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## What is the Long Term Impact of Feeding DON to Finishing Pigs?



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### Mycotoxins continuous concern for agriculture

Mycotoxin-contaminated grains are commonly downgraded for use in livestock feed. While the best strategy for livestock producers is to avoid feeding mycotoxincontaminated grain altogether, with the increased incidence and level of contamination this is no longer a viable option. The mycotoxin, deoxynivalenol (DON), is of significant importance to agriculture since it commonly contaminates corn, wheat, oats, and barley and is

one of the most prevalent mycotoxins worldwide. Therefore, strategies which allow the use of mycotoxin-contaminated grains in livestock feed are necessary.

The majority of studies examining the effects of mycotoxins in swine are performed in young (e.g., weaned) animals with the assumption that the effects of consuming mycotoxincontaminated feed is highest in the young animal.

(What is the long-term ... continued on page 2)



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Moreover, previous studies have examined the impact of mycotoxins over a relatively short period of time. It is possible that due to the higher feed intake in grower-finisher pigs and longer possible exposure time that the effects of mycotoxins may be greater in this stage of production. However, it has also been suggested that the effect of mycotoxin intake is reduced in grower-finisher pigs and that older pigs may have the capacity to adapt to DON-contaminated feed, with feed intake and growth performance recovering after a period of exposure. We wanted to examine the impact of long-term feeding of graded levels of DON in finisher pigs to determine whether pigs have the ability to adapt to DON-contaminated feed and the economics of reduced growth performance.

### What we did

A total of 200 pigs (initial BW of  $76.6\pm3.9$  kg) were housed in groups of 5 pigs/pen and randomly assigned to 1 of 4 dietary treatments over 2 blocks (n=10/trt). Dietary treatments consisted of a control diet with no DON contamination (CON), or 1 of 3 DON-contaminated diets containing 1, 3, or 5 ppm DON (DON1, DON3, DON5). DON contaminated diets were achieved by the addition of an appropriate amount of

### Table 1. Growth performance of finisher pigs fed diets containing graded levels ofDON for 6 weeks

	CON	DON1	DON3	DON5	SEM	P-value
Body weight (kg	)			ı		1
Day 0	76.9	77.0	76.3	76.0	1.18	0.917
Day 7	85.4ª	84.8ª	83.0 <sup>b</sup>	80.8 <sup>c</sup>	0.34	<.0001
Day 14	95.3ª	95.3ª	92.4 <sup>b</sup>	88.7°	0.42	<.0001
Day 21	103.4ª	103.8ª	99.8 <sup>b</sup>	95.7°	0.50	<.0001
Day 28	112.1ª	111.9ª	107.8 <sup>b</sup>	103.0 <sup>c</sup>	0.53	<.0001
Day 35	119.7ª	119.8ª	114.9 <sup>b</sup>	110.4 <sup>c</sup>	0.63	<.0001
Day 42	126.7ª	126.9ª	123.6 <sup>b</sup>	118.5°	0.80	<.0001
Average daily gain (kg/d)						
Week 1	1.27ª	1.18ª	0.93 <sup>b</sup>	0.60 <sup>c</sup>	0.05	<.0001
Week 2	1.40 <sup>ab</sup>	1.49ª	1.33 <sup>b</sup>	1.13 <sup>c</sup>	0.04	<.0001
Week 3	1.17 <sup>ab</sup>	1.21ª	1.06 <sup>b</sup>	1.01 <sup>c</sup>	0.04	0.004
Week 4	1.24ª	1.17 <sup>ab</sup>	1.15 <sup>ab</sup>	1.04 <sup>b</sup>	0.04	0.033
Week 5	1.08	1.12	1.01	1.06	0.04	0.392
Week 6	1.06	1.00	1.20	1.14	0.06	0.116
Overall	1.19a	1.20ª	1.12 <sup>b</sup>	1.00 <sup>c</sup>	0.02	<.0001
Average daily feed intake (kg/d)						
Week 1	2.59ª	2.59ª	2.22 <sup>b</sup>	1.70 <sup>c</sup>	0.06	<.0001
Week 2	2.98ª	3.07ª	2.89ª	2.55 <sup>b</sup>	0.07	<.0001
Week 3	3.03ª	3.03ª	2.88ª	2.56 <sup>b</sup>	0.05	<.0001
Week 4	3.25ª	3.19 <sup>a</sup>	3.13ª	2.85 <sup>b</sup>	0.05	<.0001
Week 5	3.22	3.20	3.19	3.04	0.06	0.222
Week 6	3.19	3.11	3.36	3.05	0.08	0.079
Overall	2.99ª	3.06ª	2.94ª	2.60 <sup>b</sup>	0.05	<.0001
Gain:Feed (kg/k	g)					
Week 1	0.49 <sup>a</sup>	0.46ª	0.41ª	0.34 <sup>b</sup>	0.02	<.0001
Week 2	0.47	0.49	0.47	0.44	0.01	0.136
Week 3	0.38	0.40	0.37	0.40	0.01	0.518
Week 4	0.38	0.36	0.37	0.36	0.02	0.738
Week 5	0.33	0.35	0.32	0.35	0.01	0.211
Week 6	0.33	0.32	0.36	0.37	0.01	0.083
Overall	0.40	0.39	0.38	0.38	0.01	0.073

a,b,c,d Means within a row without a common superscript differ significantly (P < 0.05)

naturally-contaminated wheat and wheat screenings at the expense of clean wheat. All diets were formulated to be isonitrogenous and isoenergetic and to meet or exceed nutrient requirements (NRC, 2012) and both feed and water were provided ad libitum. Body weight and feed intake were measured on a weekly basis for 6 weeks for determination of average daily gain, average daily feed intake, and feed efficiency (gain:feed).

### What we found

Compared to CON fed pigs, body weight was reduced in pigs fed the DON3 and DON5 diet from week 1 to the end of the study. Average daily gain was reduced on the DON3 and DON5 diets for the first 3 weeks of the study but recovered by week 4 for DON3 and week 5 for DON5. Average daily feed intake was reduced only in week 1 for pigs fed DON3 and DON5 diets and only in DON5 fed pigs up to week 4, whereas afterwards ADFI was the same across diets. Feed efficiency was only reduced for DON5 fed pigs in week 1. There was no difference between CON and DON1 fed pigs for any measures.



"Based on project results, it would appear that pigs have the ability to adapt to DON-contaminated diets."

### What does this mean?

While it has been suggested that deoxynivalenol can have a significant impact on animal physiology, with negative effects on gut health, protein synthesis (lean gain), and organ function, the results observed in the present study suggest that the reduction in performance is mostly related to the reduction in feed intake observed immediately after introduction of the experimental diets. Indeed, while feed intake was reduced for up to 5 weeks in DON-fed pigs compared to control fed pigs, feed efficiency was only reduced in week one, suggesting that the capacity for growth is not affected in these pigs but feed intake is insufficient to support maximum growth. While there was an immediate reduction in feed intake, growth performance, and

feed efficiency, these parameters had recovered by week 4, for DON3-fed pigs, and week 5, for DON5-fed pigs. Based on these results, it would appear that pigs have the ability to adapt to DON-contaminated diets. While feed intake and growth performance had recovered to the level of CON-fed pigs, body weight never recovered.

### **Economics**

Initial results indicate margin over feed costs may not differ between 1, 3, and 5ppm DON contaminated diets. While feeding diets containing 3 and 5 ppm DON resulted in a lighter hog at market resulting in lost revenue up to \$20/hog – feed consumption was also reduced by approximately \$20/hog resulting in little change when comparing margin over feed cost. It is important to note individual grading grids may have a significant impact on the change relative to margin over feed cost.

#### Take Home Message

Overall, it may be possible to feed diets containing higher levels of DON than currently recommended, however, adjustments may be needed to account for reduced performance.

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