



NUTRIFAX
Nutrition News and Information Update



Mycotoxins in Swine



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Fungi, which are commonly referred to as molds, are microorganisms that live and grow on feedstuffs when moisture, temperature, and other conditions favour their growth. Some, but not all, molds produce toxins that cause disease in livestock and poultry. These toxins are referred to as mycotoxins. More than 200 different types of mycotoxins have been identified and new ones are continually being discovered. In Ontario, there are two types of mycotoxins that cause serious problems to the swine industry: feed refusal and estrogenic mycotoxins.

A. Feed Refusal Mycotoxins

Vomitoxin (Deoxynivalenol or DON), fusaric acid and trichothecenes (e.g. T-2 toxin) are the toxins most commonly associated with feed refusal or reduction in feed intake in swine. The reduction in feed intake is proportional to the concentration of these toxins in the diet. The reduction in growth rate and feed conversion of pigs is primarily due to a reduced intake of energy, amino acids, minerals, and vitamins. At high concentrations in the diet, vomitoxin also causes vomiting in pigs. Fusaric acid is also associated with feed refusal and operates in a mechanism similar to for vomitoxin. Both influence the brain's regulation of feed intake. Fusaric acid may increase the negative effect of vomitoxin on feed intake where vomitoxin is present. Both mycotoxins may be present in mycotoxin-contaminated corn, with levels of both mycotoxins rising in parallel.

The trichothecenes are far more toxic than vomitoxin in that they cause nervous disorders, irritation of the skin and digestive tract, birth defects, reduced disease resistance, and hemorrhaging in addition to a reduction in feed intake.

The symptoms, such as vomiting and large reductions in feed intake, caused by high concentrations of these mycotoxins will be readily observed by all pork producers. However, smaller reductions in feed intake, which may be of great economic significance, may go unnoticed if feed intake is not monitored.

VOMITOXIN

<1 ppm	❖ limited influence on feed consumption
1-2 ppm	❖ limited influence on feed consumption
>2 ppm	❖ reduced feed intake & growth noticeable after 7 days
	❖ can be difficult to detect at farm level unless you monitor feed intake or usage.
>3 ppm	❖ reduced intake will be noticeable within 3 days
	❖ dilution may be effective at this level
>5 ppm	❖ 30% - 50% reduction in consumption and growth rate
7 ppm	❖ intake problems are very obvious
	❖ dilution may not be a practical solution at this level
10 ppm	❖ almost complete feed refusal

It is very difficult to interpret assay values and accurately predict the impact on pig performance. There is a possibility that the assay reading is not representative of the grain source being used in the ration formula. It is also possible that other toxins may exist in the grain that will reduce performance more than what typically would be expected. The values above for vomitoxin are a suggested guideline.

B. Estrogenic Toxins

ZEARALENONE

Zearalenone (also known as F-2 Toxin) is the mycotoxin that affects reproductive efficiency but generally not feed intake. Once absorbed by the pig, zearalenone mimics the action of estrogen, a key reproductive hormone. Relative to other species, swine are extremely sensitive to this mycotoxin.

In gilts and sows, the vulva and reproductive tract become enlarged and vaginal and rectal prolapses occur. Heats become irregular and litter size is reduced. In boars, zearalenone causes degeneration of the testes and reduced libido. The loss of boar fertility alone will have a large negative impact on herd productivity if it goes unnoticed. The reduction of litter size of sows may amount to a loss of several pigs per sow per year.

Market animals may show signs of increased irritability causing tailbiting and fighting. As a result of mucosal irritation and straining, vaginal and rectal prolapses may occur. Growth decline or stall out has been noticed in market weight animals.

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| 1 – 2 ppm | ❖ will initiate estrogenic syndrome, and mucosal irritation. |
| 3 – 5 ppm | ❖ some interference with reproductive performance |
| 6 – 9 ppm | ❖ serious reproductive problems |
| | ❖ failure to show heats |
| | ❖ reduces sex drive in boars |

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FEED FORMULATION

Several strategies can be employed to minimize the effect that mycotoxin contaminated ingredients will have when mixed in swine rations. In many cases, the situation can be “managed” through adjusting the feed formula.

Practical options include:

- a) dilution of the contaminated grain,
- b) increasing nutrient density to offset feed intake reductions
- c) adding alfalfa meal to reduce the absorption of the toxin,
- d) adding specific compounds that will bind with the toxins.
- e) feed to less susceptible species

The SHUR-GAIN program for Managing Mycotoxins recommends a combination of these methods to reduce the negative effects from feeding rations with toxins. In some cases, the best option is to feed suspect grain to less sensitive species.

A. DILUTION

The severity of symptoms produced by any mycotoxin is proportional to the amount present in the diet. Therefore, at low to moderate levels of contamination, dilution with clean grain is the first option to consider to reduce the concentration of mycotoxins in diets for swine.

If zearalenone levels exceed 2 ppm and vomitoxin levels exceed 4 ppm, a 50:50 dilution with clean grain is recommended.

If you are unable to dilute your contaminated grain due to bin restrictions or storage requirements, Shur-Gain has formulated 3 Swine NMP 50:50 Supplements that contain no corn and can be used to dilute the contaminated grain source and increase nutrient density of your diet. In cases where your grain sources contain higher levels of mycotoxins and a 50:50 dilution is not sufficient to reduce the toxin levels to safe levels, Shur-Gain can formulate Custom Swine Supplements to meet your needs.

B. INCREASE DIET DENSITY

Growth rate and feed conversion of swine are adversely affected by feed refusal mycotoxins because daily intake of energy, amino acids, minerals and vitamins is not sufficient to support maximum growth rate.

By increasing the nutrient density, energy and nutrient intake can be maintained while the intake of mycotoxin-contaminated corn is reduced. There is some evidence that fat may also reduce intestinal absorption of vomitoxin and T-2 toxin. The addition of Shur-Gain's dry free flowing fat to your SHUR-GAIN swine premix at 10 – 20 kg per tonne will assist you in increasing your nutrient density. Shur-Gain 3 Swine NMP 50:50 Supplements can also be used to increase nutrient density of your diet.

C. REDUCE ABSORPTION OF MYCOTOXINS

Even if swine do consume feeds containing mycotoxins, some of the adverse effects can be prevented if absorption of the mycotoxins is reduced. The addition of 50 kg of alfalfa meal to diets for swine reduces absorption of zearalenone and T-2 toxin.

It has been known for some time that a group of compounds belonging to the aluminosilicate family have the property of tightly binding a wide range of compounds, including some mycotoxins. These compounds permit the feeding of higher concentrations of mycotoxins without reducing performance of animals and are used at rates that will not significantly dilute the diet.

The effectiveness of a large number of aluminosilicates has been studied by Shur-Gain's Research Group. A few have been identified which have superior toxin binding properties. Shur-Gain's Feed Check FSP (Feed Service Pack) can be added to your Swine Feed or Swine Premix at a rate of 10 kg per tonne. Shur-Gain's Feed Check FSP contains sodium aluminosilicates plus other ingredients to reduce the effects of mycotoxins on pig performance.