

Effect of total replacement of fish meal by meat and bone meal and poultry byproduct meal in grower and finisher diets on growth performance of native Vietnamese broilers

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Abstract

A total of 810 four week old mixed sex native Vietnamese yellow feather broilers (Luong Phuong breed) were fed grower (G-4 wks) and finisher (F-2wks) formulated with fish meal (4% G, 2% F), meat and bone meal (4.8% G, 2.4% F), or poultry byproduct meal (3.8% G, 1.9% F) for 6 six weeks to evaluate the protein source effect on growth. Substitution of protein meals was based on equal total protein. Feeds were formulated to meet the common nutrients specifications and were fed ad lib in meal form. Results showed that growth performance was not affected by protein sources. In fact weight gain and feed inversion ratio, were improved by about 3% and culling rate was reduced by 45% for the MBM and PBM diets compared with fish meal diet. Feeding cost could be reduced by 5 – 10% with MBM and PBM substitution for FM. Under the present study condition, fish meal in native broiler diets can be totally replaced with MBM of PBM without any negative effect on growth performance.

	Protein Source					
	FM ¹		MBM ²		PBM ³	
	G ⁴	F ⁵	G ⁴	F ⁵	G ⁴	F ⁵
<u>Formulation</u>						
FM ¹ 60%	4	2	-	-	-	-
PBM ² 50%	-	-	4.8	2.4	-	-
PBM ³ 63%	-	-	-	-	3.8	1.9
SBM ⁴ 44%	21.8	21.6	22.5	21.5	22.4	21.5
Corn	50	50	50	50	50	50
Cassava	10	10	10	10	10	10
Rice polishing	10.4	11.4	8.8	11	9.6	11.5
<u>Analysis</u>						
ME (kcal/kg)	2948	2997	2958	3002	2941	2993
C. Protein (%)	17.5	16.3	17.7	16.3	17.7	16.3
Dig lysine(%)	.8	.72	.76	.72	.76	.72
<u>Performance</u>						
Wt gain (kg/bird)	1.38		1.43		1.43	
Feed intake(kg/bird)	3.78		3.8		3.88	
Feed / gain	2.74		2.66		2.71	
Survival rate (%)	100		99		98	
¹ Fish meal	² Meat and bone meal		³ Poultry byproduct meal			
⁴ Soybean meal	⁵ Grower phase		⁶ Finisher phase			

Introduction

In Vietnam, native yellow feather broilers are marketed at a premium over white feather chickens for their perceived value in taste and nutritional quality. It commands a high share of all poultry meats for household consumption. Native broilers are known to have a slower growth rate and thus a reduced efficiency of feed utilization. One of the practical means in lowering the feeding cost of native broilers is to replace imported high cost fish meal (FM) with US meat and bone meal (MBM) and poultry byproduct meal (PBM). However, Vietnamese broiler industry has no experience in substituting FM with MBM or PBM in native broiler diets. The purpose of the present study is to demonstrate the feasibility and effectiveness of substituting imported FM with US PBM and MBM.

Materials and Methods

1. Diets

Three nitrogenous and bioenergetic broiler grower, and finisher diets were formulated (Table 1). Ingredients used in test feeds were identical except for the animal protein meals (FM, MBM or PBM). Inclusion rate of fish meal was embittered typical in the feed industry, and the replacement of FM was based on equal total protein contribution. All diets were formulated to similar nutrient specifications (e.g. protein, ME, digestible lysine and methionine plus cystine), which are considered adequate in meeting the nutrient requirements of the native broiler.

Table 1. Formulation and nutrient analysis of experimental diets.

	Protein & Source					
	FM ¹		MBM ²		PBM ³	
	G ⁴	F ⁵	G ⁴	F ⁵	G ⁴	F ⁵
<u>Formulation (%)</u>						
Corn	50	50	50	50	50	50
Cassava	10	10	10	10	10	10
Rice Polishing	10.39	11.4	8.84	11.0	9.61	11.5
Soybean Meal 44%	21.81	21.6	22.54	21.5	22.4	21.5
Fish meal 60%	4	2				
US MBM 50%			4.8	2.4		
US PBM 63%					3.8	1.9
Oyster Shell	1.05	1.2	0.74	1.03	1.12	1.24
MDCP 21	1.39	1.48	1.15	1.36	1.67	1.62
Palm oil	0.5	1.53	1.05	1.75	0.46	1.42
Salt	0.36	0.39	0.37	0.39	0.38	0.4
Mineral Premix	0.25	0.2	0.25	0.2	0.25	0.2
Choline C60	0.08	0.06	0.08	0.06	0.08	0.06
Lysine				0.04		0.03
Methionine	0.14	0.14	0.17	0.16	0.15	0.15
Tryptophane			0.01		0.01	
Albac 15%						
Salion/cygro						
Anti-mold	0.05	0.05	0.05	0.05	0.05	0.05
Antioxydant	0.01	0.01	0.01	0.01	0.01	0.01
<u>Nutrient Analysis:</u>						
ME (Kcal/kg)	2948	2997	2958	3002	2941	2993
Protein %	17.5	16.3	17.7	16.3	17.7	16.3
True Digestible						
Lysine %	0.8	0.72	0.76	0.72	0.76	0.72
True Digestible						
Sulfur amino acid %	0.62	0.59	0.62	0.59	0.61	0.58
¹ Fish meal	² Meat and bone meal		³ Poultry byproduct meal			
⁴ Soybean meal	⁵ Grower phase		⁶ Finisher phase			

A nutritionally sound common starter was fed to all chicks during the first four weeks. All test diets were fed ad lib in meal form.

2. Animals

A total of 810 mixed sex four weeks old yellow feather native broilers (Luong Phuong breed) weighting about 470g were at randomly allocated to 18 pens (45 birds/pen), and six pens were randomly assignee per treatment.

3. Performance data measurements

Bright gain, feed intake, survival rate and culling rate were measured during the four-week grower and two-week finisher phases and were analyses statistically for difference.

Results

Growth performance data are presented in Table 2. Replacement of FM with MBM and PBM did not have significant effect on growth performance. In fact, MBM and PBM substitution improved weight gain and feed utilization efficiency by about 3%. Survival rate was excellent for all treatments. However, the MBM and PBM groups again had a 45% advantage.

Table 2. Growth performance of native broilers fed the experimental grower and finisher.

	Protein Source		
	FM ¹	MBM ²	PBM ³
<u>Wks 4-10 performance</u>			
Initial wt (kg/bird)	.47	.47	.47
Weight gain (kg/bird)	1.38	1.43	1.43
Feed intake (kg/bird)	3.78	3.8	3.88
Feed / gain	2.74	2.66	2.71
Survival rate (%)	100	99	98
Culling rate (%)	3.52	1.98	1.63

1. Fish meal
2. Meat and bone meal
3. Poultry byproduct meal

In culling rate over the fish meal control group.

Discussion

Due to the time constraint, starter phase was unfortunately not able to be tested in the present study for the protein substitution effect. Growth rate and feed conversion for the grower/finisher phases of control FM and substituted diets were normal for this particular native breed. It is highly likely that FM substitution with MBM and PBM would not affect growth performance during starter phase, although it remains to be verified in the future.

Fish meal has long been regarded as the essential protein ingredient for Vietnamese native broiler diets, but the present trial clearly demonstrated that with application of modern formulation technology and the use of US MBM and PBM birds can perform well without FM. This finding is highly significant for the Vietnamese feed industry, and also for US MBM and PBM exporters. Under normal price differentials, substitution of FM with MBM or PBM should result in 5-10% savings in feed cost for the broiler industry.

Results from the present trial is very similar to the earlier study conducted in China (NRA, 1996) with native yellow feather broilers and thus further confirm the feasibility of substituting FM with US MBM or PBM in native broiler diets.

Conclusions

Under the Vietnamese farming conditions, imported FM could be replaced with US MBM or PBM in native yellow feather broiler G/F diets without impairing growth performance. Results are consistent with findings from China. Feed cost could be reduced by 5-10% with the substitution of FM with MBM or PBM.