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The effects of poultry meal and fishmeal on growth performance of weanling pigs

Abstract

A total of 210 weanling pigs (initially 16.4 lb and 21 Â± 2 d of age, PIC) was used to evaluate the effects of select menhaden fishmeal and stabilized poultry meal on growth performance of nursery pigs. Five dietary treatments were fed from d 0 to 28 after weaning. Diets included a control with no specialty protein products and diets with 2.5% and 5.0% fishmeal and poultry meal replacing the lysine provide by fishmeal at 2.9% and 5.9%. All the diets were formulated on an equal lysine basis. Overall (d 0 to 28), pigs fed diets containing fishmeal had greater (P < 0.05) ADG compared to pigs fed the control diet and pigs fed diets containing poultry meal. Also, increasing fishmeal tended (quadratic, P<0.07) to improve ADG, with the greatest increase observed in pigs fed 2.5% fishmeal. Feed intake was not affected by any dietary treatment. Pigs fed diets containing select menhaden fishmeal had improved (P<0.05) feed efficiency compared to pigs fed diets containing stabilized poultry meal. In conclusion, the addition of fishmeal to the diet improved the growth performance of weanling pigs, while stabilized poultry protein meal did not affect growth performance.; Swine Day, 2003, Kansas State University, Manhattan, KS, 2003

Keywords

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THE EFFECTS OF POULTRY MEAL AND FISHMEAL ON GROWTH PERFORMANCE OF WEANLING PIGS[1]

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Summary

A total of 210 weanling pigs (initially 16.4 lb and 21 ± 2 d of age, PIC) was used to evaluate the effects of select menhaden fishmeal and stabilized poultry meal on growth performance of nursery pigs. Five dietary treatments were fed from d 0 to 28 after weaning. Diets included a control with no specialty protein products and diets with 2.5% and 5.0% fishmeal and poultry meal replacing the lysine provide by fishmeal at 2.9% and 5.9%. All the diets were formulated on an equal lysine basis. Overall (d 0 to 28), pigs fed diets containing fishmeal had greater ($P < 0.05$) ADG compared to pigs fed the control diet and pigs fed diets containing poultry meal. Also, increasing fishmeal tended (quadratic, $P<0.07$) to improve ADG, with the greatest increase observed in pigs fed 2.5% fishmeal. Feed intake was not affected by any dietary treatment. Pigs fed diets containing select menhaden fishmeal had improved ($P<0.05$) feed efficiency compared to pigs fed diets containing stabilized poultry meal. In conclusion, the addition of fishmeal to the diet improved the growth performance of weanling pigs, while stabilized poultry protein meal did not affect growth performance.

(Key Words: Poultry Meal, Weanling Pigs, Fishmeal.)

Introduction

The use of complex nursery diets with highly digestible ingredients has increased the need for specialty protein products, such as select menhaden fishmeal. However, specialty protein sources such as fishmeal are relatively expensive. Therefore, other specialty protein sources that have the potential to reduce diet cost without decreasing performance must be explored. Poultry meal is a by-product from poultry harvesting facilities that has a similar crude protein and amino acid profile to that of select menhaden fishmeal. Recent advancements in processing and quality control of the stabilized poultry meal have improved the consistency and palatability of the final product. Poultry meal is readily available and is currently used in the pet food and poultry industries.

A previous trial conducted at Kansas State University showed no response in growth performance for pigs fed fishmeal or poultry meal compared to pigs fed diets without any specialty protein products. This suggested that the use of whey was adequate for maximum growth of pigs in this particular environment. Therefore, the objective of this experiment was to compare the effects of select menhaden fishmeal and stabilized poultry meal on the growth performance of nursery pigs in a con-

[1]Appreciation is expressed to American Proteins Inc. (Cumming, Georgia) for supplying the stabilized poultry meal.

[2]Food Animal Health and Management Center.

trolled research setting without the use of animal plasma, blood products, or high levels of dried whey.

Procedures

A total of 210 pigs (initially 16.4 lb and 21 ± 2 d of age, PIC) was used in a 28-d growth assay. Pigs were blocked by weight and allotted to one of five dietary treatments at weaning. There were eight replicates (two replicates with six pigs per pen and six replicates with five pigs per pen) per treatment. Pigs were housed in an environmentally controlled nursery at the KSU Swine Teaching and Research farm. All pens (4 x 5 ft) contained one self-feeder and one nipple waterer to provide ad libitum access to feed and water.

The select menhaden fishmeal, stabilized poultry meal, and soybean meal were analyzed for amino acids, Ca, and P before being used in diet formulation (Table 1). Pigs were fed one of five dietary treatments, which included a control diet with no specialty protein products, and diets containing 2.5% or 5% fishmeal, and stabilized poultry meal replacing the lysine provided by fishmeal at the inclusion rates of 2.9% or 5.9%. All diets were corn-soybean meal based and included 10% edible grade spray-dried whey and were formulated to contain 1.45% total lysine, 0.90% Ca, and 0.75% P (Table 2). Average daily gain, ADFI, and feed efficiency (F/G) were determined by weighing pigs and measuring feed disappearance on d 7, 14, 21, and 28 post weaning.

Data were analyzed as a randomized complete block design using the mixed procedure of SAS with pen as the experimental unit. Single degree of freedom contrasts were used to compare performance of pigs fed the control diet to those fed the diets containing fishmeal or diets containing the different quality poultry meal. An additional contrast was used to compare pigs fed the fishmeal diets to those fed poultry meal. Linear and quadratic comparisons were used to determine the effects of feeding increasing levels of fishmeal or poultry meal.

Results and Discussion

From d 0 to 14, pigs fed fishmeal tended ($P<0.10$) to have greater ADG than pig fed stabilized poultry meal. Also, increasing fishmeal tended ($P<0.10$) to increase ADG with the greatest improvement observed in pigs fed 2.5% fishmeal. Pigs fed diets containing fishmeal had improved ($P<0.05$) feed efficiency compared to pigs fed diets containing stabilized poultry meal. Increasing poultry meal tended to result in poorer efficiency (linear, $P<0.08$).

From d 14 to 28, pigs fed diets containing fishmeal had greater ($P<0.05$) ADG compared to pigs fed the control diet or diets containing poultry meal. Also, increasing fishmeal increased (linear, $P<0.05$) ADG. Pigs fed diets containing fishmeal had improved ($P<0.05$) feed efficiency compared to pigs fed diets containing stabilized poultry meal.

For the overall treatment period (d 0 to 28), pigs fed diets containing fishmeal had greater ($P<0.05$) ADG than the pigs fed the control diet without any specialty protein products or diets containing poultry meal. Increasing fishmeal tended to result in improved (quadratic, $P<0.07$) ADG, with the greatest improvement observed in pigs fed the diet containing 2.5% fishmeal. Pigs fed diets containing fishmeal had improved ($P<0.01$) feed efficiency compared to pigs fed diets containing stabilized poultry meal. Increasing the stabilized poultry meal in the diet tended to result in poorer feed efficiency (linear, $P<0.09$).

Consistent with many previous trials, these results indicate that the addition of select menhaden fishmeal to diets improved the growth performance of weanling pigs. However, the use of stabilized poultry protein meal did not improve pig performance compared to

those fed the control diet without specialty proteins. Because adding stabilized poultry meal to the diet had a negative affect on feed efficiency without impacting feed intake, it appears that the amino acid availability of the poultry product may be lower than that of fishmeal or soybean meal.

Table 1. Chemical Analysis (As-fed Basis)[a]

Item, %	Stabilized Poultry Meal	Select Menhaden Fish-meal	Soybean Meal
CP	63.46	61.21	48.30
Ca	2.78	4.27	0.36
P	1.91	2.83	0.64
Lysine	4.30	5.01	3.03
Isoleucine	2.59	2.55	2.23
Leucine	4.62	4.55	3.76
Methionine	1.34	1.78	0.71
Met. and cys.	2.08	2.34	1.50
Threonine	2.46	2.52	1.87
Tryptophan	0.70	0.67	0.68
Valine	3.23	3.06	2.42

[a]Values represent the analysis of one sample of each ingredient.

Table 2. Diet Composition (As-Fed Basis)[a]

		Select Menhaden Fishmeal		Stabilized Poultry Meal[b]	
Item, %	Control	2.5%	5.0%	2.9%	5.9%
Corn	45.41	47.56	49.72	47.04	48.69
Soybean meal, 46.5%	34.50	30.18	25.87	30.19	25.87
Spray dried whey	10.00	10.00	10.00	10.00	10.00
Select menhaden fishmeal	-	2.50	5.00	-	-
Stabilized poultry meal	-	-	-	2.95	5.90
Soybean oil	5.00	5.00	5.00	5.00	5.00
Monocalcium phosphate, 21% P	1.55	1.35	1.10	1.35	1.18
Limestone	1.05	0.90	0.80	0.98	0.88
Antibiotic[c]	1.00	1.00	1.00	1.00	1.00
Salt	0.35	0.35	0.35	0.35	0.35
Vitamin premix	0.25	0.25	0.25	0.25	0.25
Trace mineral premix	0.15	0.15	0.15	0.15	0.15
Zinc oxide	0.25	0.25	0.25	0.25	0.25
Lysine HCl	0.25	0.25	0.25	0.25	0.25
DL-Methionine	0.15	0.15	0.15	0.15	0.14
TOTAL	100.00	100.00	100.00	100.00	100.00
Calculated Values, %					
Lysine	1.45	1.45	1.45	1.45	1.45
Isoleucine:lysine ratio	66	64	62	65	64
Leucine:lysine ratio	128	126	124	127	126
Methionine:lysine ratio	33	35	36	34	35
Met & Cys:lysine ratio	60	60	60	60	60
Threonine:lysine ratio	65	65	65	65	65
Tryptophan:lysine ratio	19	19	18	19	18
Valine:lysine ratio	74	73	71	74	73
CP	21.73	21.36	20.99	21.71	21.68
Ca	0.90	0.90	0.90	0.9	0.90
P	0.75	0.75	0.75	0.75	0.75

[a]Pigs fed diets from d 0 to 28 after weaning.
[s]Stabilized poultry meal inclusion rates were based off the lysine provided by fishmeal.
[c]Provided 50g/ton carbadox.

Table 3. Effects of Stabilized Poultry Meal on Growth Performance of Weanling Pigs[a]

								Contrast (P <)						
		Fishmeal		Poultry Meal[c]				Control vs.		Fish vs.	Fishmeal		Poultry Meal	
	Control[b]	2.5%	5.0%	2.9%	5.9%	SE	TRT[d]	Fish	Poultry	Poultry	Linear	Quad.	Linear	Quad.
D 0 to 14														
ADG, lb	0.50	0.55	0.51	0.48	0.51	0.031	0.22	0.29	0.78	0.10	0.78	0.10	0.75	0.27
ADFI, lb	0.59	0.61	0.59	0.57	0.64	0.038	0.40	0.71	0.61	0.87	0.96	0.50	0.17	0.18
F/G	1.18	1.11	1.16	1.21	1.26	0.046	0.03	0.30	0.18	0.01	0.74	0.13	0.08	0.70
D 14 to 28														
ADG, lb	1.26	1.33	1.33	1.28	1.27	0.034	0.08	0.02	0.60	0.02	0.03	0.20	0.73	0.64
ADFI, lb	1.43	1.48	1.47	1.48	1.49	0.060	0.87	0.41	0.29	0.77	0.56	0.54	0.34	0.64
F/G	1.14	1.11	1.10	1.16	1.17	0.034	0.13	0.24	0.30	0.01	0.25	0.74	0.29	0.82
D 0 to 28														
ADG, lb	0.88	0.94	0.92	0.88	0.89	0.025	0.06	0.02	0.85	0.01	0.11	0.07	0.68	0.73
ADFI, lb	1.01	1.05	1.03	1.03	1.06	0.044	0.76	0.47	0.35	0.79	0.67	0.48	0.22	0.79
F/G	1.15	1.11	1.11	1.17	1.20	0.030	0.02	0.18	0.15	0.01	0.29	0.37	0.09	0.97

[a]A total of 210 pigs initially 16.4 lb and 18 ± 3 d of age (two replications with six pigs per pen and six replications with five pigs per pen).
[b]Control diet contained no fishmeal or poultry meal.
[c]Stabilized poultry meal inclusion rates were based off the lysine provided by fishmeal.
[d]P-value represents overall treatment effects.