Evaluation of a Distillers Dried Grain Derivative Feedstuff on Performance of Nursery Pigs

M. S. Honeyman, associate professor;
M. E. Larson, graduate research assistant;
Department of Animal Science

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Summary

The study evaluated two levels of distillers dried grain derivative (DDGD) (2 and 4% of the total diet) compared with a control diet (0%) on pig growth performances. Thirty-two nursery pigs (22 days of age) were individually housed in stainless steel pens. The pens were located in a clean, environmentally controlled room. The pigs were allowed to consume one of the three diets ad libitum during the 28-day trial. The pigs were fed a phase I diet for the first 14 days of the trial and phase II diet for the remaining 14 days. There were no major positive or negative cumulative effects on ADG, ADFI, and G:F when feeding DDGD at 2 and 4% during a 28-day trial. Additional Performance trials would help elucidate the optimal role of DDGD in nursery pig diets.

Introduction

Natural Chem Industries has recently developed a new feed ingredient that is derived from the distillers dried grain broth by a unique glycerin removal and drying process (DDGD). During 1997 and 1998, Natural Chem Industries evaluated the effects of DDGD on the performance of broiler chicks at the University of Georgia Poultry Science Department. The University of Georgia found a growth improvement in broilers fed DDGD compared with the control diet. The Poultry Science Department conducted five studies and in four out of the five studies a growth performance improvement was noted for the broilers fed DDGD when compared with the control. In 1999, Natural Chem Industries wanted to evaluate their product with other livestock species and contacted Iowa State University Swine Nutrition Department. A 28-day trial with nursery pigs was conducted.

The objectives of this study were to determine whether different levels of DDGD would work in nursery pig diets and to evaluate the growth performance response under ad libitum feeding conditions.

Materials and Methods

Animal care. The Iowa State University Committee on Animal Care (COAC) approved the use of pigs and the experimental protocol.

Experimental design. Thirty-two nursery pigs weighing (7.92 kg average) were blocked by litter and randomly assigned to three treatment groups: a 0% control group (n=11), 2% DDGD group (n=10), and a 4% DDGD group (n=11). The trial contained 11 blocks and the 11th block did not contain all treatments. The 11th block contained a pig from the control group and the 4% DDGD group and excluded the 2% DDGD group.

Animals and diets. Thirty-two nursery pigs weighing (7.92 kg) were individually penned in (2 ft × 4 ft) stainless steel pens. The pens were located in an environmentally controlled room at the Iowa State University Swine Nutrition Farm. The room temperature at the start of the trial was 80°F and the temperature was gradually lowered over the duration of the 28-day trial. By the end of the trial, the room temperature was 73°F. The average temperature throughout the trial was 74°F. The temperature was lowered to maintain a comfort zone (no huddling/shivering) for pigs to maximize growth. Every 7 days the pigs were weighed and the wasted feed was collected to calculate average daily gain (ADG), average daily feed intake (ADFI), and gain to feed ratio (G:F). Feed intake and gains for each pig were recorded weekly during the 28-day trial. The trial contained two phases: phase I (0–14 days) and phase II (15–28 days). The compositions of the dietary treatments for phase I are shown in Table 2. At the end of the first 14 days, the pigs were switched to the phase II dietary treatments (Table 3). The diets were made isocaloric with soy oil.

Statistical analysis. The trial was analyzed as a randomized block design. The data were subjected to statistical analysis with the GLM procedures of SAS (1998). In the study the pig was considered the experimental unit. The LS means adjust for the missing observations.

Results and Discussion

All dietary treatments performed well throughout the 28-day trial. All pigs were healthy entering the trial and no deaths were recorded. There was no difference among the dietary treatments in ADG for the first, second, fourth and cumulative weeks of the trial (Table 4) (P>.10). The control group grew faster for the third week of the trial compared with the 4% DDGD diets (P>.02).

There was a general trend that the control group pigs would consume slightly more feed than pigs fed 2% DDGD for weeks 1(P<.07), 2 (P<.06), and cumulative (1–4 weeks) (P<.08) (Table 4). The cumulative ADFI was similar across all dietary treatments (P>.10) (Table 4).

Overall, the pigs from each dietary treatment had no differences in feed efficiency (P>.10) (Table 4). During week 3, the control group and the 2% DDGD group were more efficient than the 4% DDGD group (P<.02) (Table

4). There was no difference in feed efficiency for the first, second, and fourth weeks of the trial.

Conclusions

In reviewing the results of this trial, no major positive or negative cumulative effects of feeding DDGD on the performance of nursery pigs at 2% and 4% of the diet were observed during a 28-day trial (P>.10). However, a trend (P<.08) of depressed feed intake was noted when comparing the control diet with the 2% DDGD diet over the 28-day trial. Additional performance trials would help elucidate the optimal role of DDGD in nursery pig diets.

Acknowledgment

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Table 1. Analysis of distiller's dried grain derivative (DDGD) (dry matter basis).

Dry matter, %	85.6
Crude protein, %	34.3
Crude fat, %	28.3
Ash, %	6.1
Metabolizable energy, Mcal/lb	1.94
Phosphorus, %	1.3
Calcium, %	.16
Lysine, %	.96

Analysis provided by Natural Chem. Industries, LTD, Houston, TX.

Table 2. Composition and calculated analysis of diets in phase I (0–14 days).

Ingredient	Treatments		
	0% Control	2% DDGD	4% DDGD
	---------- % ----------		
Corn	36.78	34.94	33.12
Soybean meal, dehulled	28.80	28.80	28.80
Whey, dried	25.00	25.00	25.00
AP 920	5.00	5.00	5.00
Dicalcium phosphate	1.65	1.65	1.65
Limestone	.90	.90	.90
Methionine, DL	.10	.10	.10
Zinc oxide	.35	.35	.35
SN Vitamins[a]	.40	.40	.40
SN Trace minerals[a]	.07	.07	.07
SN Selenium[a]	.05	.05	.05
Lysine, synthetic	.02	.019	.017
CSP 250	.05	.05	.05
Soybean oil	.65	.05	.03
DDGD	**0**	**2.00**	**4.00**

[a]SN = Iowa State University Swine Nutrition vitamin, mineral, and selenium premix.

Calculated Analysis	0% Control	2% DDGD	4% DDGD
Lysine	1.70	1.70	1.70
Crude protein	24.0	24.5	24.9
Metabolized energy	1470	1470	1470
Calcium	1.00	1.00	1.01
Phosphorus available	.60	.62	.63

Table 3. Composition and calculated analysis of diets in phase II (15–28 days).

	Treatments		
Ingredient	0% Control	2% DDGD	4% DDGD
	---------- % ----------		
Corn	51.87	50.08	48.24
Soybean meal, dehulled	33.30	33.30	33.30
Whey, dried	10.00	10.00	10.00
Dicalcium phosphate	2.20	2.20	2.20
Limestone	.90	.90	.90
Methionine, DL	.10	.10	.10
Salt (NaCl)	.25	.25	.25
Zinc oxide	.35	.35	.35
SN Vitamins[a]	.30	.30	.30
SN Trace minerals[a]	.06	.06	.06
SN Selenium[a]	.05	.05	.05
Lysine, synthetic	.02	.18	.17
CSP 250	.05	.05	.05
Soybean oil	.60	.41	.25
DDGD	**0**	**2.00**	**4.00**

[a]SN = Iowa State University Swine Nutrition vitamin, mineral, and selenium premix.

Calculated Analysis	0% Control	2% DDGD	4% DDGD
Lysine	1.40	1.40	1.40
Crude protein	21.5	22.0	22.4
Metabolized energy	1470	1470	1470
Calcium	1.00	1.00	1.00
Phosphorus available	.54	.56	.57

Table 4. Performance means of early-weaned pigs fed diets with and without DDGD (least squares means).

	Level of DDGD		
	0% Control	2% Control	4% Control
ADG, kg/d			
Week 1, phase I	.244	.186	.241
Week 2	.506	.452	.500
Week 3, phase II[a]	.670	.587	.487
Week 4	.798	.784	.787
Cumulative (Weeks 1–4)	.555	.502	.504
ADFI, kg/d			
Week 1, phase I[b]	.269	.206	.230
Week 2[c]	.588	.496	.505
Week 3, phase II	.824	.746	.723
Week 4	1.136	1.067	1.104
Cumulative (Weeks 1–4)[d]	.704	.629	.641
G:F			
Week 1, phase I	1.30	1.27	1.01
Week 2	1.17	1.12	1.01
Week 3, phase II[e,f]	1.22	1.29	1.62
Week 4	1.42	1.36	1.46
Cumulative (Weeks 1–4)	1.27	1.25	1.27

[a] 0% vs. 4% (P<.02)

[b] 0% vs. 2% (P<.07)

[c] 0% vs. 2% (P<.06)

[d] 0% vs. 2% (P<.08)

[e] 0% vs. 4% (P<.01)

[f] 2% vs. 4% (P<.02)

ADG, average daily gain

ADFI, average daily feed intake

G:F, gain to feed

All other LS means presented do not differ (P>.10).