PIGLET NUTRITION

Does piglet feed overestimate protein digestibility?

Protein digestibility is a primary concern when formulating feed for weaned piglets. But the fact is that most current formulation practices don’t get it right. The reason is that they use digestibility values based on growing and finishing pigs — and, in doing so, over-estimate the digestibility of raw materials in younger animals.

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IN SHORT

- Feed intake key in large litters
- 4 tips on how to achieve 40 PSY – watch video
- Nutritional value of soy products fed to pigs

“Piglets need the right level of digestible nutrients for healthy growth. Our research is supporting the development of optimised nutrient specifications for feed.”

Niels-Otto Damholdt
Sales director at Hamlet Protein

PIGLET NUTRITION

Getting off to the healthiest start possible

New parents are subjected to all kinds of contradictory advice regarding feeding their new-born child. Although the advisers may not always be right, their intention is good; getting the infant off to the healthiest start. What a human eats as a baby and child strongly affects the long-term body weight, health, metabolic programming, immune system, and overall aging. Experts in the field of human nutrition often refer to this concept as ‘nutritional programming’. In human nutrition, this concept is widely studied with regards to programmed changes in the child’s body and the effect on the health status as an adult. Early life nutrition has a significant role on the brain and immune system development.

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Cut indigestible protein — and do piglet health a favour

One of the most important parameters when evaluating feed ingredients is the digestibility of the nutrients they contain. These digestibility values are often used in research projects to verify published data — and they are of key importance when formulating feed for each stage of an animal’s life.

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PIGLET NUTRITION

Science makes feed for better pig performance

New knowledge is gradually taking the art out of formulating piglet starter feed. By insisting on a scientific approach, researchers are developing a set of ingredients that can meet the specific dietary requirements of younger animals and maximize their growth and performance. Among the focus areas is the question of nutrient digestibility. In a meta-analysis conducted by Hamlet Protein and the University of Illinois, it was found that the digestibility of the amino acids (AA) in different soy-based ingredients changes as piglets become older.

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IN SHORT

- Whatever animals eat is important for their growth
- Effect of higher protein canola meal in pig diets
- Shorter gestation length a risk for piglet survival

Video: 4 ideas on how to achieve 40 PSY!
DOES PIGLET FEED OVERESTIMATE PROTEIN DIGESTIBILITY?

Protein digestibility is a primary concern when formulating feed for weaned piglets. But the fact is that most current formulation practices don’t get it right. The reason is that they use digestibility values based on growing and finishing pigs – and, in doing so, over-estimate the digestibility of raw materials in younger animals.

By Carsten Pedersen, PhD, nutritionist, Hamlet Protein

To evaluate age-related differences in nutrient digestibility, Hamlet Protein and the Department of Animal Sciences at the University of Illinois teamed up to conduct a meta-analysis of standardised ileal digestibility (SID) data published in 1998-2013. All the data collected for the analysis covered soy-based ingredients for piglet starter feed. It is clear from the analysis that pig weight does have an impact on the SID of protein and amino acids.

Higher digestibility with low ANF
Table 1 shows the SID of the crude protein (CP) in soy-based ingredients. Here, it can be seen that fermented soybean meal (FSBM) has the lowest SID, followed by dehulled soybean meal (SBM 48%). Enzyme-treated soybean meal (ETSBM) and soy protein concentrate (SPC) have the highest. The data clearly documents the impact of processing on the SID value of crude protein in soy-based feed ingredients.

In processing ETSBM, FSBM, SPC and SPI, the objective is to reduce the anti-nutritional factors (ANF) in soybean meal – including antigens, lectins, oligosaccharides and trypsin inhibitors – to a level where young animals can tolerate them. This is reflected in the higher numerical SID for crude protein. The SID of the CP in FSBM, on the other hand, is even lower than SBM.

Pig weight makes a difference
The meta-analysis also investigated the SID of crude protein in animals of different weight. Table 2 shows the results obtained with the crude protein in SBM 48%. Piglets weighing less than 20 kg at the start of the experimental period had a significantly lower SID than pigs weighing 20 kg and above.

It is as yet unknown whether the age-related change in SID seen with SBM 48% is the same across all raw materials. If the change is not consistent, then the digestibility values for growing and finishing pigs, which are typically used for formulating feed, will rank raw materials incorrectly for young piglets.
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Getting off to the healthiest start possible

Nutritional programming is an extensively studied concept in human nutrition. It means that nutritional choices during pregnancy and after birth can make significant changes for the human being later in life. And this is true for animals as well.

By Emmy Koeleman

New parents are subjected to all kinds of contradictory advice regarding feeding their new-born child. Although the advisers may not always be right, their intention is good; getting the infant off to the healthiest start. What a human eats as a baby and child strongly affects the long-term body weight, health, metabolic programming, immune system, and overall aging. Experts in the field of human nutrition often refer to this concept as ‘nutritional programming’. In human nutrition, this concept is widely studied with regards to programmed changes in the child’s body and the effect on the health status as an adult.

Nutritional programming (or metabolic programming) is an intriguing phenomenon. And whether you talk about humans or animals, the concept remains the same. Some of the human nutrition studies regarding this topic show interesting results.

The effects on undernutrition, for instance, depend upon its timing during gestation and the organs and systems developing during that critical time window. Furthermore, Dutch findings suggest that maternal malnutrition during gestation may permanently affect adult health without affecting the size of the baby at birth.

Spreading to the animal feed sector

Although nutritional programming is becoming a real hot topic in human nutrition, the interest to apply this for young animals is gaining interest as well. And some of the results seen in humans and rodents might be useful for animal nutritionists as the correlation between infant nutrition and obesity might be comparable with young animal nutrition and its effect on weight gain or fertility in adult farm animals. Although many studies have been done in farm animals, it seems that feed companies only start to acknowledge recently that neonate nutrition deserves even more attention than we did before. When seeking to maximise animal performance, efficiency and intestinal health, it’s critical to focus on proper feeding of young animals so as to deliver greater returns. It’s all about increased incomes for the farmers from such things as reaching slaughter sooner, heavier animals or more milk production. In other words, the neonate phase in an animal’s life can have a significant effect on growth rate, feed conversion and milk production all of which have financial implication. A good start is half the battle won.

Financial implications for farmers

Based on the results from human studies, combined with the challenges faced in the animal production sector (e.g. higher feed costs, tighter margins for meat, increased demands of consumers), we can certainly state that neonate nutrition deserves even more attention than we did before. When seeking to maximise animal performance, efficiency and intestinal health, it’s critical to focus on proper feeding of young animals so as to deliver greater returns. It’s all about increased incomes for the farmers from such things as reaching slaughter sooner, heavier animals or more milk production. In other words, the neonate phase in an animal’s life can have a significant effect on growth rate, feed conversion and milk production all of which have financial implication. A good start is half the battle won.

References are available on request.

> Read the full article on All About Feed
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Cut Indigestible Protein – and do piglet health a favour

By Lars Sangill Andersen, MSc, nutritionist, Hamlet Protein

One of the most important parameters when evaluating feed ingredients is the digestibility of the nutrients they contain. Published in nutrition guides, these digestibility values are often used in research projects to verify published data or shed light on new hypotheses – and they are of key importance when formulating feed for each stage of an animal’s life. However, another equally important parameter often receives less attention. That is the amount of undigested nutrients in feed and their effect on animal health. Due to the comparative vulnerability of their gut, piglets are of particular interest in this regard.

Major feed nutrient
Protein is among the nutrients that both have an easily digestible part and a fraction that passes through the digestive tract without being absorbed. As the most expensive of the major nutrients in feed, it is critical to feed manufacturers and farmers that the protein they use is as digestible as possible. Financial considerations aside, undigested protein is also a potential cause of gut health problems – and it costs energy when nitrogen from deaminated amino acids is removed and excreted via the liver and kidneys.

Higher vulnerability in piglets
Studies have shown that the indigestible protein fraction is higher in young piglets (<20 kg) during the first few weeks after weaning. Piglets of this age are also more sensitive to anti-nutritional factors in the protein than pigs over 25 kg. Crude protein (N x 6.25) is calculated as nitrogen from amino acids and from non-protein nitrogen (NPN). As Figure 1 shows, the digestibility of the amino acid fraction varies. This causes various amounts of undigested amino acid to enter the large intestine along with the NPN fraction.

Risk of diarrhoea
Proteolytic bacteria in the gut feed on these two crude protein fractions, promoting bacteria growth and risking a microflora imbalance that can cause diarrhoea. At the same time, ammonia produced in the gut is absorbed and contributes to the nitrogen load that must be removed by the liver and excreted from the kidneys via urine. This both costs energy and diverts liver capacity away from other metabolic outputs that support growth and health. Feed strategies that focus on minimising the indigestibility and NPN fraction of raw materials are a worthwhile investment. Risks and maintenance costs are reduced, and healthy young animal growth is in full focus.

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Formulating a piglet starter diet is today almost as much an art as it is a science. There are many considerations involved in making sure that pigs not only eat the feed but also grow efficiently and healthily.

By Gary Fitzner, PhD, PAS, Nutritionist, Hamlet Protein

New knowledge is gradually taking the art out of formulating piglet starter feed. By insisting on a scientific approach, researchers are developing a set of ingredients that can meet the specific dietary requirements of younger animals and maximise their growth and performance. Among the focus areas is the question of nutrient digestibility. In a meta-analysis conducted by Hamlet Protein and the University of Illinois, it was found that the digestibility of the amino acids (AA) in different soy-based ingredients changes as piglets become older. As most published values for ingredient digestibility have been determined in growing/finishing pigs, the meta-analysis confirms that such standardised ileal digestibility (SID) values are not applicable to pigs <20 kg. In fact, the study’s findings show that the SID AA measured in pigs <20 kg is about 10% lower than that of pigs >20 kg. With the amino acid lysine as an example, Figure 1 shows the potential difference in formulation if the SID lysine of all the protein components in the diet is reduced by the same amount as SBM in the meta-analysis. But what are the implications of this when formulating post-weaning pig diets?

The right balance and amount of amino acids

If the SID AA values are used to formulate diets for piglets, then the AAs that are actually absorbed by the young pigs are less than those calculated. By the same token, the SID AA requirements of young pigs will also be overstated because they are based on published values that reflect the requirements of growing/finishing pigs. As the meta-analysis only included soy-based ingredients, it is not known if the age-related difference in SID AA values is consistent across all ingredients used to formulate feed for the early phases of nursery diets. However, should research reveal that the age-related change in SID AA values is consistent across animal meals, high protein vegetable meals and grains, then the use of published values will result in the correct proportion of ingredients in the feed but will overstate actual SID AA requirements.

If the age-related change in SID AA values turns out not to be consistent across ingredients, then the use of published values will rank feed ingredients incorrectly. The calculated values will then be overstated, and the nutrients less efficiently utilised by the young pig than expected. This brings us back to the original statement about the formulation of pig starter diets being more of an art form than a science. As nutrient digestibility continues to be measured in pigs <20 kg, a set of nutrient specifications is being developed specifically for young pigs. This is taking us one step closer to making decisions that are more scientifically based.
This FOCUS edition was made by Reed Business Information’s international agricultural titles World Poultry, AllAboutFeed, Pig Progress and Dairy Global. On this FOCUS newsletter, Reed Business Information (RBI) collaborated with Hamlet Protein.

The primary goal of FOCUS is to provide the reader useful insights about particular themes within RBI’s areas of expertise, as well as those of her partners. Our goal is to provide readers in approximately 10 minutes a complete, in-depth update on that specific theme.

FOCUS offers a premium opportunity for companies to market their expertise on specific themes. Interested to collaborate with us in upcoming editions? Please contact the FOCUS team.

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