

## Effect of Feeding Conjugated Linoleic Acid over Different Periods of Weight Gain on Swine Performance and Body Composition

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#### Summary and Implications

Pigs fed conjugated linoleic acid (CLA) for the longest period had increased gain:feed ratios, decreased backfat thickness, and increased loin muscle area. Most of the performance responses to CLA, however, were obtained with shorter periods of feeding CLA.

#### Introduction

In a previous study, we found that an increase in dietary concentration of CLA fed for the growing–finishing period increased average daily gain and gain:feed ratio and improved carcass quality. Our current experiment was conducted to determine the length of time CLA needed to be fed to attain these benefits.

#### Materials and Methods

Ninety-two pigs were fed diets containing 1.25% CLA oil (oil contained 60% CLA) for the last 0, 29, 58, and 87 kg of body weight gain. Pigs were marketed at a body weight of 115 kg. Diets were made isocaloric by substituting CLA oil for soybean oil. Diet formulas and calculated analyses of diets are presented in Table 1.

The experiment was designed as a randomized complete block with four treatments and five blocks. Each block contained four contiguous pens, with littermates in each of the four pens. Pens contained four or five pigs and all pens within a block contained the same number of pigs.

Body weight and feed intake data were recorded every other week. Real time ultrasound was used to determine backfat thickness and loin muscle area at approximately 28, 57, 86, and 115 kg of body weight. At market, backfat thickness and loin muscle area were measured. A five point subjective measure was used to evaluate marbling, firmness, and color of the loin muscle.

**Table 1. Diet composition and calculated analysis.**

Ingredient	Body weight range, kg		
	28 to 57	57 to 86	86 to 115
Corn	68.76	83.47	85.01
Soybean meal	27.38	12.99	11.76
Dicalcium phosphate	1.24	.82	.57
Calcium carbonate	.82	.77	.77
Salt	.25	.25	.25
Vitamin premix <sup>a</sup>	.20	.20	.20
Trace mineral premix <sup>b</sup>	.05	.05	.05
Tylan 40	.05	.05	.05
Lysine-HCl	.00	.15	.09
Oil <sup>c</sup>	1.25	1.25	1.25
Total	100.00	100.00	100.00
Calculated analysis:			
ME, kcal/kg	3369	3382	3395
Lysine, %	1.00	.73	.65
Calcium, %	.70	.58	.50
Phosphorus, %	.60	.47	.42

<sup>a</sup> At .2% of diet contributes per kilogram of diet: 4,400 IU vitamin A; 1,100 IU vitamin D<sub>3</sub>; 6.6 mg riboflavin; 17.6 mg pantothenic acid; 33 mg niacin; 22 µg vitamin B<sub>12</sub>.

<sup>b</sup> At .05% of the diet contributes in ppm: 75 Zn, 87.5 Fe, 30 Mn, 8.75 Cu, 0.1 I.

<sup>c</sup> Soybean oil or CLA oil in their respective treatments.

#### Results and Discussion

Although average daily gain and feed intake were not affected during any growth periods, gain:feed ratio for the entire experimental period increased quadratically in response to length of feeding CLA, with pigs fed CLA for 29 and 58 kg of weight gain having the highest gain to feed ratios. There was a linear decrease in backfat thickness and a linear increase in loin muscle area in response to increased days of feeding CLA.

The gain:feed ratio, backfat thickness, and loin muscle area all showed diminishing responses as length of CLA feeding increased. The diminishing response would indicate that the most economical length of feeding CLA would be for 58 or 29 kg of weight gain.

**Table 2. Effect of conjugated linoleic acid on growing-finishing pig performance and carcass traits.**

Item	Bodyweight	Final weight gain while fed CLA, kg				P values	
		0	29	58	87	Linear	Quadratic
ADG, g							
	28 to 57 kg	855	834	869	828	.60	.61
	57 to 86 kg	942	958	1,002	968	.30	.32
	86 to 115kg	980	1,003	966	950	.45	.61
	28 to 86kg	894	890	929	890	.71	.36
	28 to 115 kg	924	929	942	912	.77	.33
ADFI, g							
	28 to 57 kg	2,126	2,024	2,117	2,055	.46	.57
	57 to 86 kg	3,007	2,967	2,917	2,876	.06	.98
	86 to 115kg	3,306	3,287	3,297	3,292	.95	.95
	28 to 86kg	2,521	2,447	2,476	2,424	.08	.73
	28 to 115 kg	2,791	2,737	2,759	2,724	.47	.86
G/F, g/kg							
	28 to 57 kg	402	413	411	404	.92	.30
	57 to 86 kg	314	323	345	336	.05	.30
	86 to 115kg	296	306	293	288	.20	.29
	28 to 86kg	355	364	376	367	.20	.55
	28 to 115 kg	331	340	342	335	.44	.05
Carcass weight, kg							
		84.4	84.4	85.3	83.5	.93	.95
Backfat, mm							
	10 <sup>th</sup> rib	26.2	22.4	22.4	20.8	.01	.15
	1 <sup>st</sup> rib	47.0	43.2	42.9	41.7	.05	.28
	Last lumbar	24.6	22.1	21.6	21.6	.02	.08
Loin muscle area, cm <sup>2</sup>							
		39.1	41.7	43.4	42.7	.01	.17