Acid Binding Capacity in Piglet Nutrition

The pH in the stomach of the young piglet plays an important role in digestion (Fig.1). The ideal pH is below 4.

Two major functions of a low pH in the stomach of the young piglet are:

- Protein digestion (pepsin activity). When pH is <4 protein digestion is optimal resulting in:
  - More amino acids available for the piglets.
  - Less indigestible protein will reach the intestines, so a lower risk for fermentation and toxin production ⇒ less chance for diarrhoea.

- Killing pathogens (creating a barrier). See also Fig. 2. showing the pH range of which bacteria can survive. At a pH < 4 most bacteria cannot survive the stomach and will not reach the small intestine and will not cause problems / diarrhoea.

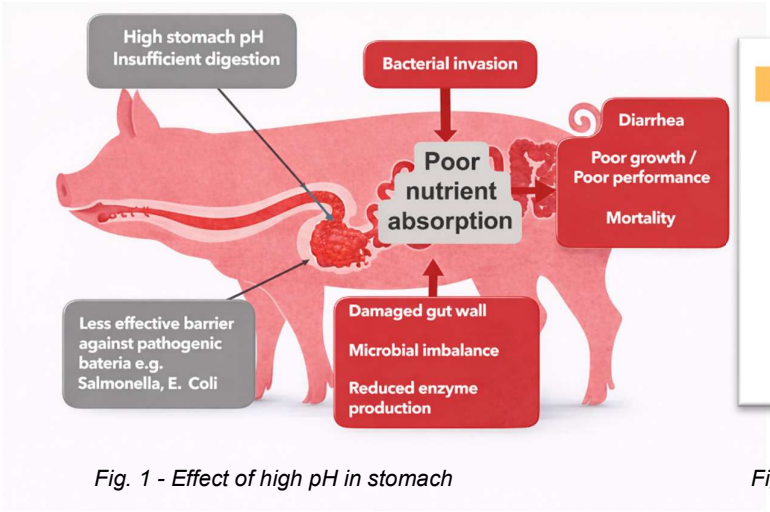

Fig. 1 - Effect of high pH in stomach

Fig. 2 - pH range at which bacteria can survive

However, the optimal efficiency of the digestive system of the piglet is reached only at 8-10 weeks of age. The young weaned piglet produces insufficient HCL in order to maintain a low pH in the stomach. In piglet nutrition one can use the Acid Binding Capacity value to also focus on the pH in the stomach. The acid buffering capacity (ABC-4) of feed ingredients and complete feeds can be analysed in the laboratory. The ABC-4 means how much hydrochloric acid in Milli Equivalent the piglets need to secrete to reduce the pH value of one kilo of feed to pH4. The buffering capacity of raw materials used in animal feed is more important than the pH of these raw materials. For piglet feed, a buffer capacity in the range of 275-350 meq/kg feed is realistic.

Ingredients which impact ABC-4 values most are organic acids (low ABC-4 value) or minerals like sodium bicarbonate and limestone (extreme high ABC-4 value).

See also Fig.3. In piglet diets it is recommended to avoid these kinds of ingredients which have an extreme high ABC-4 value like for example limestone

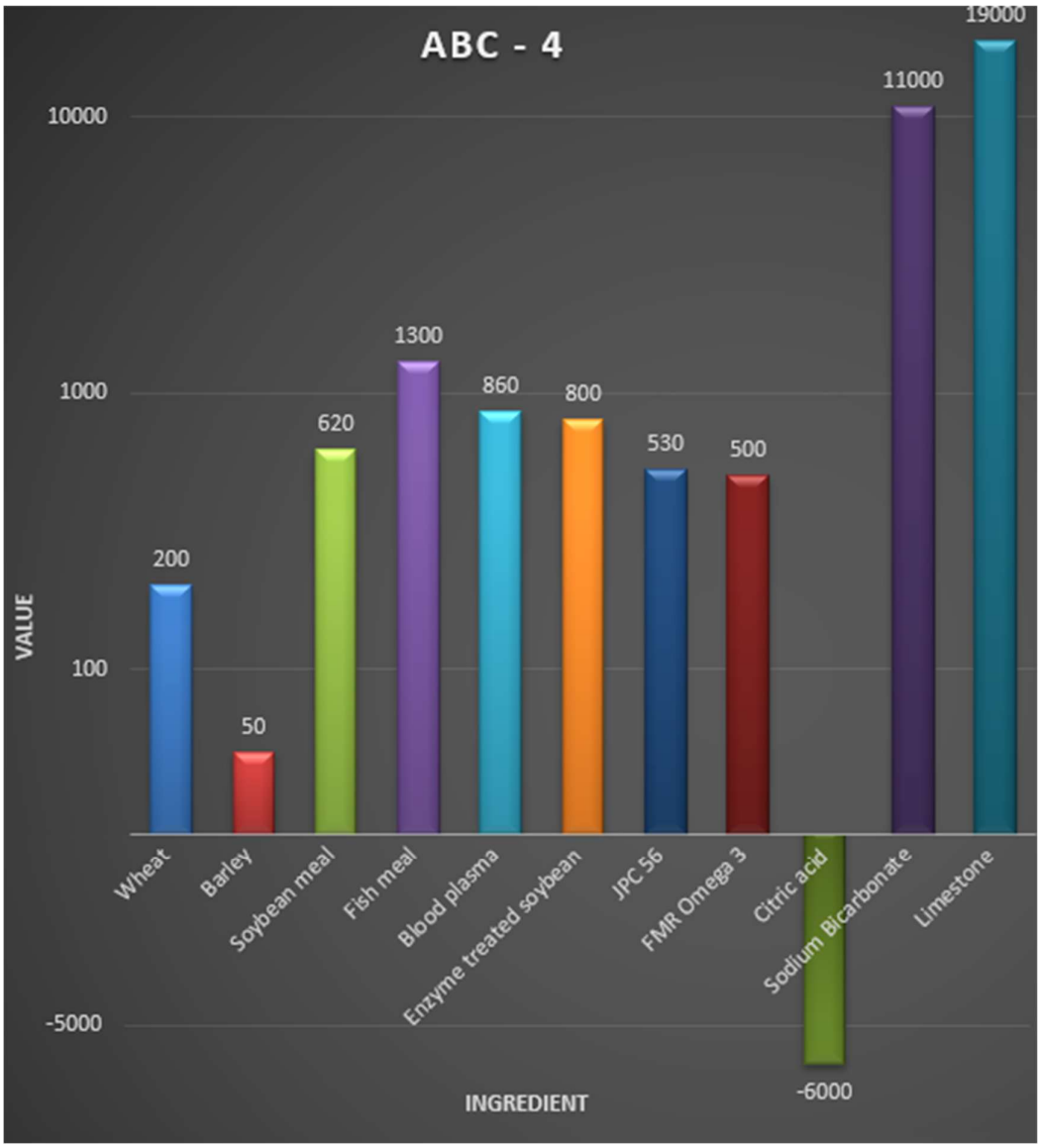

Fig. 3 - Overview of different ingredients and their ABC-4 values

In general grains are quite low in ABC values. Most protein sources compensate this because most protein sources increase the buffering capacity of the feed. Among protein-rich raw materials, animal proteins (fish meal, plasma) in particular have the highest buffer capacity. More digestible proteins have a low buffering capacity and therefore are recommended in weaner piglet feeds. The protein concentrates of Joosten Products have an ABC-4 value of around 500 meq/kg. (Fig. 3).