Eubiotic lignocellulose – a new tool for swine nutritionists

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Dietary fibre is an important component of livestock animal diets. Eubiotic lignocellulose made from fresh wood is a relatively new feedstuff and research is proving that it is a very valuable dietary fibre source with a wide range of benefits for animal nutrition.

Dietary fibre is necessary to regulate digestion in monogastric animals. High starch diets favour rapid fermentation, which is often complete early in the digestion process leaving little or no fermentation for the large intestine. Including fibre in the diet shifts the fermentation process back to the colon and increases the growth of beneficial bacteria.

These bacteria produce volatile fatty acids that stimulate the health and integrity of the intestinal lining and improve water absorption, leading to drier excreta and fewer diarrhoea problems.

Healthy populations of beneficial bacteria decrease the pathogen load in the animals' intestine and in the environment, improving overall health status.

In addition to the effects on digestive processes, dietary fibre is also known for its beneficial effects on the animals' welfare, especially on stress behaviour.

Digestive processes

Feed designers have to take care to assure optimal fibre contents for each stage of swine production. For that reason, it is valuable to consider the physiological activity of different fibre types. While fibre, by definition, is not digested by the animal itself, the non-fermentable and fermentable fractions of dietary fibre are differentially degraded by intestinal microbes and, therefore, have different but complementary modes of action.

The non-fermentable fibre fraction is minimally degraded by the microbes and has primarily physical effects. It physically regulates digesta passage rate, influences faecal quality, and shifts fermentation to the colon.

With inadequate fibre levels in nutrient dense diets, fermentation moves further up the intestine, where pathogens can negatively influence health status and production performance. Wet greasy faeces and diarrhoea can contribute to sanitation problems.

Fermentable fibre, as the name suggests, is fermented by bacteria in the large intestine. The effects of fermentable fibre are directly related to this bacterial metabolism.

The fermentable fibre fraction is not digested by the animal itself, but is utilised by the microbes in the large intestine, where lactate and the volatile fatty acids acetate, butyrate, and propionate are produced.

Lactic acid and volatile fatty acids are essential to maintain eubiosis (stable and healthy micro-flora populations) in the large intestine. The effects of the volatile fatty acids, especially butyrate, improve water absorption in the large intestine, which improves the consistency of the faeces.

Additionally, some fermentable dietary fibre components are preferentially fermented by lactobacilli in the large intestine, which will naturally lead to an increased production of lactic acid. Lactic acid is known as an important antagonist to pathogens in the digestive tract and will therefore positively influence gut health status of the animals.

Ideal fibre source

Lignocellulose products have found use in the past as a dietary fibre source for animal nutrition. Digestive processes are improved when only low inclusions of lignocellulose are used in livestock diets.

Lignocellulose is made from fresh wood and is used as a high quality fibre source in animal nutrition. Compared to traditional fibre sources, lignocellulose is characterised by high crude fibre (>55%) and high lignin (25-30%) contents. Recently, a unique new eubiotic lignocellulose product has become commercially available.

In contrast to the first generation lignocellulose products that contain nearly 100% non-fermentable fibre (lignin, cellulose, and non-fermentable hemicellulose), eubiotic lignocellulose contains non-fermentable and fermentable fibre. By including both types of dietary fibre, maximum benefits can be achieved. Due to its remarkably high fibre content, low inclusion rates of eubiotic lignocellulose (1.0-1.5%) positively influence digestive processes. Dramatic changes in diet formulations are not necessary to maintain nutrient and energy densities when eubiotic lignocellulose is used.

Eubiotic lignocellulose in animal nutrition:

- Improved gut health status.
- Decreased risk of diarrhoea and constipation.
- Improved digestive processes lead to increased productivity.
- Reduced translocation of pathogens to small intestine.
- Fermentable and non-fermentable fibre combination provides maximum benefits.
- High dietary fibre content – low inclusion.
- Free of mycotoxins.
- GMO-free.

Traditional fibre sources available for animal diets are of varying quality and supply with mycotoxin contamination a constant concern. Eubiotic lignocellulose is a consistently high quality product guaranteed free of mycotoxins.

Additionally, supply is not influenced by seasonal growing conditions as it can be with traditional fibre sources. Eubiotic lignocellulose is an exciting new feed ingredient that can provide beneficial fibre in high quality diets without taking up significant amounts of valuable space in the diet.

Ultra-fine particle size

Eubiotic lignocellulose contains a unique mixture of different wood varieties to provide both fermentable and non-fermentable fibre. Using modern techniques, the raw material is processed to an ultra fine particle size to have optimal activity in the gut. The fine particle size is especially necessary to support the growth of microvilli and cells lining the intestine.

Recent scientific data shows that the non-fermentable parts of eubiotic lignocellulose

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lead to a beneficial shift of important digestive processes from the caecum to the colon. In the colon, fermentable fractions can be metabolised ideally and improve digestive processes, especially with regards to increased production of lactic acid.

Use in sows

Due to the high fibre demand of gestating sows, the recommended inclusion rate of eubiotic lignocellulose is 2.5%.

Scientific studies show that eubiotic lignocellulose (OptiCell, Agromed Austria) has very positive effects on production and performance parameters of sows. Both scientific studies and many practical experiences confirm the high potential of eubiotic lignocellulose.

Compared to traditional fibre products (such as bran, alfalfa meal, sugar beet pulp) eubiotic lignocellulose improves the number of weaned piglets per sow per year (plus 1.3 live weaned piglets) and decreases the risk of MMA significantly (-45%). Observations also show that eubiotic lignocellulose decreases the duration of the birthing process significantly (-30%), which increases survival rate of newborn piglets dramatically.

For practical use, eubiotic lignocellulose seems to be very suitable especially in sows. The high crude fibre demand of breeding sows can easily be satisfied with relatively low inclusion rates of eubiotic lignocellulose. The impact of such dietary fibre products leads to improved digesta passage rates and decreased risk of constipation. The positive effect on satiety leads to a stress relieving effect. Eubiotic lignocellulose stabilises blood glucose concentrations, which decreases cortisol excretion and increases satiety.

Eubiotic lignocellulose in sows:

- Higher number of weaned piglets per sow.
- Decreased risk of constipation.
- Beneficial effects against MMA.
- Positive influence on duration of birth process.
- Less weight loss during lactation.
- Increased satiety and less stress behaviour of sows.

Use in piglets and fatteners

In weaning piglets and fattening pigs eubiotic lignocellulose is included in diets at 1.0-1.5%. Practical and scientific studies with weaning piglets at the University of Veterinary Science in Vienna show that eubiotic lignocellulose leads to higher daily weight gain and feed intake, while feed conversion ratio is not influenced or is even slightly improved.

The combination of non-fermentable and fermentable dietary fibre of eubiotic lignocellulose has positive effects on digestive processes and nutrient metabolism. This hypothesis is confirmed by improved consistency of faeces, which was observed in many scientific and practical studies.

Very similar results were observed when eubiotic lignocellulose was fed to fattening pigs. Animals receiving eubiotic lignocellulose in the diet had higher daily weight gain (4%), while mortality (mainly caused by inflammation in the digestive tract) was 50% lower.

Conclusion

Eubiotic lignocellulose provides the wide range of benefits from both fermentable and non-fermentable fibre, while requiring only 1.0-1.5% (2.5% for sows) inclusion rates.

Research and practical experiences have shown that eubiotic lignocellulose is an ideal tool to improve productivity and safety in modern swine production. ■

Eubiotic lignocellulose in piglets and fatteners:

- Decreased occurrence of diarrhoea.
- Decreased mortality.
- Higher daily weight gain.
- Less weaning problems due to feed changes.
- More profit from healthier pigs.