Kansas Agricultural Experiment Station Research Reports

Volume 0
Issue 10 *Swine Day (1968-2014)*

Article 784

1999

Influence of dietary supplementation of modified tall oil and vitamin e on bacon characteristics

A T. Waylan

P R. O'Quinn

J C. Woodworth

S I. Koo

See next page for additional authors

Influence of dietary supplementation of modified tall oil and vitamin e on bacon characteristics

Abstract

Seventy-two crossbred (PIC) barrows were used to determine the influence of feeding modified tall oil (MTO, 0 or .5% of diet) and vitamin E (0, 10, or 50 IU/lb of feed) on bacon quality characteristics. Feeding MTO to pigs during both. the growing and finishing phases increased bacon slice firmness. Feeding swine MTO and vitamin E had minimal effects on bacon production, proximate analysis, and quality traits. Therefore, any of these combinations of MTO with vitamin E can be fed to swine to improve carcass traits without affecting bacon.; Swine Day, Manhattan, KS, November 18, 1999

Keywords

Swine day, 1999; Kansas Agricultural Experiment Station contribution; no. 00-103-S; Report of progress (Kansas State University. Agricultural Experiment Station and Cooperative Extension Service); 841; Swine; Modified tall oil; Vitamin E; Bacon

Authors

A T. Waylan, P R. O'Quinn, J C. Woodworth, S I. Koo, John A. Unruh, Robert D. Goodband, Jim L. Nelssen, and Michael D. Tokach

INFLUENCE OF DIETARY SUPPLEMENTATION OF MODIFIED TALL OIL AND VITAMIN E ON BACON CHARACTERISTICS

A. T. Waylan, P. R. O'Quinn, J. A. Unruh, R. D. Goodband, J. L. Nelssen, J. C. Woodworth, M. D. Tokach[1], and S. I. Koo[2]

Summary

Seventy-two crossbred (PIC) barrows were used to determine the influence of feeding modified tall oil (MTO, 0 or .5% of diet) and vitamin E (0, 10, or 50 IU/lb of feed) on bacon quality characteristics. Feeding MTO to pigs during both the growing and finishing phases increased bacon slice firmness. Feeding swine MTO and vitamin E had minimal effects on bacon production, proximate analysis, and quality traits. Therefore, any of these combinations of MTO with vitamin E can be fed to swine to improve carcass traits without affecting bacon.

(Key Words: Modified Tall Oil, Vitamin E, Bacon.)

Introduction

Modified tall oil is a by-product of the pulp and paper industry and has a high content of conjugated linoleic acid (66.6%). Supplementation of swine diets with MTO has decreased backfat, increased lean percentage, and increased belly firmness. Vitamin E is an effective lipid-soluble antioxidant that protects cells membranes from oxidation and deterioration. Feeding MTO to pigs may assist in the tissue absorption of vitamin E. Therefore, the objective of this study was to determine the influence of diet supplementation of MTO and vitamin E in swine diets on production, proximate analysis, and quality characteristics of bacon.

Procedures

In a 2 × 3 factorial arrangement, 72 crossbred (PIC) barrows were blocked by initial BW (100 lb) and ancestry and randomly allotted to one of six dietary treatments. Two pigs were fed in each pen with six replicate pens per treatment. The main effects were two levels of MTO (0 or .5% of diet) and three levels of dl-α-tocopheryl acetate (0, NE; 10, LE; and 50 IU/lb of feed, HE). The corn-soybean meal-based growing diet was fed from 100 lb to 180 lb BW and was formulated to contain 1.0% lysine. The corn-soybean meal-based finishing diet was fed from 180 lb to 260 lb BW and was formulated to contain .75% lysine.

At 28 h postmortem, the right side of each carcass was fabricated into the wholesale cuts of ham, loin, belly, spareribs, and shoulder. Bellies were vacuum packaged and stored at -40°F until bacon manufacture, when they were thawed at 37°F for 72 h in their vacuum bags. The bellies were weighed and injected with a pickle (10% of the weight) using a multineedle pump injector and reweighed. The pickle was a standard curing mixture (13.2% salt, 7% sugar, 1% sodium nitrite, 2% maple sugar, and 76.8% water). Bellies were tumbled continuously for 4 h, weighed, and hung on bacon combs before cooking in a smokehouse. After attaining an average internal temperature of 147°F (approximately 2 h), bellies were weighed, skin was peeled, and bellies were

[1]Northeast Area Extension Office, Manhattan, KS.
[2]Department of Human Nutrition.

reweighed and rehung. The bellies were placed back in the smokehouse, where they completed a drying cycle (1 1/4 h), were smoked for 1 1/2 h with 100% hickory wood sawdust, and were processed to an internal temperature of 135°F. Bellies were placed in a 37°F cooler for 40 h and reweighed. Percentages of belly thawing loss, pumping uptake, tumbling loss, cooking loss, and final yield were calculated.

Cured bellies were cut into .16-in. bacon slices. Twelve slices at approximately one-third the length of the bacon slab from the cranial end were obtained for analysis. Slices were evaluated for firmness and number of holes. Firmness was evaluated on a scale from 1 = very soft and oily to 8 = very brittle and crumbly. Number of holes was ranked on a scale of 1 = very high number to 8 = none.

Two slices of bacon were frozen at -40°F and pulverized in a Waring Blender. Samples were analyzed for percent extractable lipid and moisture using AOAC (1992) procedures.

The experiment was a 2 × 3 factorial in a randomized complete block design using initial weight and ancestry to establish blocks. Statistical analyses were performed with the GLM procedure of SAS using the pen mean as the experimental unit. All main effect and interaction means were separated ($P<.05$) using the Least Significant Difference procedure when the respective F-tests were significant ($P<.05$).

Results and Discussion

Bacon production, proximate analysis, and quality traits are presented in Table 1. Percentages of lipid and moisture, thaw loss, tumbling loss, cook loss, and final yield did not differ ($P>.10$) among treatments. Bellies from pigs fed MTO (8.43%) had lower ($P<.05$) pump uptake percentages than bellies from nonsupplemented pigs (9.43%).

An MTO × E interaction ($P = .02$) occurred; bacon from pigs fed MTO with LE had firmer ($P<.05$) slices than bacon from pigs fed no MTO with HE and MTO with NE. Also, bacon from pigs fed MTO with LE, MTO with HE, and no MTO with NE had firmer ($P<.05$) slices than bacon from pigs fed no MTO with HE. No differences ($P>.05$) were detected for the number of holes in the bacon slices. Overall, the combination of MTO and vitamin E did not influence production characteristics of bacon but may have contributed somewhat to improved firmness. Previous research reported that fresh bellies from pigs fed .5% MTO were firmer than bellies from pigs fed no MTO. Overall, MTO and vitamin E supplementation appears to have minimal effects on bacon. Therefore, producers probably can feed MTO with vitamin E for improved carcass traits without influencing bacon quality characteristics.

Table 1. Influence of Modified Tall Oil and Vitamin E Supplementation on Production, Proximate Analysis, and Quality Traits of Bacon

	Supplementation[a]						
MTO, %	0	0	0	.5	.5	.5	
Item Vit. E	0	10	50	0	10	50	SE
Production Characteristics							
Thawing loss, %	.96	1.79	1.38	1.14	1.13	1.34	.22
Pump uptake, %[b]	9.15	9.15	9.97	8.17	8.61	8.51	.38
Tumbling loss, %	2.35	2.48	2.70	2.75	2.12	2.90	.27
Cooking loss, %	21.80	22.66	22.08	23.75	22.83	22.81	1.01
Final yield, %	83.54	82.22	84.02	80.49	82.46	81.43	1.32
Proximate Analysis							
Moisture, %	46.19	46.84	46.65	46.71	46.34	47.15	1.37
Fat, %	35.46	34.02	35.33	33.54	35.14	33.44	1.91
Quality Evaluations							
Slice firmness[c]	5.25[fg]	5.00[efg]	4.54[e]	4.92[ef]	5.58[g]	5.38[fg]	.21
Slice holes[d]	7.21	7.00	6.50	7.04	6.96	7.17	.19

[a]MTO = Modified tall oil and Vit. E = IU d, l α-tocopheryl acetate/lb feed.

[b]Pigs fed .5% MTO had lower (P<.05) values than pigs not fed MTO.

[c]Scores of 1 to 8: 1 = very soft oily; 8 = very brittle and crumbly.

[d]Scores of 1 to 8: 1 = high number of holes; 8 = no holes.

[e,f,g]Means in the same row with a different superscript letter differ (P<.05).