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Maximizing DDGS for Finishing Pigs in Bedded Hoop Barns: Trial One

Mark S. Honeyman
Iowa State University, honeyman@iastate.edu

David R. Stender
Iowa State University, dstender@iastate.edu

Wayne B. Roush
Iowa State University, wroush@iastate.edu

Don Hummel
Iowa State University

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Abstract
Iowa's ethanol industry continues to expand rapidly. A major coproduct of ethanol production is dried distillers grains with solubles (DDGS). Higher prices for corn and increasing supplies of DDGS have generated questions about feeding DDGS to market swine. The objective of this study was to evaluate various programs to maximize DDGS feeding to finishing pigs in bedded hoop barns. The work reported is the first of several trials planned.

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Maximizing DDGS for Finishing Pigs in Bedded Hoop Barns: Trial One

Mark Honeyman, professor
Department of Animal Science
Dave Stender, extension field specialist
Wayne Roush, farm superintendent
Don Hummel, ag specialist

Introduction

Iowa's ethanol industry continues to expand rapidly. A major coproduct of ethanol production is dried distillers grains with solubles (DDGS). Higher prices for corn and increasing supplies of DDGS have generated questions about feeding DDGS to market swine. The objective of this study was to evaluate various programs to maximize DDGS feeding to finishing pigs in bedded hoop barns. The work reported is the first of several trials planned.

Materials and Methods

Crossbred finishing pigs (n = 60) were allocated to six pens with five barrows and five gilts per pen (52 lb avg. weight). The trial was conducted during April through August 2008 at the ISU Western Research Farm, Castana, IA. The pens were in small hoop barns with two pens per barn. Each pen had a self-feeder and an automatic waterer and was bedded with straw. The pigs were from the ISU Swine Nutrition Farm, Ames, IA and were from white sows crossed with Duroc terminal boars.

Each pen was assigned to one of three dietary treatments—continuous 20% DDGS (Cont), a step-up program from 0% to 30% DDGS (Step), and a high DDGS program that rapidly got pigs to 30% DDGS (High) (Table 1). All treatments were fed a 20% DDGS diet for the last phase of the trial. There were 4 dietary phases in the 98-day trial (Table 2). Phase 1 and 4 were each 21d. Phase 2 and 3 were each 28d. The diets were pelletted and fed ad libitum. Within each phase, the diets were formulated to be equal in apparent digestible amino acids—lysine, threonine, and tryptophan (Table 3). Diets were supplied by Arcadia Co-op, Arcadia, IA, using DDGS from the Amaizing Energy ethanol plant, Denison, IA. All phases were manufactured and delivered simultaneously at the beginning of the phase. DDGS values used in diet formulation were the average analysis values provided by the plant. DDGS nutrient values used were 28% CP, 0.62% total lysine, 0.29% apparent digestible lysine, 0.94% threonine, 0.25% tryptophan, 0.03% Ca, 0.52% available P, 7.0%, 9.5%, and 1,656 kcal/lb ME. All other values were from the ISU Lifecycle Swine Nutrition program. Each phase had at least 2 treatment diets in common (Table 1). The composition and calculated analysis of the diets are shown in Table 3.

The pigs were allotted to their pen and diet. The pigs were then continued in their respective pens on the assigned diets until market. Feed intake and weight gain were recorded. At the end of the trial, the pigs (avg. weight 271 lb) were scanned for backfat and loin muscle area and harvested at the Farmland plant, Denison, IA.

Results and Discussion

The pigs consumed the diets readily with no apparent problems making the transition among the diets. Results are shown in Table 4. Feed intake (ADFI), growth (ADG), and feed per liveweight gain (F/G) were similar. No major differences were noted in backfat thickness (BF) and loin muscle area (LMA).

On average, a pig fed the continuous program consumed 119 lb of DDGS or 20% of the total feed over the 98-day feeding trial (from 52 to 272 lb). A pig fed the Step-up program consumed 106 lb of DDGS or 17% of the total feed. A pig fed the High program consumed 162 lb of DDGS or 26% of the total feed. This is the first trial and no conclusions can be drawn, but this work suggests that diets and feeding programs can be designed to increase DDGS usage by market swine without negatively affecting pig performance. Also formulating diets on apparent digestible amino acid content may be advantageous when using DDGS on swine diets.

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Table 1. Percentage of DDGS in diet by phase and treatment.

	Phase			
Treatment	1	2	3	4
Cont	20*	20*	20	20*
Step	0	20*	30*	20*
High	20*	30	30*	20*

*Within a phase or column, diets with an asterisk were identical.

Table 2. Days for each dietary phase.

	Phase				
Treatment	1	2	3	4	Total
Cont	21	28	28	21	98
Step	21	28	28	21	98
High	21	28	28	21	98

Table 3. Composition and calculated analysis of diets, as-fed basis.

Phase	1	1	2	2	3	3	4
Treatment	Step	Cont/High	Cont/Step	High	Cont	Step/High	All
Ingredient							
Corn	721.50	590.30	625.30	573.90	658.10	597.50	709.90
DDGS	0.00	200.00	200.00	300.00	200.00	300.00	200.00
SBM (hulless)	250.00	180.00	150.00	100.00	120.00	80.00	70.00
Dical phos	13.50	8.70	5.80	3.50	3.50	1.20	2.00
Limestone	8.20	11.50	11.50	13.20	12.00	13.50	11.80
Salt	3.50	3.70	3.50	3.50	3.20	3.20	3.20
LOL Vit mix	1.00	1.00	0.70	0.70	0.60	0.60	0.50
LOL Min mix	0.70	0.70	0.70	0.70	0.60	0.60	0.50
Lysine	1.40	3.30	2.50	4.00	2.00	3.10	2.10
Tryptophan	0.00	0.40	0.00	0.20	0.00	0.10	0.00
Threonine	0.20	0.40	0.00	0.30	0.00	0.20	0.00
	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00
Calculated Analysis							
Cr. Protein, %	18.0	19.4	18.2	18.3	17.0	17.5	15.0
Met. Energy, kcal/	1502	1523	1531	1540	1536	1546	1539
Calcium, %	0.71	0.71	0.64	0.64	0.60	0.59	0.54
Total P, %	0.63	0.59	0.52	0.50	0.47	0.45	0.42
Avail P, %	0.32	0.32	0.26	0.26	0.21	0.22	0.18
Total lysine, %	1.05	1.08	0.93	0.95	0.81	0.82	0.68
App. dig. Lysine	0.83	0.84	0.71	0.72	0.60	0.60	0.47
Threonine, %	0.69	0.73	0.65	0.66	0.60	0.62	0.52
App. dig. Thr, %	0.51	0.51	0.44	0.44	0.40	0.40	0.34
Tryptophan, %	0.21	0.24	0.19	0.19	0.17	0.17	0.14
App. dig. Trp, %	0.18	0.18	0.13	0.13	0.11	0.11	0.09

Table 4. Pig performance of finishing pigs fed DDGS-based diets in bedded hoop barns.

	Cont	Step	High
Start wt, lb	52.0	51.9	53.1
End wt, lb	271.9	262.9	277.2
ADFI, lb/d	6.09	6.28	6.39
ADG, lb/d	2.24	2.15	2.22
F/G	2.72	2.92	2.88
BF, $in.^2$	0.89	0.80	0.82
LMA, sq in.	7.48	7.32	7.34
Total DDGS/pig, lb	119	106	162