

UTILIZATION OF POULTRY WHOLE CARCASS MEAL AS A SUBSTITUTE FOR FISH MEAL IN THE DIETS OF GROWING PIGS

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ABSTRACT

A biological experiment was conducted to study utilization of poultry whole carcass meal, as protein supplement in pig rations. Eighteen weaned Large White Yorkshire growing pigs were randomly divided into three groups, having six pigs in each group viz., T1 (Control ; pigs fed with balanced grower ration containing dry fish as animal origin protein source), T2 (pigs fed with balanced grower ration containing 5% poultry whole carcass meal) and T3 (pigs fed with balanced grower ration containing 10% poultry whole carcass meal). All experimental diets were iso-caloric iso-nitrogenous; and were fed ad libitum to all pigs (T1, T2 and T3 groups) throughout the experimental period of 2 to 8 months of age and general performance of pigs was recorded. Total body weight gained (kg.) during experimental period was significantly ($P < 0.05$) higher in pigs under T2 as compared to pigs under treatments T1 and T3 ; The total feed intake (kg) and feed efficiency during experimental period (180 days) did not differ significantly amongst treatment groups. The decrease in cost of feeding for each kg. weight gain was 4.86 and 10.62 percent in pigs fed experimental diets containing PWCM @ 5 (T2) and 10 percent (T3) levels. From this study, it was concluded that, poultry whole carcass meal can be incorporated in grower rations of pigs at 5% level without any depression in feed intake and feed.

Key words : Poultry whole carcass meal, LWY pigs, Post weaning weight gain

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INTRODUCTION

The integrated approach of livestock farming is needed to meet the challenges faced by our country in securing the food as well as nutritional security. Among the farm livestock species, pig is one of the efficient species for meat production and is ranked after the broiler. Pig farming also provides employment opportunities and is a source of supplementary income, to improve their living standards of farmers. Continuous rising of feed cost and seasonal availability of protein sources especially fish meal compels the farmers to search for alternate sources of protein or/and feed ingredients. One such alternate ingredient may be poultry whole carcass meal as replacement of fish meal. The returns from the pig industry can be increased by utilizing the low cost by-products, wastes and dead birds, which often remain unutilized. The increasing costs of waste disposal and environmental pollution also necessitate the need for utilization of poultry industry wastes. The dead birds can be successfully converted into poultry carcass meal by the process of rendering. Poultry processing byproduct meal is generally considered as a palatable and high quality feed ingredient, due to its essential amino acids, fatty acids, vitamins and minerals content (Meeker *et al.*, 2006). The fish meal is a preferred animal protein supplement in pig diets and had been in use since long. Research work on utilization of inedible poultry processing by products are scanty. Hence, the present study was conducted with the objective of evaluating the suitability of utilization of poultry whole carcass meal (PWCM) in diets of growing and finishing pigs as replacement to dry fish meal.

MATERIALS AND METHODS

The study was conducted at Post Graduate Research Institute in Animal Sciences, Kattupakkam with Large White Yorkshire pigs. Three types of isonitrogenous and isocaloric experimental diets (BIS, 1986) were prepared *viz*, T1 (control), T2 and T3 (experimental). Experimental diets (T2 and T3) contained poultry whole carcass meal at 5 and 10 per cent level respectively. The ingredient and chemical composition of the diet (AOAC, 1990) is presented in Table 1. The poultry whole carcass meal (PWCM) was procured from the Department of Meat Science and Technology, Veterinary College and Research institute, Namakkal, Tamilnadu. PWCM is produced by dry rendering. The nutrient levels of PWCM and other feed ingredients is given in Table 2.

Eighteen numbers of Large White Yorkshire weaned pigs (2 month-old) were weighed, ear tagged and distributed equally and randomly into three groups. The experimental pigs were reared under uniform managemental practices and they were fed with control and experimental diets *ad libitum* with free access to water. Feed intake was recorded daily; and body weight was taken at fortnightly intervals throughout the experimental period, *i.e* upto eight months. At the end of feeding experiment, final body weight, total body weight gain, average daily gain, feed intake, feed efficiency and feed cost/kg live weight gain were recorded or/and calculated. The data on various parameters were statistically analysed for variance and test of significance using CRD (Snedecor and Cochran, 1989).

RESULTS AND DISCUSSION

The nutritive value of diets (T1 , T2 and T3) is given in Table 1. Data on general performance of pigs *viz.* feed intake, growth rate, feed efficiency and economics of feeding (feed cost/kg live weight gain) are presented in Table 3.

Growth performance

The initial (60-day) and final (240-day) body weights (Mean \pm SE) of Large White Yorkshire growing pigs, fed control and experimental diets containing PWCM at 5 and 10 per cent levels (T2 and T3) respectively is given in Table 3. Total weight gain (Mean \pm SE) of pigs in different treatment groups *viz.*, T₁, T₂ and T₃ was 72.17 \pm 2.68 , 74.88 \pm 3.34 and 70.35 \pm 3.64 kg respectively, while the average daily gain was 400.93 \pm 14.91, 415.97 \pm 18.57 and 390.83 \pm 20.22 g respectively in pigs under T₁, T₂ and T₃ treatments. The pigs fed with diets containing PWCM (T₂) had significantly (P<0.05) higher total body weight gain than pigs under other two treatment groups (T₁ and T₃). The total body weight gain in pigs under T₁ and T₃ treatments was statistically similar. Statistically non-significant numerically higher average daily gain was recorded in pigs under T₂ group as compared to control and T₃ group. These results corroborate with the findings of Bravo Jimenez *et al.*(2009) who observed that inclusion of spent hen meal to fattening pig's diet @ 2.5 and 5 per cent level had significantly (P<0.05) increased weight gain over that of control. Similarly, Keegan *et al.* (2004) had reported significant (P<0.05) increase in weight gain in pigs when poultry meal is incorporated at 2.9 and 5.8 % levels in pig diets with the greatest improvement at the

low level of inclusion. Zhang *et al.*(2005) found that substitution of fish meal with poultry byproduct meal (w/w) increased weight gain by 9-11 per cent in weaned pigs

Feed intake and Feed efficiency

The total feed intake of pigs fed control (T1) and experimental (T2 and T3) diets containing PWCM at 5 and 10 per cent levels, was 301.17 \pm 17.22, 311.83 \pm 14.15 and 298.50 \pm 23.82 kg respectively during the experimental period of 180 days and was statistically comparable amongst different treatment groups. Hong *et al.* (2001) observed that the feed intake was not affected in pigs fed with diets containing fermented poultry meal up to 20 per cent level. However, Shelton *et al.* (2001) had reported that the inclusion of poultry by product meal @ 15% in diets significantly (P<0.05) reduced the feed intake in pigs.

The cumulative feed efficiency (Feed consumed in kg./Weight gain in kg.) of pigs fed control and experimental diets was statistically comparable and the values were 4.17 \pm 0.14, 4.16 \pm 0.12 and 4.24 \pm 0.27 respectively in T1 , T2 and T3 groups. Feed efficiency was not significantly affected due to incorporation of PWCM. The findings are in agreement with the observations of Zhang *et al.* (2005), who did not find significant difference in feed utilization in pigs fed with diets containing poultry by-product meal, when compared with diets containing fish. However, significant reduction in feed efficiency was reported in pigs fed with diets containing spent hen meal at 7.5% level (Bravo Jimenez *et al.*, 2009). The higher or/ and similar weight gain with comparable feed efficiency between pigs fed control and experimental diets recorded in this study

indicates better availability of nutrients from poultry whole carcass meal.

Economics of feeding or/and live weight gain

The feed cost (INR/kg) and feed cost per kg weight gain (INR) are given in Table 3. The feed cost per kg weight gain (INR) was found to be lower in experimental diets (T2 and T3) as compared to control (T1). The decrease in cost of feeding for each kg. weight gain was 4.86 and 10.62 per cent in pigs fed experimental diets containing PWCM @ 5 (T2) and 10 per cent (T3) levels. Zhang *et al.* (2005) also observed that replacement of fish meal with poultry byproduct meal had markedly reduced the feed cost per kg gain by 10 % as found in this study.

It is obvious to note that incorporation of poultry whole carcass meal even at 10 per cent level in LWY pig's grower ration found to be economical, without causing statistically significant difference in average daily gain, feed intake and cumulative feed efficiency. Hence, the addition of PWCM in fattener ration will be beneficial to the commercial pig units. Overall results of the present study indicates that PWCM can be included in rations of growing swine at 5 to 10% level without any adverse effect on general performance.

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Table 1. Ingredient, chemical composition and nutritive value of the control and experimental diets

Feed ingredients	PWCM inclusion level (%)		
	Control(T ₁)	PWCM at 5% (T ₂)	PWCM at 10% (T ₃)
Maize	45.00	47.50	48.50
Bajra	17.00	16.00	17.00
Deoiled ricebran	11.00	13.00	11.00
Wheat bran	8.00	7.00	9.50
Groundnut oilcake expeller	5.00	4.00	1.50
Soyabean meal	5.50	5.00	0.00
Dry fish	6.00	0.00	0.00
PWCM	0.00	5.00	10.00
Mineral mixture	2.00	2.00	2.00
Salt	0.50	0.50	0.50
Total	100.00	100.00	100.00
Nutritive value*			
Metabolizable Energy (kcal/kg)	2751	2754	2754
Crude Protein (%)	15.96	16.02	16.02
Lysine (%)	1.00	1.00	1.00
Methionine (%)	0.30	0.30	0.30
Calcium (%)	0.90	0.90	0.90
Available Phosphorus (%)	0.35	0.35	0.35

PWCM : Poultry Whole Carcass Meal

Table 2. Nutrient content of feed ingredients

Ingredients	CP (%)	ME (Kcal/kg)	Lysine (%)	Methionine (%)	Calcium (%)	Phosphorus (%)	CF (%)
Maize	9	3366	0.22	0.18	0.03	0.085	2.0
Bajra	10	3300	0.22	0.27	0.07	0.33	2.0
Deoiled ricebran	14.90	2000	0.51	0.22	0.07	1.20	16.0
Wheat bran	10.0	2000	0.29	0.12	0.07	0.80	12.0
Groundnut oil cake expeller	42.0	2450	1.13	0.35	0.15	0.55	12.0
Soyabean meal	44.0	2420	2.79	0.62	0.30	0.28	6.63
Dry fish	45	2460	3.89	1.23	8.0	2.0	0.26
PWCM	61.42	2336	3.30	1.04	3.84	1.99	0.24
Mineral mixture					28	5.0	

CP : Crude Protein, ME : Metabolizable Energy, CF : Crude Fibre

Table 3. Post-weaning performance of Large White Yorkshire growing-finishing pigs fed with different levels of PWCM in experimental diets (Mean \pm SE)

Performance parameters	Treatment groups		
	T ₁	T ₂	T ₃
Initial body weight (60 days ; kg)	10.42 \pm 0.68	10.54 \pm 0.45	10.73 \pm 0.65
Final body weight(240 days ; kg)	82.58 ^a \pm 2.79	85.42 ^b \pm 3.69	81.08 ^a \pm 3.55
Total Weight gain (kg)	72.17 ^a \pm 2.68	74.88 ^b \pm 3.34	70.35 ^a \pm 3.64
Average daily gain (g)	400.93 \pm 14.91	415.97 \pm 18.57	390.83 \pm 20.22
Total Feed intake (kg)	301.17 \pm 17.22	311.83 \pm 14.15	298.50 \pm 23.82
Feed conversion efficiency (Cumulative)	4.17 \pm 0.14	4.16 \pm 0.12	4.24 \pm 0.27
Feed cost (INR/kg)	11.98	11.42	10.53
Cost of production per kg body weight (INR)	49.99	47.56	44.68

Means bearing different superscripts in a row differ significantly (P<0.05)