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EFFECT OF DIETARY RAW CHICKPEA (*Cicer arietinum* L.) SEEDS REPLACEMENT GROUNDNUT MEAL, SESAME MEAL ON BROILER PERFORMANCE AND BLOOD CONSTITUENTS

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ABSTRACT: *This study was conducted to investigate the effect of chickpea seeds on performance and blood constituents of broilers. One hundred and twenty eight unsexed one day old (Ross) broiler chicks were randomly assigned to four approximately isocaloric and isonitrogenous diets labeled as follows: Diet (F0) containing 0% chickpea (control diet), diet (F1) 10% chickpea substitute same levels of sesame meal and groundnuts meal, diet (F2) 10% chickpea substitute from groundnuts meal only and diet (F3) 10% chickpea substitute from sesame meal only. Each treatment had four replicates with 8 birds/ replicate. The study lasted for 8 weeks. Parameters Measured were feed intake, body weight gain, feed conversion ratio (FCR), pre –slaughter weight, dressing percentage, protein efficiency, some blood parameters (glucose, cholesterol, triglyceride, total protein, calcium, and phosphorus) and profitability. The results showed significant decrease (P<0.05) in feed intake) for birds consumed the diets supplemented with chickpeas than control. Body weight gain, pre slaughter weight and carcass weight were significantly (P<0.05) greater for birds received diet F0 (1527.37g), (1615.49g), (1195.32g) respectively and diet F3 (1430.80g), (1472.29g), (1072.06g) respectively and lower for birds received diet F2 (937.71g), (761.58g) and (533.29g) respectively. No significant differences were observed in feed conversion ratio and protein efficiency ratio among all dietary treatments. Broiler chicks received diet F2 recorded significantly (P<0.05) poorer dressing percentage than other treated diets. All the treatments had no significant (P>0.05) effect on serum glucose, cholesterol, triglyceride, total protein, calcium and inorganic phosphorus levels. Broiler chicks received diet F3 recorded the highest profitability than other groups.*

Key words: *Chickpeas, Broilers, Performance, Carcass, Characteristics*

ORIGINAL ARTICLE

INTRODUCTION

Food legumes have been well recognized as valuable source of dietary proteins in many parts of the world. A major portion of the world population relies on legumes as staple food particularly in combination with cereals. (Nalaini, 2005). Chickpea is a food legume crop grown in tropical, sub-tropical and temperate regions. Chickpea is the 2nd most important pulse crop in the world, accounting for 14% (FAO, 1998) of world pulse production (Singh et al., 1991) Peas contain between 220 and 270 g/Kg crude protein and have an amino acid profile which is relatively well balanced (Canibe et al., 1997) although like many grain legumes, the protein is marginal in the sulphur amino acids (Perez et al., 1999). The protein concentration in pea is lower than lupine, soybeans or oilseed meals, the metabolizable energy is generally higher (Cowieson et al., 2001). To date the poultry industry has been reluctant to use these products in broiler diets due to suspected presence of anti-nutritional factors and very limited information on possible inclusion levels of untreated grains. Like other legumes, chickpea seeds contain varieties of anti-nutritional factors such as protease and amylase inhibitors, lectins, polyphenole and oligosaccharides (Yutste et al., 1991 and Cerioli et al., 1998) which impair nutrient absorption from the gastrointestinal tract and can result in detrimental effects on animal health and growth (Chavan et al., 1989; Perez et al., 1999) Increasing the proportion of chickpea seed in the broiler diet negatively influenced body weight gain, food intake and food efficiency (Farrel, 1999; Viveros et al., 2001; Pisulewska et al., 2000). In comparison to soybean (*Glycine max* L.), peas (*Pisum sativum* L.) and common beans (*Phaseolus vulgaris* L.), chickpea offers less problems as far as these factors (ANF) are concerned (Singh, 1988). Chickpeas are also a good source of dietary minerals, such as calcium,

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phosphorus, magnesium, iron, and potassium (Chavan et al., 1989). The objective of this study is to assess the effect of feeding row chickpea seed replacement sesame meal and groundnuts meal on the broilers performance and blood constituents also to study the economic benefits.

MATERIALS AND METHODS

Experimental birds and design

One hundred and twenty Eight day-old unsexed commercial broilers chicks (Ross) were used for this study the initial weight of birds ranged 37- 45 g The chicks were randomly assigned to the four experimental diets 32birds per treatment group in a completely randomize design each treatment group was further subdivided into four replicates of 8 birds.

Experimental diets

The experimental diets were calculated to meet the nutrient requirement of broiler chicks according to the National Research Council (1994). Four iso energetic and iso nitrogenous diets were formulated as follows: Diet (F0) containing 0% chickpea (control diet), diet (F1) 10% chickpea substitute same levels of sesame meal and groundnuts meal, diet (F2) 10% chickpea substitute from groundnuts meal only and diet (F3) 10% chickpea substitute from sesame meal only. The composition and the calculated analysis of the experimental diets are shown in Table 2.

Table 1 - Proximate analysis and anti-nutritional factors of chickpeas seeds

Items	Chickpeas seed
Dry matter	93.10
Either extractives	3.78
Crude protein	24.31
Crude fiber	13.57
Ash	3.02
Nitrogen free extractives	48.41
Tannin	0.06
Poly phenol	0.03
Phytic acid	0.64
Digestibility	83.38
ME (kcal/kg)	2540

ME = Calculated according to equation of Lodhi et al. (1976)

Table 2 - Percentage composition and calculate analysis of rations

Feed staffs %	Diets			
	F0	F1	F2	F3
Sorghum	65.00	63.21	63.21	63.21
Groundnut meal	13.00	10.00	00.00	20.00
Sesame meal	12.00	10.00	20.00	0000.
Chickpea	00.00	10.00	10.00	10.00
Wheat brand	3.21	0000	0000	00.00
Super concentrate	05.00	05.00	05.00	05.00
Di-calcium phosphate	01.25	01.25	01.25	01.25
Methionine	0.000	0000	00.00	00.00
Lysine	00.04	00.04	00.04	00.04
Premix[1]	00.25	00.25	00.25	00.25
Salt	00.25	00.25	00.25	00.25
Calculated analysis %				
ME (kcal/kg) diet	3089	3083	3087	3087
Crud protein	21.90	21.31	21.11	21.51
Crud fiber	3.393	3.997	3.025	4.969
Calcium	0.985	0.949	1.083	0.805
Available phosphorus	0.557	0.542	0.554	0.54
Lysine	1.076	0.996	0.961	1.031
Methionine	0.460	0.412	0.489	0.355

[1]provided per kg of diets: vitamin A 8000 IU, vitamin D3 1400 IU, vitamin E 2IU, vitamin K3 2 mg, vitamin B2 4 mg, vitamin B1 2 mg, Ca – d–pantothenate 5 mg, Nicotin amide 15 mg, Choline chloride 100 mg, Folic acid 0.5 mg, vitamin B12 5mcg, Iron 22 mg, Manganese 33 mg, Copper 2.2 mg, Cobalt 0.5 mg, Zinc 25 mg, Iodine 1.1mg. F0) chickpea 0% (control); F1) chickpea 10%, groundnut meal 10% and sesame meal 10%; F2) chickpea 10% and sesame meal 20%; F3) chickpea 10% and groundnut meal 20%

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Management and data collection

The chicks were reared in deep litter with feed and water supplied ad-libitum. The birds were vaccinated against Newcastle disease at 7day-old (IB) and at the 28 day (lasota) > Gumboro disease vaccine was given at the 21 day. Vitamins offered as supportive does before and after vaccination Measurements taken were feed intake, weigh gain and feed conversion ratio. At the end of experimental period 4 birds from each replicate of each dietary treatment were randomly selected and weighted individually then slaughtered and allowed to bleed. Samples of blood were collected into clean dry test tube and allowed to clot and serum was separated and collected for frozen and later analyzed. Carcasses weight was recorded and the dressing percentage was determined by expressing carcass weight to the live weight. Protein efficiency ratio calculated as weight gain divided by protein intake.

Statistical analysis

The data collected were subjected to analysis of variance and the means were separated using Duncan's Multiple Range test as described by Steel and Torrie (1980).

RESULTS AND DISCUSSION

The effects of dietary treatments on feed intake, body weight gain, pre slaughter weight, carcass weight, feed conversion ratio (FCR), protein efficiency ratio (PER) and dressing percentage are shown in Table 3. Results revealed that treatment had significant ($P<0.05$) on feed intake. Birds consumed the diets supplemented with chickpeas reduced feed intake, this result may attributed to the palatability of those diets or may affected by tannins in legume grains. Birds received the diet F2 (contained 20% sesame meal) significantly ($P<0.05$) observed the lowest feed intake. The results of the current study are congruence with Linfield et al. (1985); Ali et al. (2000) and Godber et al. (1993) who reported that rancidity deteriorated the palatability and feed intake, also Hussein et al. (1982) and Award et al. (1988) reported reduction in feed intake for birds fed rations having rancid feed with high level. Weight gain, pre-slaughter weigh, carcass weight and dressing percentage were significantly ($P<0.05$) influenced by the treatments. Birds fed diet F2 (chickpea with sesame meal) had negative effect on these parameters and that may related to low feed intake of this group or may attributed to the rancidity of sesame, this result agree with the findings of Anjum et al. (2004). Chicks showed poor growth performance when dietary rice bran was rancid and other oxidized metabolites (Wang et al., 1997), thiobarbituric acid and acid values (Waheed, et al., 2004; Award et al., 1983; Miyazawa et al., 1986). Lower weight gain of birds fed OSO was generally similarly to earlier reports (Cabel et al., 1988; Lin et al., 1989; Engberg, et al., 1996; Wang et al., 1997). Chae et al. (2002) also reported lesser weight gain in chicks fed rancid rice polish compared to the chicks fed fresh rice polish. This might be due to destruction of fat-soluble vitamins in rancid oil that leads to reduced availability of nutrients as well as immunity and consequently depressed growth performance (Lin et al., 1989; Cheeke, 1991). Feed conversion ratio and protein efficiency ratio were not significantly ($P>0.05$) affected by inclusion of chickpea seeds. This result was similar with the finding reported by Christodoulou et al. (2006). Partial replacement of soybean with chickpeas at inclusion levels up to 12% of concentrate mixture as the main protein source in diets of broiler chickens resulted in similar productive performance. Brenes (2008) also demonstrated that the inclusion of graded concentrations of chickpea in chicken diets did not affect bird's performance. These results are in agreement with those reported by Viveros et al. (2001) and Farrell et al. (1999) who found a negative effect when chickpea was included up to 360 g kg-1 in the diet these differences might be due to the inclusion level or chickpea varieties used. However, Johnson et al. (1990) did not observe differences in performance of birds fed with 200 g chickpea kg-1. These discrepancies could be due to the presence of certain amounts of anti-nutritional factors in the seed, which can vary considerably among batches of the same legume (Saini et al., 1992). Although the inclusion of graded concentration of chickpea did not cause growth depression (Brenes, 2008)

The findings of the present study on serum components (Table 4) indicated that there were no significant ($P>0.05$) influenced for serum glucose, cholesterol, triglyceride, total protein, calcium, and inorganic phosphorus by the dietary treatments, this result agrees with findings reported by (Taguia, 2003). Feeding economics of experimental diets are presented in Table 5. The result showed that diet F2 (contained 10% chickpea with 20% sesame meal) is cheapest one but the broiler chicks received diet F3 (contained 10% chickpea with 20% groundnut meal) recorded the highest profitability than other groups.

Table 3 - The effect of feeding chickpea levels on overall performance of broiler chicks

Items	Diets				
	F0	F1	F2	F3	±SEM
Feed intake g/bird	3360.15^{a}	2841.96^{b}	2090.65^{c}	2912.65^{b}	60.74
Weight gain g/bird	1527.37^{a}	1311.42^{b}	937.71^{c}	1430.80^{a}	33.47
Pre-slaughter g/bird	1615.49^{a}	1280.98^{b}	761.58^{c}	1472.29^{a}	66.75
Carcass weight	1195.32^{a}	907.36^{b}	533.29^{c}	172.06^{a}	50.67
Feed conversion ratio	2.20	2.17	2.24	2.05	0.08
Protein efficiency ratio	2.03	2.10	2.04	2.15	0.06
Dressing percentage	73.96^{a}	70.83^{bc}	69.69^{c}	72.73^{ab}	0.91

$^{a, b, c:}$ values within a row with different superscripts differ significantly. SEM= Standard error of the mean.

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Table 4 - The effect of feeding chickpea seeds on serum composition of broiler chicks

Items	Diets				
	F0	F1	F2	F3	±SEM
Glucose	162.88	159.75	170.00	180.13	12.49
Cholesterol	110.00	13.25	116.25	111.25	9.84
Triglyceride	86.63	92.38	72.13	90.13	12.24
Total proteins	3.16	3.40	2.91	3.15	0.19
Calcium	10.76	10.98	12.38	11.80	0.63
Phosphorus	14.29	14.00	14.70	14.34	0.50

Table 5 - The feeding economics of experimental diets

Items	Diets			
	F0	F1	F2	F3
Feed cost per bird (SDG)	04.35	04.26	03.12	04.38
Feed cost per bird ($)	01.58	01.55	01.13	01.59
Average weight of bird (kg)	01.20	0.91	0.53	01.21
Total returns (SDG)	13.15	9.98	5.87	13.28
Total returns ($)	04.78	03.63	02.13	04.83
Total cost per bird (SDG)	07.35	07.26	06.12	07.38
Total cost per bird ($)	02.67	02.64	02.23	02.68
Net profit per bird (SDG)	05.79	02.72	-0.25	02.90
Net profit per bird ($)	02.11	0.99	-0.09	02.14

CONCLUSION

Chickpea seeds could replace sesame by 10% with no adverse effect on bird performance, blood serum constituents and feed cost.

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