Decrease the transfer of mycotoxins from sows to piglets with algoclay

Mycotoxins are secondary metabolites produced by moulds under stress conditions such as changes in temperature and humidity or competition among different moulds. In the field, favourable conditions of development of one mould facilitates the development of other mould species.

In addition, one mould can produce different types of mycotoxins, leading to a high frequency of polycontamination.

by Julia Laurain and Margriet Faber, Product Specialists For Feed, Olmix. www.olmix.com

The most frequent type of mould developing on plants in the field is Fusarium, responsible for fusariosis. Fusarium itself is not a high threat to pigs, but as highlighted under stressful conditions it produces harmful mycotoxins like trichothecenes (mainly deoxynivalenol (DON) and T-2/HT-2 toxins), zearalenone (ZEN) and fumonisins.

Importance of Fusarium mycotoxins in feed

Olmix has developed a partnership with a French public laboratory, Labocea. This lab performs contaminant analyses with specific expertise on liquid chromatography-tandem mass spectrometry allowing the detection of 45 mycotoxins or metabolites per tested sample. The Olmix-Labocea database is composed of about 15,000 feed ingredient samples, collected worldwide between 2013 and 2021.

From the database, Olmix is able to show that the major mycotoxins worldwide remain DON, ZEN, fumonisins (FUM) and aflatoxins (AFB1), depending on the region.

In addition, corn and corn derived feedstuffs are the major source of those mycotoxins. The co-occurrence of DON+ZEN is most commonly found in the Olmix-Labocea database as well as in research studies as Fusarium graminearum often produces both mycotoxins simultaneously. In field conditions it is common to find swine diets contaminated with both ZEN and DON.

Impact of DON and ZEN on swine

Pigs are considered the most exposed and sensitive animals to mycotoxins, particularly to DON and ZEN, because of the high percentage of cereals in their diet and their specific metabolism. In fact, in swine DON absorption is very rapid and reaches peak plasma concentration within 15-30 minutes after ingestion.

Furthermore in pigs, up to 55% of the orally ingested DON reached the systemic circulation. Exposure to high doses of DON can lead to acute symptoms, like diarrhoea, vomiting, leucocytosis and gastrointestinal haemorrhage.

Low to medium doses of DON will not lead to acute symptoms but will provoke significant damage to the gut that will mainly lead to lower feed efficacy, digestive troubles and immune failures impacting the profitability of animals.

Zearalenone is a well known threat in the swine industry, as it provokes a specific visible symptom: red and swollen vulva. In addition, ZEN disturbs the hormone cycle and thereby affects reproduction performances.

In many countries regulations or recommendations on safe levels of mycotoxins have been established. For example, in Europe the recommended maximum levels for DON and ZEN in swine feed are set at 900ppb and 100ppb, respectively.

In research, many studies have been done with levels of mycotoxins far above the recommended safe levels, to get an insight into the acute effects of mycotoxins.

However, in practice, acute toxicity occurs occasionally, and chronic dietary exposure plays the main role in economic losses, especially when young animals are exposed to those mycotoxins. Therefore, recent studies focus on the impact of low to moderate levels of DON and ZEN on sows and piglets.

Mycotoxin transfer from sows to piglets

A team from Schothorst Feed Research Center in the Netherlands recently worked on the impact of low doses of mycotoxins in sow diets.

The work of Benthem de Grave et al. (2021a) studied the transmission of different realistic doses of ZEN, DON, and their derivates in feed to sow and piglet serum and to the colostrum and milk of sows.

In this study, the sow's diet was contaminated with 250ppb DON in combination with either low ZEN (100ppb) or high ZEN (300ppb) from day 109 of gestation until weaning.

The diets were prepared with naturally contaminated feedstuffs and consequently the Fusarium mycotoxin DON was present in all diets at the same level (˜250ppb).

As a ZEN source, two batches of sugar beet

Continued on page 28

Continued from page 27
pulp were used. The mycotoxin levels used in this study, are below or just above the EU recommended maximum levels, and representative of what is commonly found in commercial feeds.

The transfer of ZEN and DON was significantly quantified in sow and piglet serum and observed (tendency) in the colostrum and milk compared to the control group. In the trial, performances were not affected by these levels of ZEN and DON contamination, whereas the sows showed clear signs of fat mobilisation.

In piglets, calprotectin, an inflammation marker, increased when the ZEN level was high. This study demonstrates clear impairments to sow and piglet health with low levels of DON and ZEN in the sow's diet.

The second part of this work investigated the efficacy of Olmix algoclay based decontaminant to limit the transmission of mycotoxins from sows to piglets during the last week of gestation and through lactation and to avoid the above-described health impairments.

Algoclay-based decontaminant is the solution to protect animals

As mentioned above, there were no significant differences between the control and the contaminated diets in mycotoxin levels in colostrum and milk. Meanwhile, the algoclay-based decontaminant tended to reduce ZEN and DON concentration in the colostrum and milk.

At the start of the trial (109 days of gestation), no difference in mycotoxin level was observed in the serum of sows.

However, after 33 days of mycotoxin exposure, the algoclay-based decontaminant significantly reduced ZEN concentration in the sow's serum (Fig. 1).

It also numerically lowered ZEN and DON concentration in the piglet's serum after 26 days of lactation and significantly reduced the levels of de-DON (DON metabolite) in the piglet's serum.

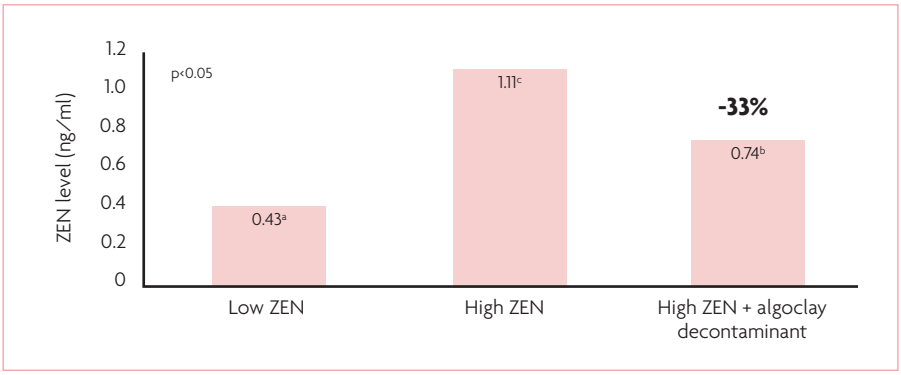

Fig. 1. Effect of the dietary treatments on ZEN levels (ng/ml) in sows' serum after 26 days of lactation with or without an algoclay-based decontaminant.

No difference was observed in the DON level in the sow's serum.

This study showed a lower transfer of DON and ZEN from sows to piglets in the presence of the algoclay decontaminant.

Piglets face many challenges during their lifetime, especially stress at weaning. Therefore, it is of great importance to minimise any predisposing factors, including mycotoxins, to prevent the development of secondary diseases or impaired performance of the piglets in the growing stage. ■

References are available from the authors on request