Kansas Agricultural Experiment Station Research Reports

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

Article 481

1991

Effect of fat source and level on finishing pig performance

David A. Nichols

Joe D. Hancock

Jim L. Nelssen

See next page for additional authors

Recommended Citation

Nichols, David A.; Hancock, Joe D.; Nelssen, Jim L.; Hines, Robert H.; and Kropf, Donald H. (1991) "Effect of fat source and level on finishing pig performance," *Kansas Agricultural Experiment Station Research Reports*: Vol. 0: Iss. 10. https://doi.org/10.4148/2378-5977.6321

Effect of fat source and level on finishing pig performance

Authors

David A. Nichols, Joe D. Hancock, Jim L. Nelssen, Robert H. Hines, and Donald H. Kropf

EFFECT OF FAT SOURCE AND LEVEL ON FINISHING PIG PERFORMANCE[1]

D. A. Nichols, J. L. Nelssen, J. D. Hancock, D. H. Kropf, and R. H. Hines

Summary

Two hundred and forty finishing pigs were utilized to evaluate the effect of fat source and level on growing pig performance and carcass characteristics. Pigs were fed a milo-soybean meal diet balanced on a constant energy:lysine and energy:protein ratio. Dietary treatments were: 1) control; 2,3,4) 2.5, 5.0, or 7.5% added soybean oil; 5 and 6) 5.0 or 7.5% added tallow. In comparing pigs fed soybean oil to tallow, there were no significant effects on feed intake, average daily gain, or feed to gain ratio. Soybean oil additions compared to tallow resulted in carcasses with significantly more average backfat as well as 10th rib fat depth. In addition, carcass firmness was significantly reduced as level of soybean oil addition was increased compared with tallow addition.

(Key Words: G-F, Performance, Fat, Source, Carcass.)

Introduction

Fat is an excellent feed source for finishing pigs. It is an energy dense, highly palatable, feed ingredient and can increase daily gain and improve feed efficiency. In addition, it can reduce dustiness and equipment wear. Recently, interest in fat additions has been renewed. The purpose of this study was to examine the effect of fat source on performance and carcass traits of finishing swine.

Procedures

Two hundred forty pigs were assigned to one of the following dietary treatments:

1. Control: corn/soybean meal diet
2. Control plus 2.5% soybean oil
3. Control plus 5.0% soybean oil
4. Control plus 7.5% soybean oil
5. Control plus 5.0% tallow
6. Control plus 7.5% tallow

Pigs were housed in a modified open front building with 8 pigs/pen and 5 pens/treatment. Diets were balanced on a constant energy: lysine and energy:protein ratio. Pigs were started on experiment at an initial weight of 120 lb and were terminated when the weight of pigs in a pen averaged 230 lb. Pigs were weighed bi-weekly, and average daily feed intake, average daily gain, and pen feed efficiency were determined.

Upon completion of the feeding portion of the experiment, two pigs per pen were randomly selected to evaluate treatment effects on carcass characteristics. Response criteria measured included dressing percentage, average backfat thickness, 10th rib fat depth, loin-eye area, carcass grade, and percentage muscle. In addition, a series of fat biopsies were taken from each carcass to determine fatty acid profiles.

These data were used to determine if feeding high levels of soybean oil adversely affects carcass quality and fat composition.

[1]Special appreciation to the American Soybean Association for partial funding of this project.

Results and Discussion

As most previous studies have established, increasing energy level of the diet reduced feed intake (Table 1). With added fat, the average daily feed intake for pigs in this study was reduced 12% ($P < .002$). Source of fat did not significantly change feed intake. When soybean oil addition was increased from 2.5% to 5.0% and 7.5%, we observed a numerical reduction in feed intake. On the other hand, increasing tallow from 5.0% to 7.5% had little or no effect on feed intake. During the feeding period, Manhattan experienced severe cold weather, which may have increased variability of feed consumption.

Feed to gain ratio was improved ($P < .001$) with addition of fat, regardless of source. Higher levels of fat (5.0 and 7.5%) resulted in lower feed to gain ratio than the 2.5% soybean oil addition ($P < .02$). No differences were observed between fat sources for feed to gain ratio.

Treatment effects on carcass traits are presented in Table 2. Fat source or level had no effect on dressing percent ($P > .17$), loin eye area ($P > .17$), carcass length ($P > .18$), or percentage lean ($P > .13$). Fat source did affect average and 10th rib backfat thickness. Pigs fed soybean oil had higher average backfat thickness ($P < .01$) than those fed tallow. In addition, soybean oil addition tended to increase 10th rib fat depth compared to tallow addition.

When tissue samples were taken for laboratory analysis, carcasses were scored for firmness. Hams and loins were scored for marbling, color and firmness. Results are presented in Table 3. No treatment effects were observed for ham marbling, loin color, or loin firmness.

A fat source by fat level interaction was observed when we evaluated ham color. Increasing levels of soybean oil tended to reduce ham color scores, whereas increasing tallow levels tended to increase ham score. Hams from soybean oil-fed pigs had lower firmness scores ($P < .01$) than hams from tallow-fed pigs.

When loins were evaluated we observed a ($P < .05$) linear effect of fat level on marbling. As fat level increased, marbling score increased, regardless of fat source. No differences were observed in loin color or firmness ($P > .10$).

Prior to tissue collection, we subjectively evaluated carcasses for firmness by handling the belly wall as well as applying pressure to the outside of the subcutaneous fat layers. Upon analysis, a fat level as well as fat source effect was observed. Carcasses from pigs fed soybean oil were softer ($P < .01$) than those from pigs fed tallow. Increasing level of soy oil resulted in a significant reduction in firmness score, both at the 5% and 7.5% dietary level.

In comparing soybean oil to tallow, we can make the following conclusions:

1. Fat source had no significant effects on feed intake, average daily gain, or feed to gain ratio.
2. Soybean oil addition compared to tallow addition resulted in carcasses with significantly more average backfat, as well as 10th rib fat depth.
3. Hams from soybean oil-fed pigs were significantly softer than those from tallow-fed pigs.
4. Carcass firmness was significantly reduced as level of soy oil addition was increased, compared with tallow addition.
5. Sensory panel analysis showed that all dietary treatments resulted in acceptable pork quality.
6. Differences in fatty acid profiles between soybean oil- and tallow-fed pigs can be explained based on composition of the fat sources.
7. Feed efficiency continued to improve linearly with increasing soybean oil addition to finishing swine diets.

Table 1. Least Square Means for Performance Traits

Item	Control	Soybean oil, % 2.5	5.0	7.5	Tallow, % 5.0	7.5	CV
Average daily gain, lb[a]	1.94	1.87	1.98	1.97	1.90	1.97	6.4
Average daily feed, lb[b]	7.14	6.56	6.48	6.11	6.05	6.16	7.7
Feed to gain ratio[c]	3.70	3.50	3.27	3.10	3.17	3.13	5.3

[a]No treatment effect (P > .19).
[b]Control vs added fat (P < .002).
[c]Control vs added fat (P < .001); 2.5% soy vs 5.0% and 7.5% soy and tallow (P < .002).

Table 2. Least Square Means for Carcass Traits

Item	Control	Soybean oil, % 2.5	5.0	7.5	Tallow, % 5.0	7.5	CV
Dressing percent	74.49	74.92	74.60	75.10	74.91	74.90	1.9
Loin eye area, in^2	4.9	5.53	5.19	5.61	5.01	5.40	13.3
Length, in	31.1	30.7	30.7	30.6	31.2	30.9	2.3
Average backfat, in[a]	1.37	1.37	1.40	1.41	1.24	1.28	10.7
10th rib backfat, in[b]	1.30	1.21	1.29	1.25	1.26	1.17	17.9
Percent lean	50.50	51.98	50.93	51.66	52.08	52.14	4.6

[a]Soy oil vs tallow (P < .05).
[b]Soy oil vs tallow (P < .10).

Table 3. Least Square Means for Carcass Marbling, Color and Firmness

Item	Control	Soybean oil, % 2.5	5.0	7.5	Tallow, % 5.0	7.5	CV
Ham							
Marbling	2.34	2.16	2.04	1.77	2.10	2.07	12.9
Color	2.89	3.13	2.89	2.76	2.72	2.96	5.9
Firmness[a]	2.79	2.56	2.46	1.99	2.86	2.79	8.6
Loin							
Marbling	2.86	3.13	2.31	2.86	2.37	2.79	10.9
Color	2.69	2.99	2.72	2.76	2.60	2.99	8.8
Firmness	2.69	3.03	2.62	2.56	2.60	2.89	8.3
Total carcass firmness[b,c,d]	7.08	5.11	4.24	2.66	6.76	6.20	18.9

[a]Soy oil vs tallow (P < .05).
[b]Soy oil vs tallow (P < .10).
[c]Control vs added fat (P < .05).
[d]1 = very soft, 10 = very firm.