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

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Summary

A total of 350 pigs (PIC, initially 19.7 lb and 22 ± 2 d of age) was used to evaluate the effects of select menhaden fishmeal and stabilized poultry meal source on growth performance of nursery pigs. Seven dietary treatments were fed from d 4 to 19 after weaning. Diets included a control with no specialty protein products and diets with 2.5% or 5% fishmeal, or two different sources of poultry meal (low or high ash content). All the diets were formulated on an equal lysine basis. The poultry meal replaced the lysine provided by fishmeal with inclusion rates of 2.9% and 5.8% for low ash and 3.1% and 6.2% for high ash poultry meal. The low ash and high ash poultry meal sources had ash concentrations of 9% and 13%, respectively.

Overall, d 0 to 15, pigs fed diets containing fishmeal or poultry meal had improved ($P<0.05$) F/G compared to pigs fed the control diet. Also, pigs fed low ash poultry meal had improved ($P<0.05$) F/G compared to pigs fed high ash poultry meal. Consistent with many previous trials, these results indicate that the addition of select menhaden fishmeal to diets improved growth performance in weanling pigs the first week and feed efficiency over a two-week period. The addition of low ash poultry meal resulted in improvements in feed efficiency, whereas high ash poultry meal did not. Based on these data, quality control specifications, such as ash content, need to be considered when using poultry meal as an animal protein replacement in diets for nursery pigs.

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

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 evaluated. Recent trials conducted at Kansas State University have looked at the possibilities of using poultry meal in nursery diets as a replacement for readily used and higher priced fishmeal. Results have indicated that the use of poultry meal is not comparable in pig performance to fishmeal. However, due to the processing of poultry meal, several different quality sources are available. It is expected that pig performance would improve with the use of a higher quality poultry meal than used in prior experiments. Therefore, the objective of this study

[1]Appreciation is expressed to Tyson Foods for supplying the poultry meals.
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is to evaluate the effects of two different grades of poultry meal in nursery pig performance to determine potential use in early wean swine diets.

Procedures

A total of 350 pigs (initially 19.7 lb and 22 ± 2 d of age, PIC) was used in a 15-d growth assay. Pigs were blocked by weight and allotted to one of seven dietary treatments at weaning. There were ten replicates per treatment with five pigs per pen. Pigs were housed in an environmentally controlled nursery at the KSU Segregated Early Wean Facility. All pens (4 x 4 ft) contained one self-feeder and one nipple waterer to provide ad libitum access to feed and water.

The two different sources of poultry meal were analyzed for amino acids Ca and P before use in the diet formulation (Table 1). Pigs were fed one of seven dietary treatments, which included a control diet with no specialty protein products, or diets containing 2.5% or 5% fishmeal, or two different sources of poultry meal (low or high ash content). The poultry meal replaced the lysine provided by fishmeal with inclusion rates of 2.9% and 5.8% for low ash and 3.1% and 6.2% for high ash. 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 0.76% P (Table 2). Average daily gain, ADFI, and feed efficiency (F/G) were determined by weighing pigs and measuring feed disappearance on d 7 and 15 of the trial or d 11 and 19 post weaning.

Data were analyzed as a randomized complete block design using the mixed procedure of SAS with pen as the experimental unit. Linear and quadratic comparisons were used to determine the effects of feeding increasing levels of fishmeal and both sources of poultry meal. Contrasts were made between the control and fishmeal, control and poultry meal, fishmeal versus poultry meal, and low ash versus high ash poultry meal.

Table 1. Chemical Analysis

Item, %	Low Ash Poultry Meal	High Ash Poultry Meal
CP	60.95	60.87
Ca	2.56	3.11
P	1.82	2.09
Lysine	4.20	3.95
Isoleucine	2.48	2.47
Leucine	4.57	4.36
Methionine	1.29	1.25
Met. and cys.	2.00	1.93
Threonine	2.41	2.28
Tryptophan	0.70	0.59
Valine	2.97	2.94

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

Results and Discussion

From d 0 to 7, increasing fishmeal in the diet increased (linear, $P<0.05$) ADG. Increasing poultry meal (mean of both low and high sources) increased (quadratic, $P<0.05$) ADG with the greatest improvement at the low inclusion and then decreasing at the highest inclusion rate. Pigs fed the diet containing low ash poultry meal had improved ($P<0.05$) F/G compared to pigs fed the diet containing high ash poultry meal. Increasing the levels of fishmeal or poultry meal improved (quadratic, $P<0.05$) feed efficiency, with the greatest improvement at the lower inclusion rate for all sources.

From d 7 to 15, pigs fed diets containing low ash poultry meal tended to have improved ($P<0.10$) F/G compared to pigs fed diets containing high ash poultry meal.

Overall, d 0 to 15, pigs fed diets containing low ash poultry meal had improved ($P<0.05$) F/G compared to pigs fed diets con-

taining high ash poultry meal. Increasing the inclusion of fishmeal or poultry meal within the diet improved (linear, P<0.05) F/G.

Consistent with many previous trials, these results indicate that the addition of select menhaden fishmeal to diets improved growth performance in weanling pigs the first week and improved feed efficiency over a two-week period. The addition of low ash poultry meal resulted in improvements in feed efficiency, whereas high ash poultry meal did not. Based on these data, quality control specifications, such as ash content, need to be considered when using poultry meal as an animal protein replacement in diets for nursery pigs.

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

		Select Menhaden Fishmeal		Poultry meal 9% Ash[b]		Poultry meal 13% Ash[b]	
Item, %	Control	2.5%	5.0%	2.9%	5.8%	3.1%	6.2%
Corn	44.84	46.97	49.04	46.36	47.82	46.25	47.62
Soybean meal, 46.5%	37.27	33.10	28.94	33.10	28.95	33.09	28.95
Spray dried whey	10.00	10.00	10.00	10.00	10.00	10.00	10.00
Soy oil	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Select menhaden fish meal	-	2.50	5.00	-	-	-	-
Low ash poultry meal	-	-	-	2.90	5.80	-	-
High ash poultry meal	-	-	-	-	-	3.10	6.18
Monocalcium phosphate, 21% P	1.45	1.20	0.95	1.30	1.18	1.25	1.08
Limestone	1.10	0.90	0.73	1.00	0.93	0.98	0.85
Antibiotic[c]	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Salt	0.35	0.35	0.35	0.35	0.35	0.35	0.35
Vitamin premix	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Zinc oxide	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Trace mineral premix	0.15	0.15	0.15	0.15	0.15	0.15	0.15
Lysine HCl	0.15	0.15	0.15	0.15	0.15	0.15	0.15
DL-methionine	0.14	0.13	0.13	0.14	0.13	0.13	0.13
L-threonine	0.05	0.05	0.06	0.05	0.05	0.05	0.05
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Calculated Analysis, %							
Lysine	1.45	1.45	1.45	1.45	1.45	1.45	1.45
Isoleucine:lysine ratio	68	67	66	68	67	68	67
Leucine:lysine ratio	132	131	130	132	131	132	132
Methionine:lysine ratio	33	34	35	34	34	33	34
Met & cys:lysine ratio	60	60	60	60	60	60	60
Threonine:lysine ratio	65	65	65	65	65	65	65
Tryptophan:lysine ratio	20	19	19	19	19	19	19
Valine:lysine ratio	74	74	73	74	74	75	75
CP	22.35	22.17	21.98	22.31	22.27	22.42	22.48
Ca	0.90	0.90	0.90	0.90	0.91	0.90	0.90
P	0.76	0.76	0.76	0.76	0.76	0.76	0.76

[a]Pigs fed diets from d 4 to 19 after weaning.
[b]Poultry meal inclusion rates replaced of the lysine provided by fishmeal.
[c]Provided 50g/ton carbadox.

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

		Select Menhaden		Low Ash		High Ash				Contrast (P<)			
	Negative	Fishmeal		Poultry Meal[c]		Poultry Meal[c]				Con vs.	Con vs.	Fish vs.	Low vs.
	Control	2.5%	5.0%	2.9%	5.8%	3.1%	6.2%	SE	TRT[d]	Fish	Poultry	Poultry	High[e]
D 0 to 7													
ADG, lb[fi]	0.54	0.61	0.65	0.62	0.57	0.60	0.54	0.048	0.221	0.04	0.27	0.13	0.43
ADFI, lb	0.75	0.75	0.80	0.75	0.71	0.75	0.71	0.050	0.628	0.56	0.69	0.19	0.98
F/G[fghi]	1.38	1.22	1.24	1.22	1.25	1.29	1.33	0.052	0.018	0.01	0.01	0.21	0.04
D 7 to 15													
ADG, lb	1.08	1.12	1.10	1.10	1.11	1.07	1.15	0.059	0.877	0.57	0.54	0.99	0.81
ADFI, lb	1.41	1.43	1.42	1.39	1.40	1.46	1.47	0.066	0.884	0.85	0.75	0.89	0.16
F/G	1.33	1.29	1.30	1.27	1.28	1.36	1.28	0.041	0.270	0.38	0.40	0.87	0.09
D 0 to 15													
ADG, lb	0.83	0.88	0.89	0.87	0.86	0.85	0.87	0.040	0.800	0.11	0.28	0.40	0.80
ADFI, lb	1.10	1.11	1.13	1.09	1.08	1.13	1.12	0.050	0.955	0.69	0.97	0.60	0.32
F/G[fg]	1.34	1.27	1.27	1.25	1.27	1.32	1.29	0.026	0.014	0.01	0.01	0.43	0.01

[a]A total of 350 pigs initially 19.7 lb. and 21 ± 2 d of age with five pigs per pen and ten pens per treatment.
[b]Treatment diets fed from d 4 to 19 post weaning (d 0 to 15 of experiment).
[c]Poultry meal inclusion rates replaced the lysine provided by fishmeal.
[d]P-value represents overall treatment effect.
[e]Contrast between low and high ash poultry meal.
[f]Linear improvement with increasing fishmeal (P<0.05).
[g]Quadratic improvement with increasing fishmeal (P<0.06).
[h]Linear improvement with increasing poultry meal (P<0.05).
[i]Quadratic improvement with increasing poultry meal (P<0.05).