuable by-product with numerous effects.

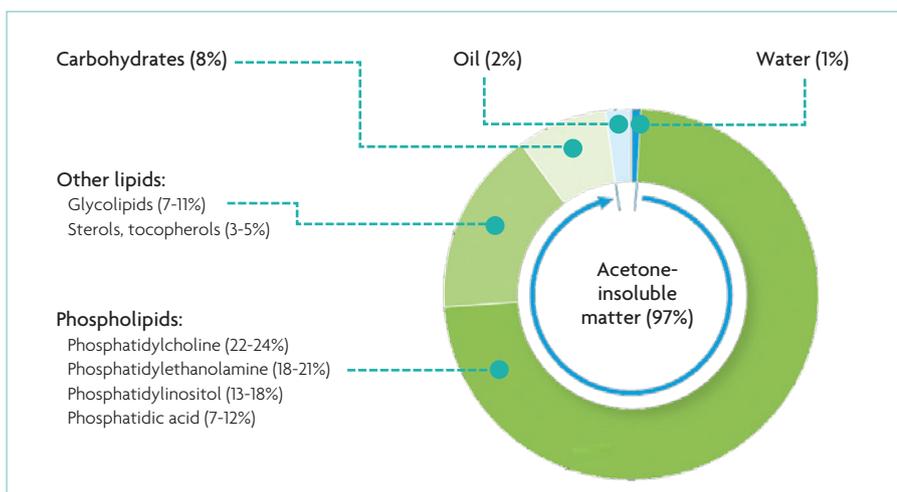
In particular it can be used:

- As a technical agent in the production process (better pellet stability, less abrasion in pellet presses).
- As a source of essential fatty acids and functional compounds.
- To promote the processes of digestion

and absorption. The distinctive feature of lecithin is its amphiphilic nature, that is: its affinity to both fat and water. Because of this it acts as an emulsifier and is able, for example, to promote the digestion of fat by assisting the bile acids in forming emulsion globules in the small intestine and promoting the absorption of fat at the intestinal mucosa.

Furthermore, phospholipids are important constituents of cell membranes; they are therefore involved in the formation of body cells and essential for their proper functioning.

Fig. 1. The constituents of deoiled lecithin.



Fat digestion

Fat digestion takes place mostly in the small intestine by means of lipase, an enzyme produced by the pancreas. The first step is emulsification of the feed fats by bile acid to turn large fat droplets into small ones, thus increasing the surface area to promote enzymatic splitting.

Adding phospholipids assists in emulsifying the fats, aiding in digestion. After the feed fats are split into monoglycerides and free fatty acids, these fat splitting products form micelles together with bile acid and phospholipids. The micelles transport the fat splitting products and phospholipids to the intestine wall, where they are absorbed.

The phospholipid content shown in Fig. 1
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is the most important constituent of lecithin. Phosphatidylcholine has special significance since it supplies very readily available choline.

Choline, in particular, is required for synthesis of the neurotransmitter acetylcholine and is therefore especially important for the nervous system. Moreover, choline acts as a methyl group donor and therefore carries out important functions in liver metabolism.

The addition of phospholipids to pig feed has a number of positive effects on the animals' performance and vitality. Their positive influence on the digestive processes promotes feed conversion and daily weight gain. In this way lecithin opens up performance reserves and reduces feed costs.

The result of more efficient feed conversion and thus better performance is a substantial increase in profitability.

Improved digestibility

The improved digestibility of the fat and nutrients in the diet brought about by lecithin has the further effect of relieving and stabilising the pigs' digestive system. These biological effects have a positive influence on the animals' performance and vitality.

Additional protective mechanisms such as antioxidative cell protection or increased efficacy of the fat-soluble vitamins are further evidence of the significance of lecithin for the metabolic system.

The positive influence on fat digestibility is especially evident during the suckling and rearing phases of piglets.

At these stages of their development, the activity of the digestive enzymes has not yet reached its peak. In particular, the action of the fat-splitting enzyme lipase is inadequate (Fig. 2).

The addition of lecithin promotes the young animals' ability to digest fat ideally and optimises the supply of energy and nutrients during this critical phase. Lecithin is a very important and extremely versatile

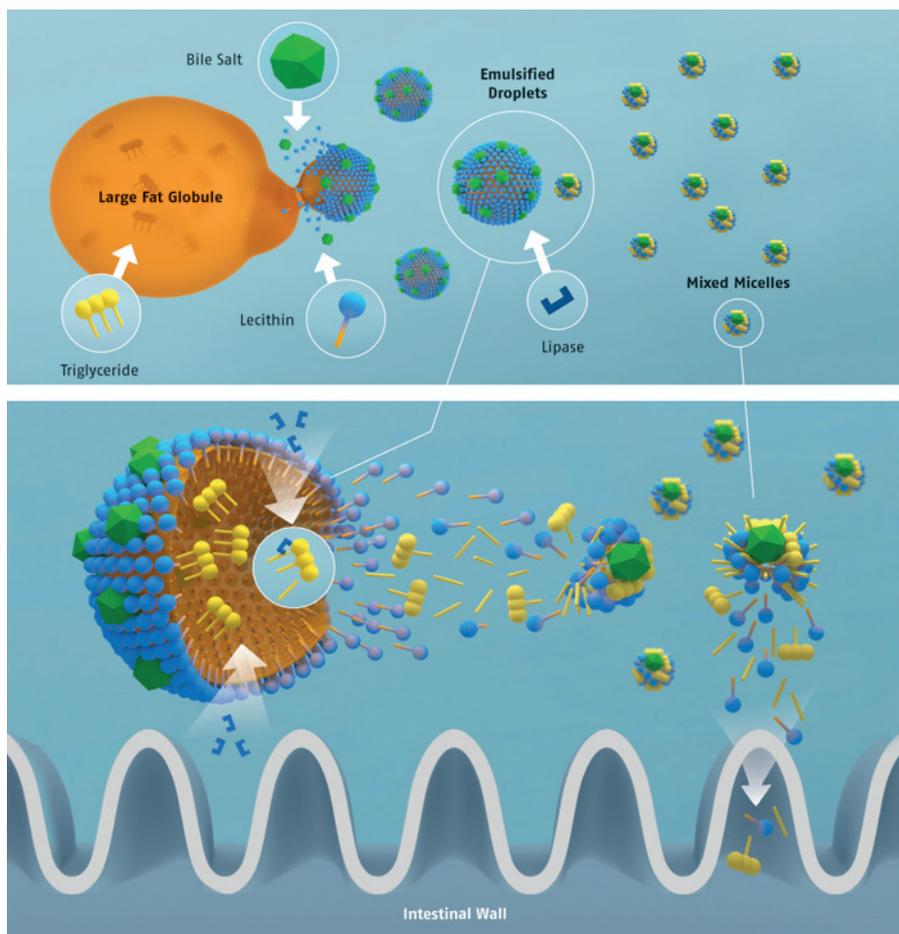
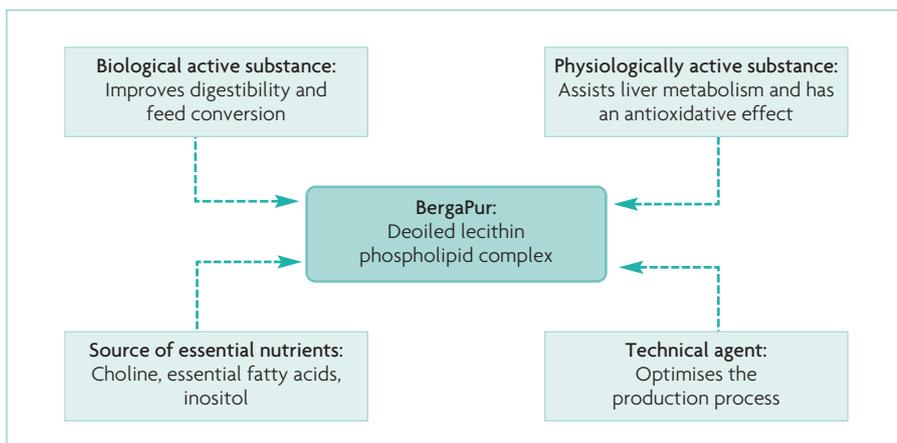


Fig. 4. How lecithin aids in digestion of fats (Berg and Schmidt).

How lecithin aids in digestion of fats in the intestine – the process

Lecithin helps the bile salts to emulsify fats. Large fat globules are broken down into smaller emulsified droplets. These emulsified droplets give the lipase a larger surface area to work on, so it can split the triglycerides in the droplets more easily. This enzymatic process breaks the triglycerides down into monoglycerides and fatty acids. Monoglycerides, fatty acids, lecithin and bile acids are released from the emulsified droplets. They form mixed micelles that are transported to the intestinal wall and absorbed.

Fig. 3. The effects of BergaPur deoiled lecithin.



trials in collaboration with universities and testing of the products together with farmers guarantee a high degree of innovation and progress and top product quality in practical use.

The dosage recommendations are based on the latest research results and vary between 0.1 and 0.4%, depending on the application. The wide range of lecithin products and customised solutions constitutes the basis for the successful use of BergaPur in pig feeding.