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Abstract

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Keywords

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EFFECTS OF DIET MANIPULATION ON GROWTH PERFORMANCE, CARCASS CHARACTERISTICS, AND MEAT QUALITY OF INTACT MALE PIGS

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Summary

Castrates were predictably less efficient, had greater ADFI, and tended to have more BF than contemporary boars. Castration decreased detection of boar taint, but alterations of dietary CP, pH, and antimicrobial level from 225 to 276 lb had no effect on sensory panel perception of odor from fat of intact males.

(Key Words: Boars, Diet, Boar Odor.)

Introduction

Use of intact males for fresh pork production in the United States offers many economically important advantages, such as improved feed efficiency and leaner carcasses when compared to barrows. Other advantages, which could lead to greater consumer acceptance of pork, are decreased animal welfare concerns (by ending surgical castration) and producing a leaner product with a high percentage of unsaturated fatty acids. However, the perception of off-odor or taint overshadows these advantages, with 35% of adults perceiving boar odor as objectionable. Skatole and androstenone are two unrelated compounds blamed for the undesirable odor during cooking and consumption of boar meat. The data reported herein result from an experiment designed to determine if diet manipulation affects taste panel perception of pork from intact males.

Procedures

A total of 80 pigs (10 barrows and 70 boars with an average initial BW of 112 lb) was used in a 70-d growth assay to determine the effects of diet manipulation on growth performance, carcass characteristics, and meat quality of intact male pigs. The pigs were blocked by weight and allotted to pens based on gender and ancestry. There were two pigs per pen and five pens per treatment. The diets (Table 1) were formulated to 1.3% lysine, .75% Ca, and .65% P for 112 to 169 lb; 1.1% lysine, .65% Ca, and .55% P for 169 to 225 lb; and 1.1% lysine, .55% Ca, and .45% P for 225 to 276 lb. The pigs were fed the same diet to 225 lb BW. For 225 to 276 lb, barrows and a boar control received the basal diet. For the other treatments, dietary pH was decreased by adding citric acid (low pH) and increased with sodium bicarbonate (high pH), crude protein was increased by removing crystalline amino acids (low crystalline amino acids) and decreased by adding them (high crystalline amino acids), and antimicrobials were decreased by removing the tylosin from the diet (low antimicrobials) and increased by adding copper sulfate and tylosin to the diet (high antimicrobials).

The pigs were housed in an environmentally controlled finishing facility in 5-ft × 5-ft pens with totally slotted flooring. The pens were equipped with a single-hole self-feeder and nipple waterer to allow ad libitum consumption of feed and water. Pig and feeder weights were collected after each phase of the experiment to allow calculation of ADG, ADFI, and F/G. The pigs were killed at a commercial packing plant where HCW and BF were measured, and adipose samples were obtain for sensory analyses.

Consumer perception of the tissue samples was determined by a trained panel. All panel members were chosen from a pool of people subjected to a screening process, with the most sensitive to boar odor chosen for the

panel. The panel would not be considered a cross section of the population, because only those who were sensitive to boar taint were chosen. To determine level of boar taint, a small sample of fat was streaked across a hot plate, and the aroma immediately evaluated by each panelist. The samples were scored from 1 to 5 where: 1 = no odor; 2 = very slight; 3 = slight; 4 = moderate; and 5 = strong boar odor.

The experimental design was a randomized complete block with orthogonal contrasts used to separate treatment means. Comparisons were: barrows vs boars; control boars vs those with diet modifications; crystalline amino acids vs pH and antibiotics; low vs high crystalline amino acids; pH vs antibiotics; low vs high pH; and low vs high antibiotics.

Results and Discussion

To 225 lb, ADG was not affected, but the barrows had greater ADFI (P<.004) and were less efficient (P<.001) than boars. From 225 to 276 lb, ADG and F/G were not affected by treatment (P>.15), although the barrows still had greater ADFI (P<.02) than the boars. Overall (from 112 to 276 lb) boars were 13% more efficient than barrows (P<.002) and consumed 8% less feed (P<.009).

From 225 to 276 lb, boars fed the low pH treatment consumed 21% less feed than the control boars and 14% less feed than boars fed the other treatments. This resulted in the boars fed low pH having lower ADFI (P<.04) than the boars fed high pH, although ADG and F/G were not affected (P>.15). Manipulating CP in the diet with crystalline amino acids did not affect growth performance, carcass measurements, or boar odor (P<.12). However, a trend (P<.07) for greater efficiency of gain occurred when pigs were fed the high antimicrobial treatment from 225 to 276 lb.

No differences occurred among the treatments for hot carcass weight or dressing percentage, but boars tended to be leaner (P<.06) than barrows. The barrows scored lower (P<.002) for odor than the boars, but diet manipulation did not affect (P>.24) odor among the boar treatments.

Based on the results of this experiment, castrates were less efficient, had increased ADFI, and tended to have greater BF than boars. Castration decreased boar taint, but alterations of dietary CP, pH, and antimicrobial concentrations, from 225 to 276 lb, did not affect sensory panel perception of odor from fat of intact males.

Table 1. Diet Composition

Item	112 to 169 lb[a]	169 to 225 lb[b]	225 to 276 lb[c]						
				Diet pH		Crystalline amino acids		Antimicrobials	
			Control	Low	High	Low	High	Low	High
Corn	63.80	73.42	76.75	73.04	72.13	72.61	83.92	77.04	76.57
Soybean meal (46.5% CP)	30.49	21.19	18.95	19.58	19.73	23.37	10.81	18.90	18.98
Soy oil	2.00	2.00	1.23	2.70	3.06	1.29	1.30	1.12	1.30
Monocalcium phosphate	1.30	.98	.54	.57	.58	.46	.69	.54	.54
Limestone	1.08	1.03	.99	.97	.97	1.00	.97	.99	.99
Salt	.35	.35	.35	.35	.35	.35	.35	.35	.35
KSU vitamins and minerals	.40	.40	.40	.40	.40	.40	.40	.40	.40
Citric acid	----	----	----	1.60	----	----	----	----	----
Sodium bicarbonate	----	----	----	----	2.00	----	----	----	----
Lysine-HCl	.28	.35	.43	.42	.41	.27	.72	.43	.43
DL-methionine	.17	.13	.16	.17	.17	.12	.24	.16	.16
L-threonine	----	.02	.07	.07	.07		.19	.07	.07
L-isoleucine	----	----	----	----	----	----	.14	----	----
Valine	----	----	----	----	----	----	.10	----	----
L-tryptophan	----	----	----	----	----	----	.04	----	----
Antibiotic[d]	.13	.13	.13	.13	.13	.13	.13	----	.13
Copper sulfate[e]	----	----	----	----	----	----	----	----	.08
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

[a]Provided 1.3% lysine, .75% Ca, and .65% P.
[b]Provided 1.1% lysine, .65% Ca, and .55% P.
[c]Provided 1.1% lysine, .55% Ca, and .45% P.
[d]Provided 100 g/ ton tylosin.
[e]Provided 200 ppm total copper.

Table 2. Effect of Diet Manipulation on Growth Performance and Carcass Characteristics[a]

Item	Barrows	Boars	Diet pH		Crystalline Amino Acids		Antimicrobials		SE
			Low	High	Low	High	Low	High	
112 to 225 lb (d 0 to 46)[b]									
ADG, lb	2.43	2.47	----	----	----	----	----	----	.08
ADFI, lb	6.69	5.85	----	----	----	----	----	----	.25
F/G	2.75	2.37	----	----	----	----	----	----	.06
225 to 276 lb (d 46 to 70)									
ADG, lb	2.10	2.37	1.95	2.12	2.09	2.32	1.90	2.13	.16
ADFI, lb	7.77	7.64	6.05	6.92	7.07	7.49	6.81	6.69	.28
F/G	3.70	2.83	3.10	3.26	3.38	3.23	3.58	3.14	.23
112 to 276 lb (d 0 to 70)									
ADG, lb	2.31	2.45	2.17	2.39	2.41	2.42	2.25	2.35	.08
ADFI, lb	7.08	6.49	5.88	6.43	5.83	6.42	6.14	6.06	.30
F/G	3.06	2.65	2.71	2.69	2.42	2.65	2.73	2.58	.11
HCW, lb	204	205	204	207	208	205	204	206	2.7
DP, %[c]	74.2	74.4	74.0	75.0	75.4	74.3	74.0	75.9	1.0
BF, in[d]	1.02	.98	.94	.94	.91	.91	.87	.91	.15
Odor[e]	2.2	2.8	3.0	3.1	3.3	3.0	2.9	3.2	.2

[a]Eighty pigs (10 barrows and 70 boars initially 112 lb) with 2 pigs/pen and 5 pens/trt.
[b]Manipulation of the diets was not initiated until d 46 (225 lb BW).
[c]Calculated as HCW / live weight x 100.
[d]Last rib (midline) fat depth.
[e]Values result from analyses by a trained sensory panel (1 = none; 2 = very slight; 3 = slight; 4 = moderate; and 5 = strong).

Table 3. Probability values (P <)

Item	Barrows vs Others	Control Boars vs Diet Manipulations	Amino Acids vs pH And Antimicrobials	Low vs High Amino Acids	pH vs Anti-microbials	Low vs High pH	Low vs High Antimicrobials
112 to 225 lb (d 0 to 46)[a]							
ADG, lb	----[b]	----	----	----	----	----	----
ADFI, lb	.004	----	----	----	----	----	----
F/G	.001	----	----	----	----	----	----
225 to 276 lb (d 46 to 70)							
ADG, lb	----	.12	----	----	----	----	----
ADFI, lb	.02	.02	.02	----	----	.04	----
F/G	----	----	----	----	----	----	.07
112 to 276 lb (d 0 to 70)							
ADG, lb	----	----	.08	----	----	.07	----
ADFI, lb	.009	----	----	----	----	----	----
F/G	.002	----	.12	.12	----	----	----
HCW, lb	----	----	----	----	----	----	----
DP, %	----	----	----	----	----	----	----
BF, cm	.06	----	----	----	----	----	----
Odor	.002	----	----	----	----	----	----

[a]Manipulation of the diets was not initiated until d 46 (225 lb BW).
[b]Dash indicates (P>.15).