

EFFECT OF GRADED SUBSTITUTION LEVELS OF PIGEON PEA (*Cajanus cajan*) LEAF MEAL FOR BERSEEM LEAF MEAL ON BROILER PERFORMANCE

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ABSTRACT

The main object of this study was to assess the productive and physiological responses of broiler chickens to dietary Pigeon Pea (*Cajanus cajan*) Leaf Meal (PPLM) as an ingredient. 200 day-old, unsexed Ross (303) broiler chicks were used as experimental birds; they were distributed to (5x10x4) following the completely randomized design (CRD). Experimental diets were formulated to (0.0%, 2.5%, 5.0%, 7.5% and 10.0% PPLM), at the expense of alfalfa meal which was included at 10.0% in the control diet. Feed and water were provided *ad libitum*. Experimental period lasted for 7 weeks. Results revealed that there was a significant difference ($P<0.05$) in feed intake between level (2.5% - 5.0%), PPLM and control. There was no significant difference in total body weight gain. Feed conversion ratio (FCR) results showed that all birds fed PPLM were lagging after control, no significant difference detected between control and 5.0% PPLM. In conclusion the study showed that Pigeon pea (*Cajanus cajan*) leaf meal could be included in broiler diets at level 2.5-5.0% without any adverse effects on broiler performance.

Key words : *Pigeon pea leaf meal, Berseem leaf meal, Performance broiler.*

ABSTRAK

Tujuan utama dari penelitian untuk menilai respon performans pada ayam broiler yang diberi Tepung daun Pigeon Pea (*Cajanus cajan*) sebagai pengganti Tepung daun Berseem. Ayam yang digunakan dalam penelitian sebanyak 200 ekor DOC broiler strain Ross (303) yang tidak dibedakan jenis kelaminnya. Rancangan yang digunakan adalah Rancangan Acak Lengkap (RAL). Perlakuan terdiri atas 5 macam, masing-masing perlakuan terdiri dari 10 ulangan, setiap ulangan terdiri atas 4 ekor ayam. Perlakuan mengandung Tepung Daun Pea dengan level 0,0%, 2,5%, 5,0%, 7,5% dan 10,0%. Ransum dan air minum diberikan *ad libitum*. Lama percobaan selama 7 minggu. Hasil percobaan menunjukkan bahwa penambahan tepung daun Pigeon pea dalam ransum pada tingkat 2,5-5.0% tidak berpengaruh terhadap performans ayam broiler.

Kata kunci : *Tepung daun pigeon pea, Tepung daun berseem, Performans broiler.*

INTRODUCTION

The imbalance between the increasing rate of human Population growth and the world food production had led to the present shortage of protein supply and the spread of malnutrition. To solve this problem, the world must increase the

plant and animal production. Chicken meat is better than red meat, its protein considered as a good source of essential amino acids, and its cholesterol level is substantially lower than that of red meat (George, 1976). In Sudan poultry industry depends solely on limited number of feed

Ingredients, because of some reasons, knowledge lag in the composition and nutritional value of alternatives is an important reason. However, the latter is available in substantial amounts, to the best of our knowledge studies in Sudan nutritive value of legume meals for poultry, other than alfalfa (Berseem) were rather scarce. Thus there is urgent need to look critically for other indigenous protein and energy feeds, particularly those that attract no competition in consumption between man and livestock. One possible source of cheap protein is the leaf meal of some tropical legume and browse plants. Leaf meals not only serve as protein source but also provide some necessary vitamins such as vitamin A and C, minerals and also oxycarotenoids, which cause yellow color of broiler skin, shank and egg yolk (Opara, 1996).

Pigeon pea (*Cajanus cajan*) is a high yielding tropical legume its seeds are used for human consumption in Sudan as boiled grain particular during the month of Ramadan (Saeed and Khadiga, 2007). Singh *et al.* (1990) stated that pigeon pea (*Cajanus cajan*) is widely eaten in form of split seeds and it contains protein with amino acid profile similar to that of soybean. Pigeon pea (*Cajanus cajan*) showed great promise as a source of leaf and seed protein for poultry in Nigeria (Udedibie and Igwe, 1989). Pigeon pea is grown in about 70000 fedans, yielding grain about 700 kg/fedan. The plant is grown traditionally in northern and central Sudan as a minor crop, in Gezira state, along the Nile, northern state and western Sudan, Pigeon pea grows and flourishes under hot moist condition (above 35°C) and it's called "lubia Addassy" (ICRISAT, 1994).

Pigeon pea leaf meal (PPLM) (stage of growth form 4-8 weeks) found to contain; 24.3%

crude protein, 25.95% crude fiber, 5.00% ether extract, 5.62% Ash, 1.24% Ca and 0.26% P (Udedibie and Igwe, 1989). Al-asgah *et al* (2003) stated that alfalfa meal contain 92.5% dry matter, 18.38% crude protein, 25.71% crude fiber, 2.70% fat, 10.60% ash and 42.61% nitrogen free extract, Regarding alfalfa meal chemical composition the present study showed that it contains 97.38% dry matter, 17.38% crude protein, 43.67% crude fiber, 1.70% ether extract, 9.90% ash, 24.71% nitrogen free extract (NFE) and 5.96Mj/kg metabolizable energy. The production of leaf meals for non-ruminant feeding inevitably involves at least some measure of processing. Sun-drying is the method of choice in the tropics and this treatment alone can be an effective method for the removal of anti-nutritive substances in some leaf meals. Thus, sun-drying of cassava leaves may reduce HCN concentrations by as much as 90% (Ravindran *et al.*, 1987).

MATERIALS AND METHODS

The present experiment was carried out in the faculty of Agriculture poultry farm in Abu seid-south of Omdurman, during autumn (July /August) 2007, where mean temperature was 30-35 °C, and it conducted in an open sided pen. 200 one-day-old unsexed Ross (303) broiler chicks supplied by Coral Company (Khartoum) were employed as experimental birds, and then it divided into (5x10x4 birds/replicates) following the completely randomized design (CRD). Sun dried PPLM and alfalfa "Berseem" meal from different farms in "South El-misektab" area (80Km north of Khartoum) were subjected to proximate analysis (AOAC, 1980) Table (1).

Table 1. Proximate composition of Pigeon pea leaf meal (PPLM) and Berseem meal (as fed)

Parameter	Pigeon pea leaf meal	Berseem leaf meal
Dry matter (%)	97.73	97.38
Crude protein (%)	16.59	17.38
Crude fiber (%)	38.90	43.67
Fat (%)	1.32	1.70
Ash (%)	9.34	9.90
NFE (%)	30.58	24.71
M.E (kcal/kg)*	1625.20	1424.44

Experimental diets (Table 1) were formulated to be isoenergetic and Isonitrogenous according to National Research Council (NRC, 1994). These diets include graded level (0.0% control, 2.5%, 5.0%, 7.5% and 10.0%) of PPLM at the expense of Berseem meal which was included at 10% in the

control. *Metabolizable energy was calculated according to Lodhi *et al* (1976) using the following equation;

$$ME \text{ (Mj/kg)} = [1.549 + 0.0102 \text{ CP} + 0.0275 \text{ EE} + 0.0148 \text{ NFE} - 0.0034 \text{ CF\%}]$$

Table 2. The ingredients composition of the experiment diets

Ingredients (%)	Treatments (PPLM%)				
	0.0(control)	2.5	5.0	7.5	10.0
Berseem	10.00	7.50	5.00	2.50	0.00
Pigeon pea	0.00	2.50	5.00	7.50	10.00
Sorghum	57.35	57.35	57.35	57.35	57.35
Grand nut cake	24.00	24.00	24.00	24.00	24.00
Super concentrate*	5.00	5.00	5.00	5.00	5.00
Oil	2.50	2.50	2.50	2.50	2.50
Oyster shell	0.50	0.50	0.50	0.50	0.50
Salt	0.25	0.25	0.25	0.25	0.25
Vitamins & mineral	0.25	0.25	0.25	0.25	0.25
Lysine	0.10	0.10	0.10	0.10	0.10
Methionine	0.05	0.05	0.05	0.05	0.05
Determined chemical composition					
Crude protein%	21.78	21.76	21.74	21.72	21.70
Crude fiber%	8.27	8.25	8.13	8.01	7.89
Ether extract%	6.11	6.10	6.09	6.08	6.07
Lysine%	0.16	0.16	0.16	0.16	0.16
Methionine%	0.08	0.08	0.08	0.08	0.08
ME(kcal/kg)	3107.00	3107.00	3107.00	3109.39	3116.56

Table 3. Super concentrate

Crude protein%	40.00%
Crude fiber%	3.00%
fat%	3.00%
Sodium	1.50%
Calcium	8.00%
Total phosphorus	4.00%
Lysine%	12.00%
Methionine%	3.00%
Methionine and cysteine	3.50%
ME(kcal/kg)	2000.00 kcal/kg

Table 4. Calculated chemical composition of experimental diets

Parameters	Treatments (PPLM%)				
	0.0	2.5	5.0	7.5	10.0
Crude protein%	21.78	21.76	21.74	21.72	21.70
Crude fiber%	8.27	8.25	8.13	8.01	7.89
Ether extract%	6.11	6.10	6.09	6.08	6.07
Lysine%	0.16	0.16	0.16	0.16	0.16
Methionine%	0.08	0.08	0.08	0.08	0.08
ME(kcal/kg)	3107.00	3107.00	3107.00	3109.39	3116.56

Experimental procedures

48 hours before arrival of birds, the house was thoroughly cleaned and disinfected using fire. Throughout the experimental period, feed and water were supplied *ad libitum*, and the light was provided for 24 hours (artificial and natural light). Clinical signs were observed and mortality was monitored. The experiment period was six weeks. During this period birds received their respective

RESULTS

Table 5. and chart 1. shows the results of overall performance (final body weight, body weight gain, feed intake and feed conversion ratio FCR). Results showed significant difference ($P < 0.05$) between level 10.0% PPLM and control, and the highest value of final body weight and total body

Statistics

Data were analyzed by the one way Analysis Of Variance (ANOVA), Steel and Torrie (1980). Treatments means were compared by the Duncan multiple range test (Duncan, 1955).

weight gain was shown by birds fed 5.0% PPLM. Total feed intake results showed that there was a significant difference ($P < 0.05$) between control and Either of 2.5% and 5.0% PPLM, and the highest value was obtained by birds fed 2.5% PPLM. Over all FCR results showed only a significant difference ($P < 0.05$) between the control and 5.0% PPLM group.

Table 5. Effect of dietary PPLM on over all broiler performance

Parameter	Treatments (PPLM%)					MSE ±
	0.0	2.5	5.0	7.5	10.0	
Initial body weight(g)	153.93 ^a	153.35 ^a	153.06 ^a	153.68 ^a	154.03 ^a	0.82
Final body weight(g)	1942.50 ^{ab}	1940.80 ^{ab}	1971.70 ^a	1672.50 ^{bc}	1580.80 ^c	37.70
Total body weight gain(g)	1788.60 ^a	1787.50 ^a	1818.00 ^a	1505.50 ^b	1426.80 ^b	37.50
Total feed intake(g)	3480.20 ^b	4395.60 ^a	4072.20 ^a	3796.80 ^{ab}	3604.10 ^b	68.9
Over all FCR	1.97 ^b	2.46 ^a	2.25 ^{ab}	2.57 ^a	2.53 ^a	0.05

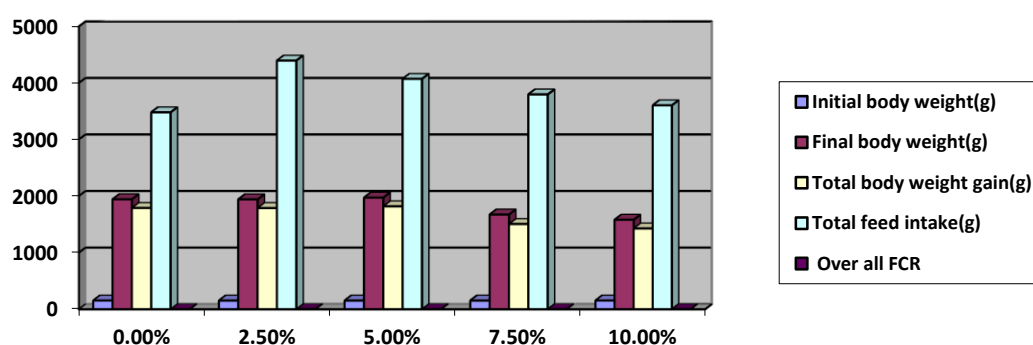


Chart 1. Effect of dietary PPLM on over all broiler performance

DISCUSSION

In vivo experimental results obtained in the present study, revealed that the dietary PPLM significantly ($p < 0.05$) increased feed intakes of broiler diet with 2.5% and 5.0% level, This result approximately conformable to Udedibie and Igwe (1989) who reported that the PPLM pigeon pea leaf meal significantly ($p < 0.05$) increased feed intake of layers. The increased feed intake noticed in 2.5% and 5.0% PPLM fed groups may be related to the probable capability of combination between the Berseem meal and pigeon pea leaf meal with level 7.5-2.5% and 5.0-5.0% respectively, in improving the palatability of the poultry rations. he significant decrease in total weight gain affected by 7.5% -10.0% PPLM may be explained by the

fact weight gain is controlled by numbers of factors which in turn affect the efficiency of feed utilization by broilers. The significant decline in feed conversion ratio (FCR) showed by birds fed the control may explain our expectation of non-availability of PPLM protein and amino acid balance.

Conclusion

In conclusion the study showed that Pigeon pea (*Cajanus cajan*) leaf meal could be replaced Berseem (alfalfa meal 10%) in broiler diets at level 2.5-5.0% without any adverse effects on broiler performance.

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