Growth Performance of Growing Pigs Fed Crude Glycerol-Supplemented Diets

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Summary and Implications

Growth performance of growing pigs fed crude glycerol was determined in a 138-d feeding trial. Crude glycerol utilized in the trial contained 84.51% glycerol, 11.95% water, 2.91% sodium chloride, and 0.32% methanol. Eight days post-weaning, 96 pigs (48 barrows, 48 gilts) with an average BW of 7.9 ± 0.4 kg were allotted to 24 pens (4 pigs/pen), with gender and pen weight balanced at the start of the experiment. Dietary regimes were randomly assigned to each pen. Dietary treatments were 0, 5, and 10% crude glycerol inclusion in corn-soybean meal based diets. Diets were offered ad libitum in meal form and formulated to be equal in metabolizable energy (ME), sodium, chloride, and Lys, with other amino acids (AA) balanced on an ideal AA basis. Every two weeks, pigs and feeders were weighed and G:F calculated. Pig growth, feed intake, and G:F were not affected by dietary treatment. Crude glycerol is a viable source of dietary energy that is well utilized by pigs. Inclusion of crude glycerol in pig diets may be determined by relative availability and price of other dietary energy sources.

Introduction

The production of biofuels, namely ethanol and biodiesel, is increasing rapidly. Biodiesel sales in the United States have grown exponentially since 1999 with existing U.S. production capacity at approximately 5.3 billion liters. A co-product of the biodiesel industry is crude glycerol, with 79 g of crude glycerol generated for every 1.0 liter of biodiesel produced. Consequently, with current biodiesel production capacity, approximately 420,000,000 kg of crude glycerol could be generated annually. The objective of the study was to evaluate effects of crude glycerol supplementation on performance in growing pigs.

Materials and Methods

Pigs (Cambrough 22 females × L337 terminal sires) were weaned at 21 d of age and fed a commercial starter diet for one week. Eight days post-weaning, 96 pigs (48 gilts, 48 barrows) with an average BW of 7.9 ± 0.4 kg were allotted to 24 pens (4 pigs/pen) with gender distribution and pen weight balanced at the start of the experiment. Dietary regimes were randomly assigned to each pen, with dietary treatments being 0, 5, and 10% crude glycerol inclusion in corn-soybean meal diets. Crude glycerol was obtained from a biodiesel production facility (AG Processing Inc., Sergeant Bluff, IA) utilizing soybean (*Glycine max)* oil as its feedstock. There were five dietary phase changes over the 138-d trial. Within each phase, diets were offered ad libitum in meal form and were formulated to be equal in ME, sodium, chloride, and Lys with other AA balanced on an ideal AA basis.

Pigs were individually weighed every two weeks with feed disappearance recorded at the time of pig weighing. The combined data were used to calculate ADG, ADFI, and G:F. Dietary phase changes corresponded with the day that pigs were weighed, occurring on the same day for all treatments. Pigs were housed in nursery (1.2 × 1.2 m) pens for 33 days, grower (1.8 × 1.9 m) pens for 28 days, and finisher (2.7 × 1.8 m) pens for the final 77 days. Nursery pens had wire mesh flooring while the grower and finisher pens had partial slats. All rooms were mechanically ventilated with pull-plug manure storage systems. During the course of the experiment six pigs were removed from the trial due to health issues with no pattern of pig removal based on dietary treatment and no individual pen having more than one pig removed. Pen feed disappearance was adjusted for the removed pig at the time of removal. On d-138, all pigs were individually weighed (133 ± 6 kg BW) for the termination of the performance period.

Data were analyzed using JMP 6.0 (SAS Institute, Inc. Cary NC). Pig performance was evaluated in each dietary phase and for the entire 138-d feeding period using a regression model to test for effect of dietary treatment on ADG, ADFI, and G:F. Individual pens were the experimental unit for growth performance measures.

Results and Discussion

Average daily gain, ADFI, and G:F were not affected by dietary treatment (Table 1) in any phase or over the entire growing 138-d period. Crude glycerol can be fed to growing pigs without altering growth and performance of the animal. Effects of crude glycerol supplementation on carcass characteristics, meat quality, and tissue histology are presented in an accompanying report. Crude glycerol is a viable source of dietary energy that is well utilized by pigs. Inclusion of crude glycerol in pig diets may be determined by the relative availability and price of other dietary energy sources.

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Table 1. Growth and performance of growing pigs fed crude glycerol[1].

	Dietary Treatment				
	0	5	10	SEM	P-value
Pigs, no.					
d 1	32	32	32		
d 19	32	32	32		
d 33	32	32	32		
d 61	30	29	32		
d 103	30	29	31		
d 138	30	29	31		
BW, kg					
d 1	7.9	8.0	7.8	0.2	0.60
d 19	14.6	14.9	14.5	0.5	0.75
d 33	23.1	23.3	22.8	0.4	0.74
d 61	49.2	50.5	49.5	1.2	0.73
d 103	94.1	96.3	95.4	1.9	0.72
d 138	132.9	134.0	132.8	2.3	0.92
ADG, g/d					
d 1 to 19	352	360	351	15	0.90
d 19 to 33	449	445	441	11	0.88
d 33 to 61	932	943	953	33	0.90
d 61 to 103	1,068	1,090	1,093	21	0.67
d 103 to 138	1,109	1,076	1,069	29	0.59
d 1 to 138	905	913	906	16	0.93
ADFI, g/d					
d 1 to 19	506	530	503	16	0.44
d 19 to 33	742	775	753	19	0.46
d 33 to 61	1,778	1,870	1,916	75	0.44
d 61 to 103	2,823	2,897	2,899	78	0.74
d 103 to 138	3,711	3,722	3,678	90	0.94
d 1 to 138	2,333	2,385	2,400	52	0.66
G:F					
d 1 to 19	0.70	0.68	0.59	0.02	0.69
d 19 to 33	0.61	0.57	0.59	0.01	0.26
d 33 to 61	0.52	0.50	0.50	0.01	0.25
d 61 to 103	0.38	0.38	0.38	0.01	0.99
d 103 to 138	0.30	0.29	0.29	0.01	0.27
d 1 to 138	0.39	0.38	0.38	0.01	0.12

[1]Dietary phase I–V corresponds with d 1 to 19, d 19 to 33, d 33 to 61, d 61 to 103, and d 103 to 138, respectively.