

126 The effect of dietary soybean isoflavones on carcass muscle content and body growth in pigs fed from 6 to 32 kg BW. D. R. Cook*, T. S. Stahly, and P. A. Murphy, *Iowa State University, Ames.*

Fifteen sets of two littermate gilts were used to evaluate the effect of dietary soybean isoflavones on carcass muscle content and body growth rate. Within a litter, pigs were allotted to a basal diet supplemented with 0 or 1585 mg isoflavones/kg supplied by an extract of soybeans. The extract contributed 670 mg genistein, 705 mg daidzein and 210 mg glycitein/kg diet, primarily in glycosidic forms, equivalent to 410, 420 and 133 mg, respectively, of the free forms. Pigs were from a high lean genetic strain, weaned at 8 to 12 days of age, reared via SEW procedures and self-fed a milk-based diet until initiation of the study. The basal diet (1.8% lysine) consisted of corn, soy protein concentrate (85 mg glycosidic isoflavones/kg), lactose, crystalline amino acids and vitamin and mineral mixtures formulated to exceed NRC (1988) recommendations for 5-10 kg pigs. Isoflavones were added at the expense of corn starch. Pigs were penned individually and given ad libitum access to water and diets. Pig weights and feed consumption were recorded every 4 days and pigs were slaughtered at 30.7 ± 1.2 kg BW. Isoflavones increased daily BW gain (579 vs 595 g, $P < .06$) but did not affect daily feed intake (911 vs 912 g, $P > .90$) nor gain:feed (.639 vs .656 g/g, $P > .25$). Isoflavones increased percentage carcass muscle (59.1 vs 60.1, $P < .07$) and estimated muscle gain/day (234 vs 245 g, $P < .01$), and tended to decrease percentage carcass fat (14.1 vs 13.3, $P < .20$) but did not affect carcass percentages of bone and skin nor visceral organ weights. The combined weight of 4 muscles with a predominance of type I fibers (triceps brachii, rectus femoris, infraspinatus and psoas major) was increased by isoflavones (380 vs 408 g, $P < .01$) but the combined weight of 4 muscles with a predominance of type II fibers (vastus lateralis, semimembranosus, gluteus medius and longissimus dorsi) was not altered (1153 vs 1142 g, $P > .70$). These data indicate that 80 mg soybean isoflavones/kg BW/day, increase carcass muscle content in pigs fed from 6 to 32 kg BW.

Key Words: Isoflavones, Pigs, Muscle

127 Conjugated linoleic acid improves performance and body composition in swine. R. L. Thiel*, J. C. Sparks, B. R. Wiegand, F. C. Parrish, Jr., and R. C. Ewan, *Iowa State University, Ames, IA.*

Conjugated linoleic acid (CLA) in the diets of lab animals has been shown to improve feed efficiency, rate of gain and body composition. This study was undertaken to determine if feeding CLA to pigs would have similar results. Eight replications of five littermate barrows with an average initial weight of 26.3 kg were allotted at random to individual pens. Within replication dietary treatments of diets containing 0, .12, .25, .5 or 1.0% CLA were assigned at random. Pigs were allowed ad libitum access to feed and water. Pigs were weighed and feed disappearance was determined at 14-day intervals. Pigs were fed for an average of 93 days and had an average weight of 116 kg at slaughter. Average daily gain increased linearly ($P < .01$) as the level of CLA increased in the diet. Average daily feed intake was not affected by the concentration in the diet. With no effect on feed intake and a linear increase in growth rate, there was a linear improvement in gain to feed ratio ($P < .003$). Backfat at the tenth rib, measured by ruler on carcasses indicated that controls were more fat than the remainder of the treatments ($P < .03$). Loin eye area measured by grid showed no difference between treatments as the concentration of CLA in the diet increased. Belly hardness increased linearly as the concentration of CLA in the diet increased, when measured lean side up ($P < .007$) and measured lean side down ($P < .05$).

Item	0	.12	.25	.50	1.0
ADG,kg	.942 ^b	.930 ^b	.953 ^b	.974 ^{ab}	1.109 ^a
Gain:feed	.352 ^{bc}	.367 ^{ac}	.373 ^a	.370 ^{ac}	.384 ^a
Backfat/cm	2.9 ^a	2.3 ^b	2.3 ^b	2.6 ^b	2.6 ^b
Lean up/cm	52.0 ^b	55.3 ^b	56.3 ^b	67.4 ^{ab}	78.8 ^a

Values with different superscripts within a row indicate significant differences ($P < 0.05$).

Key Words: Conjugated Linoleic Acid, Performance, Body Composition

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128 A comparison of modified tall oil and conjugated linoleic acid on growing-finishing pig growth performance and carcass characteristics. P. R. O'Quinn*, J. W. Smith, II, J. L. Nelssen, M. D. Tokach, R. D. Goodband, and K. Q. Owen¹, *Kansas State University, Manhattan, and ¹Lonza, Inc., Fairlawn, NJ.*

Thirty-six crossbred barrows (initially 37.6 kg) were used to compare modified tall oil (MTO) and conjugated linoleic acid (CLA) on growth performance and carcass composition of growing-finishing pigs. Pigs were blocked by weight and ancestry and randomly allotted to one of three dietary treatments. The dietary treatments consisted of a control diet, a diet containing .50% of a CLA mixture (derived from sunflower oil), and a diet containing .50% of a MTO mixture. The corn-soybean meal diets were fed in meal form in two phases: 36.3 to 72.6 (1.00% lysine) and 72.6 to 104.3 (.75% lysine) kg BW. From 36.3 to 72.6 kg, pigs fed CLA had reduced ($P = .03$) ADG when compared to pigs fed the control diet. For the remainder of the study, neither pigs fed CLA nor MTO produced results that were different ($P > .15$) from pigs fed the control diet. However, pigs fed MTO grew faster than pigs fed CLA over the entire trial ($P = .03$). This is attributable to nonsignificant improvements in ADFI and G/F from 36.3 to 72.6 kg and to a higher ADFI from 72.6 to 104.3 ($P = .06$) and overall ADFI ($P = .10$) for pigs fed MTO when compared to pigs fed CLA. No effects of dietary treatment were observed for any measured carcass characteristics ($P > .15$) or fasted serum triglyceride levels ($P > .20$). While pigs fed CLA and MTO produced results that were similar to control pigs, a distinct difference in growth performance favoring modified tall oil over conjugated linoleic acid was observed.

Overall Growth Performance (36.3 to 104.3 kg BW)

Item	Control	MTO	CLA	CV
ADG, kg	1.03	1.07	.97	7.28
ADFI, kg	2.92	2.99	2.78	7.30
G/F	.35	.36	.35	5.14

Key Words: Pigs, Modified Tall Oil, Conjugated Linoleic Acid

129 Effects of increasing modified tall oil on growing-finishing pig growth performance and carcass characteristics. P. R. O'Quinn*, J. L. Nelssen, M. D. Tokach, R. D. Goodband, J. C. Woodworth, J. A. Unruh, and K. Q. Owen¹, *Kansas State University, Manhattan, and ¹Lonza, Inc., Fairlawn, NJ.*

Initial research at Kansas State University showed pigs fed modified tall oil (MTO) had increased ADG and ADFI when compared to pigs fed conjugated linoleic acid from sunflower oil. Therefore, 80 crossbred barrows (initially 33.6 kg) were used to examine the effects of increasing MTO on growth performance and carcass composition of growing-finishing pigs. Pigs were blocked by weight and allotted to one of four dietary treatments. Dietary MTO mixture concentrations were 0, .25, .50, and 1.00%. The corn-soybean meal diets were pelleted and fed in two phases: 34.0 to 72.6 (1.00% lysine) and 72.6 to 117.9 (.75% lysine) kg BW. Diets did not contain added fat. No effect of treatment ($P > .15$) was observed for ADG, ADFI, or G/F. Tenth and last rib, and average backfat decreased with increasing MTO (quadratic, $P < .05$). The reduced backfat and larger (quadratic, $P = .07$) longissimus muscle area in pigs fed increasing MTO resulted in increased (quadratic, $P = .03$) lean percentage. Pigs fed the control diet had redder and more intensely colored (linear, $P = .04$) and more yellow (linear, $P = .07$) longissimus muscle than pigs fed MTO (Hunter values). Drip loss was reduced (quadratic, $P = .04$) with increasing MTO. Though not statistically significant ($P > .20$), pigs fed diets containing MTO had 18% firmer bellies. This experiment indicates MTO improves carcass leanness and reduces drip loss. The optimal dose level for the modified tall oil mixture appears to be about .50% of the diet.

Item	Modified Tall Oil, %				CV
	0	.25	.50	1.00	
Tenth Rib Backfat, cm	2.24	2.11	1.93	1.96	17.17
Longissimus Muscle Area, cm ²	41.23	42.00	43.42	43.48	7.45
Percentage Lean	51.79	52.52	53.59	53.69	3.69
Drip Loss, %	5.17	4.99	3.60	4.95	32.63

Key Words: Modified Tall Oil, Growth Performance, Carcass Characteristics