

Protein And Carbohydrate: Strategies To Improve Piglet Diet Digestibility

To maintain a strong performance into the grow-out stage, young pigs require good nutrient intake from birth. Often inadequate to sustain all piglets in the litter throughout lactation, sow's milk can be supplemented by creep feeding which helps stimulate the piglet's digestive enzymes. A good creep diet enables a smooth liquid-to-solid feed transition. Studies also show that exposing young animals to solid feed days before weaning creates more "eaters" (Sulabo et al 2010).

Poor digestion escalates the incidences

of diarrhea (Figure 1; a direct correlation between stool score and undigested nutrient in feces). Although creep diets should contain high amounts of energy and nutrients, limited enzyme activities in the gut cannot fully digest these nutrients. Undigested nutrients are acted upon by enteric bacteria through fermentation. Diarrhea occurs when the villi secrete water to eject the bacteria, toxins and undigested feeds.

Undigested nutrients in the ileal region triggers a feedback mechanism (ileal brake). The body interprets that the digesta would require more time to be digested; the ileal brake would slow its passage rate (Read et al., 1984; Spiller et al., 1984, 1988), thus hampering

Nutrient utilisation should be improved through a comprehensive strategy in gut health; a good understanding of nutrients in feed ingredients helps develop diets with better protein digestibility.

voluntary feed intake (Van Citters and Line, 1999).

Thus, diets require carefully selected ingredients and special formulation strategies to prevent enteric bacteria from feeding on undigested nutrients.

Enhancing protein digestibility

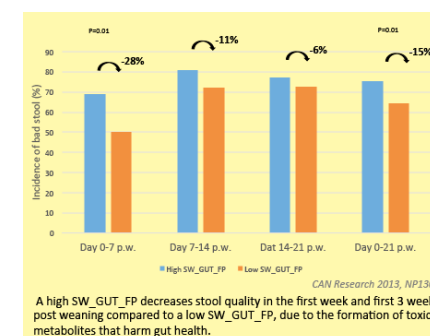
A protein source's digestibility and quality influence gut health. Given the digesta's short

transit time along the piglet's gut, protein sources must be easily digested.

Undigested protein causes bacterial fermentation in the large intestine and the subsequent production of toxins metabolites, consequentially impacting the intestinal mucosa and shifting energy to ammonia excretion that could otherwise support growth. The insufficient gastric acid and protease activity give rise to undigested nutrients by the time the digesta reaches the hind gut. Cargill Animal Nutrition (CAN) addresses this issue with a nutrient called swine gut fermentable protein (SW_GUT_FP) when formulating piglet feed.

SW_GUT_FP exists in many ingredients (whey protein concentrate, 142%; fishmeal, 2.34%; and soybean meal, 3.66%). Figure 2 shows that a high SW_GUT_FP resulted in poor stool quality in the first week and first 3 weeks post weaning compared to a low SW_GUT_FP diet. Toxic metabolites damaged the gut integrity resulting in poor stool quality.

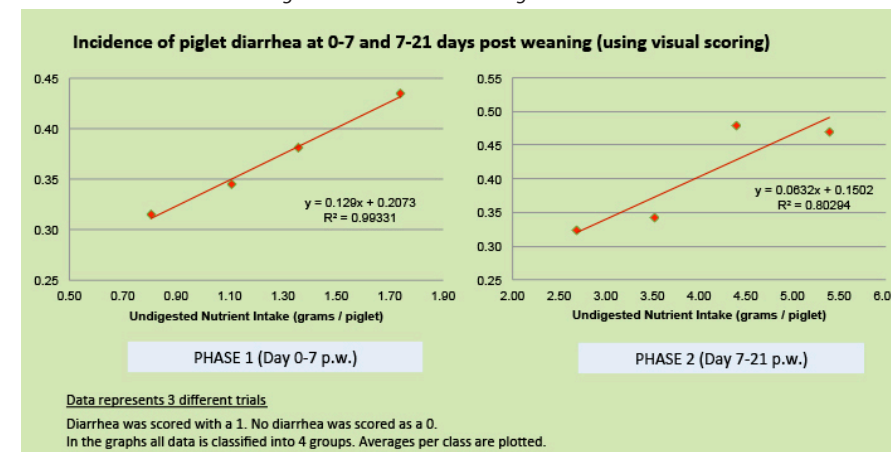
Figure 2. Effect of high vs low SW_GUT_FP on stool quality.



Different protein sources based on villi characteristics can also affect piglet performance (the best protein source is milk - see Table 1).

Additionally, when considering protein plant sources, it is important to select

Figure 1. Stool score and undigested nutrients



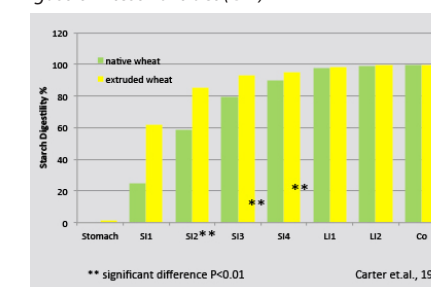
processed ingredients which are absent of impurities and anti-nutritional factors that affect the piglet's gut. CAN's findings show that hydrothermally extruded soybean promotes

extrusion of wheat on in vivo digestibility (see Figure 3). The piglets were weaned at 14 days of age, where they were fed either raw or extruded wheat as the main energy source.

Digestibility measured at 45 days of age in different parts of the gut showed that starch digestibility was higher for "extruded wheat" than "raw wheat" in some areas.

CAN's studies showed cereals that underwent such treatments had shorter digestion time, while a higher feed intake was observed in these cases.

Figure 3. Starch digestibility in different parts of the gastro-intestinal tract (GIT)



An accurate understanding of nutrient values enables proper diets with fulfilled nutrient requirements and highly digestible ingredients. Supporting nutritional plans are ingredient and feed evaluation services which provide rapid ingredient analysis and precise feed formulation. Provimi's expertise in these fields enables more cost-effective feeding strategies which improve digestibility in piglet diets.

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