Phytogenics for sows: beyond the expected performance

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Lactation is a stressful time in a sow's life where sufficient amounts of milk have to be produced to meet the needs of newborn piglets. There is no question that sows will lose weight during lactation because of protein and energy deficits.

Consequently, sows will have a longer wean-to-oestrus period and this effect will extend to the next farrowing, resulting in a pronounced reduction in the number of weaned piglets per litter and also litter weaning weight.

Feed intake is considered a limiting factor of sows' productivity, and producers therefore always offer unrestricted amounts of fresh feed.

In practice, some farms do restrict feed in the first week to avoid some health complications (for example constipation) but several studies have shown that even for short periods, feed restriction has a negative impact on the performance of sows as well as newborn piglets.

Sufficient feed intake means sufficient milk production and higher milk availability for the piglets. As the vast majority of postnatal mortality is due to lower milk production and piglets after birth are known to have insufficient stored energy in their bodies, it is critical that this energy should come from immediate milk consumption.

Some antibiotics have been shown to slightly increase feed intake during lactation and hence decrease losses in body weight. Unfortunately, the use of antibiotics could not do any more than that, and their usage is currently limited by consumer demands and preferences for antibiotic-free meat. Due to their nature, phytogenic feed additives have been shown to exert several positive effects in different animal species.

Specifically for swine, phytogenics have been proven to increase feed palatability and hence feed consumption.

Moreover, phytogenics are known to optimise gut microflora which leads to higher nutrient uptake (digestibility) and relief from the immune stress due to the high pathogenic load.

Several trials have shown that phytogenics can help sows in lactation periods by reducing body weight loss and ensuring a successful weaning period for piglets. It was clear that supplementing feed with phytogenics can result in enormous improvements in different parameters compared with untreated sows. Feed intake was improved by about 10%.

Consequently, sows fed phytogenics had 6.6% higher number of piglets born alive, 3.6% higher body weight at birth, 8.6% more piglets weaned per litter, 9% higher litter weaning weight, lower mortality and, most interestingly, a 45% reduction in body weight loss during lactation.

We can conclude that phytogenic feed additives serve as a powerful tool in feed that can improve sows' performance. This leads to higher performance for piglets and enables sows to reach the next oestrus more quickly because of the reduced loss in body weight. Phytogenics as powerful feed additives have more to offer than performance enhancements. Human food safety is an additional important benefit for phytogenics as there is neither toxicity nor resistance known for such functional compounds.

A win-win strategy between producers and customers can thus be achieved. ■

Feeding DDGS to livestock and its implications

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As the animal industry is faced with increased demands and prices in regards to protein sources, the use of alternative ingredients in feeds, like Dried Distillers' Grain and Solubles (DDGS), has become increasingly important worldwide.

However, the inclusion of DDGS in animal diets must be carefully calculated since toxic compounds such as mycotoxins are not destroyed during the product process.

Therefore these toxins are still an omnipresent problem and are concentrated up to three times in DDGS compared to their previous concentration in the grain feedstock.

It is well known that mycotoxins cause a variety of adverse health effects in livestock including gastrointestinal problems; kidney and liver damage; immune suppression; skin problems and blood abnormalities, fertility problems and an overall reduction in performance.

In the period between January 2010 and December 2011, a total of 126 DDGS samples were gathered.

They were analysed for the most important mycotoxins in terms of agriculture and animal production – aflatoxins (Afla), zearalenone (ZON), deoxynivalenol (DON), fumonisins (FUM) and ochratoxin A (OTA).

From all samples tested, only 4% of the analysed DDGS showed contamination levels below the limit of detection and 17% of samples had the presence of only one mycotoxin.

The presence of more than one mycotoxin in 79% of the samples raises the attention to possible interactions caused by multiple mycotoxins in animal feeds.

In the field, the response of affected animals to exposure to more than one mycotoxin can be the same as the response from each toxin individually (additive), more than the predicted sum of the responses from each individual mycotoxin (synergistic) and, more rarely, less than the predicted response from each toxin individually (antagonistic).

Some 15%, 83%, 90%, 69% and 37% of the DDGS samples were tested positive for the occurrence of Afla, ZON, DON, FUM and OTA, with average contamination levels of 7, 252, 2958, 835 and 1ppb, respectively.

As DDGS play an ever more important role in animal feed due to the rising demands and feed raw material prices, different strategies that can monitor the mycotoxin levels of DDGS prior to its inclusion in animal diets and improve co-product quality must be applied.

The results of this survey show once again that the presence of mycotoxins is ubiquitous and monitoring these toxins is crucial.

DDGS presented high prevalence of fusariotoxins such as ZON, DON and FUM; a situation which must be taken into account when using such commodities in animal diets.

The high prevalence and high contamination of non-absorbable mycotoxins such as deoxynivalenol and frequent contamination with multiple mycotoxins in animal feeds confirms the importance of using proper mycotoxin risk management strategies. ■

References are available upon request

Prevention of intestinal post weaning disorders

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With the growth in the world population, the demand for meat is rising. It is expected that the demand for pork will increase by 23% up to 2019. Although animal husbandry and biosecurity are improving, there is still a need to fight against pathogenic bacteria.

While diseased animals are treated by antibiotics, some natural growth promoters play an important role in the prevention of intestinal disorders and diseases.

Acidifiers are helpful in avoiding common diseases occurring shortly post-weaning. At four weeks of age, the active immunity of the piglet has only started to develop and removal from the sow and an abrupt diet change may weaken the piglet's body's defence. The presence of pathogenic bacteria such as E. coli or salmonella can result in post-weaning diarrhoea, causing high economic losses for the producer. However, the use of organic acids can only control but not eliminate post-weaning diarrhoea as several other factors can contribute to the occurrence of the disease.

Acids start their work via the feed by reducing the pH level, the buffering capacity and the microbial load in the feed. The level of reduction depends a lot on the acid used because each acid has its own specific range of efficacy.

By incorporating different acids, there is a broader spectrum of activity and the product is considerably more effective. The influence of acidifiers on the upper intestinal tract of animals has been investigated and described extensively in the scientific literature.

The pH reducing effect of acidifiers in the stomach supports protein digestion. A change in the upper digestive tract influences the lower digestive tract, and in the case of acidifiers, this means a reduction of pathogen loads, improved protein digestion and a slow down in the emptying of the gut which leads to improved digestibility and lower diarrhoea rates.

The antibacterial properties of acids were found to be strengthened through the use of Biotronic Top3, a product of Biomin Holding GmbH which combines acids with phytochemical and permeabilising substance.

Combining acid blends with phytochemicals, which are in general defined as active-health compounds found in plants, could increase the effects of organic acids on the growth inhibition of pathogenic bacteria.

Cinnamaldehyde is a phytochemical occurring naturally in the bark of cinnamon trees and known to be a strong antimicrobial as it targets the FtsZ protein which plays a major role in the cell division of potentially harmful bacteria. In the presence of cinnamaldehyde, cell division is inhibited resulting in a reduced bacterial load.

E. coli and salmonella belong to Gram-negative bacteria. The outer membrane of the Gram-negative bacterial cell acts as a protective barrier against external agents. Permeabilisers increase the efficacy of other antimicrobials as it is easier for them to enter the cell and inhibit or destroy vital cellular functions.

This means that when a permeabilising substance is added to a mixture of organic acids and a phytochemical, the effects on the inhibition of pathogenic bacteria is enhanced.

Such innovative natural solutions might be very helpful towards contributing to pathogen reduction and intestinal disease prevention in swine herds.



Pigs per sow per year: the battle of the numbers

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In a lecture held by a swine specialist during the World Nutrition Forum, the topic was on how a production rate of 45 piglets/sow/year could be achieved.

Although the question was a surprising one, another one came immediately to mind; more simply put, what can we do to reach higher productivity? This is not a new topic as thousands of papers have described the different ways to increase the productivity of sows, which pertain mainly to management, nutrition and genetic potential.

Focusing on nutrition, sows have stringent nutritional requirements and making vast modifications to diets can be costly to performance.

Furthermore, by taking into consideration that a sow's body is like a busy factory, actions need to be taken in order to increase productivity by decreasing the physiological stress experienced by sows.

Phytogenic feed additives (PFA) are plant-derived materials known for their capabilities to improve lactating sows' performance through increasing feed intake, milk production and shortening the wean-to-oestrus intervals. PFA are composed mainly of essential oils which exert different biological actions that help sows to maintain better body conditions.

We need to bring the term 'productivity' into a measurable parameter that does not ignore the reproductive performance of sows. Piglet index is a well known parameter for herd productivity and can be calculated by multiplying the number of piglets born live per litter (per 100 sows) by the farrowing percentage.

In a recent trial, a PFA based on a blend of essential oils of herbs and spices (Digestarom Sow) was examined for its efficacy on improving piglet index in a commercial farm. A sow unit containing two herds (4800 sows each) was used in this experiment.

The first herd received a control diet without PFA and the second one received the same diet with the PFA (150ppm) during the whole gestation and lactation period. The piglet index of the control group was about 1100, while that of the PFA group was about 1170.

These results inspired us to dig deeper in order to understand the mechanism behind this improvement. Fortunately, other set of data showed that continued use of the PFA reduced culling of sows due to fertility reasons, especially in early parities, by more than 30% and the replacement rate was reduced in the trial herd (51.5%) compared with the control herd (54.9%).

We cannot say that these feed additives target the gonads because we lack the information to confirm this. However, on closer inspection, the liver could offer some clues because it is a central organ that affects fertility in sows.

Furthermore, several studies have reported that essential oils improve liver function as well as relieve the external and physiological stresses on sows.

It can be concluded that the number of pigs/sow/year is not a target; it is just a tool showing that there is still room for more effective improvement in the near future if we better understand how sows respond physiologically to additives. ■

The complex family of trichothecenes: Effects & occurrence

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There are more than 400 different mycotoxins worldwide with trichothecenes (type A e.g., T-2 toxin, diacetoxyscirpenol and type B e.g., deoxynivalenol, nivalenol) forming the largest group among them.

The most important source of trichothecenes contamination in cereal grains today is the Fusarium head blight, which is primarily caused by type-B trichothecene producers.

Due to its worldwide distribution in cereal grains as a common contaminant in animal feed, deoxynivalenol (DON) is one of the most important mycotoxins in the trichothecenes group.

The basic mode of action is the inhibition of protein synthesis. DON mainly impairs the gastrointestinal tract and immune system.

Among the most frequently observed effects are reduced growth (anorexia and decreased nutritional efficiency), impaired immune function (enhancement and suppression), and decreased reproductive performance (reduced litter size).

The gastrointestinal tract is the first barrier against feed contaminants and is highly sensitive especially to DON. As trichothecenes induce changes in the intestinal barrier function, intestinal epithelial integrity and tight junction proteins are altered.

The increased permeability of intestinal tissue caused by these feed contaminations may predispose the animals to infections by enteric pathogens. Considering the fact that DON together with multiple mycotoxins are omnipresent in feed, the consumption of DON contaminated feed may induce intestinal damage and consequently impair animal health.

Biomin, a pioneer in mycotoxin risk management, has conducted over the years an annual mycotoxin survey. The survey results provide key information which allow feed and animal producers to assess the risks of using certain feedstuffs/feeds from different regions.

According to data obtained from the mycotoxin surveys since 2004, the average DON contamination levels have fluctuated slightly over the years; deoxynivalenol, however, has always been one of the major mycotoxins identified.

In the survey data of 2012, which included more than 4,000 samples worldwide, DON was found in 64% of all samples with an average contamination of over 1000 ppb in all tested samples.

In comparison to 2011, an even higher occurrence of fusariotoxins like deoxynivalenol was observed. DON was the most prevalent mycotoxin in wheat, present in 70% of tested samples.

As expected, wheat bran samples had higher contamination levels than wheat itself, even if differences were not as great as expected.

To counteract the effects of mycotoxins, Biomin has developed effective mycotoxin risk management approaches to minimise losses arising from the presence of these mycotoxins in animal feeds. ■

Corn cob sourced in Austria visibly contaminated with Fusarium (2,300ppb DON was detected).