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ORIGINAL ARTICLE

RESPONSE OF BROILER CHICKS FED ON DIETS CONTAINING GRADED LEVELS OF PIGEON PEA (*CAJANUS CAJAN*) SEEDS SUPPLEMENTED WITH ESSENTIAL CARAWAY OIL

Mukhtar A, Mukhtar Atif E and Amal O
College of Agriculture Studies, Department of Animal Production, Sudan University of Science and Technology, Khartoum North, Shambat, P.O.Box:407

ABSTRACT: This experiment was conducted to evaluate the effect of feeding broiler chicks on diets containing graded levels of raw pigeon pea seeds (PPS) supplemented by essential caraway oil (ECO) {200 ml/100kg). One hundred and twenty, 7-day old broiler chicks (Ross 308) were divided into five groups (A,B,C,D and E). Each group was subdivided into four replicates with six chicks per each in a completely randomized design (CRD). Five iso-caloric, iso-nitrogenous diets were formulated. Diet A was as acontrol (no pigeon pea, no caraway oil). Diets B, C, D and E contained 5, 10, 15 and 20% of raw pigeon pea seeds supplemented with 200ml/100kg caraway oil. Results obtained showed that the overall data for performance of chicks fed diet contained 20% pigeon pea seed supplemented with caraway oil recorded significant (p≤0.05) improvement over the control group in body weight, body weight gain and feed intake; however, the dietary had no effect on feed conversion ratio and mortality. It is concluded that addition of 200 ml/100kg caraway oil to raw pigeon pea seed is eliminate or reduce the anti-nutritional factors in pigeon pea seed, so, indicating that the caraway oil can be as anatural inhibitor for anti-natural factors.

KEYWORDS: Pigeon Pea Seed, Essential Caraway Oil, Anti-Nutritional Factors.

INTRODUCTION

The major item of cost in poultry production is feed; one of the first manifestations of this problem for feeding animals is the competition for feedstuff that can commonly be used by human and livestock. Consequently there is a worldwide interest in the search for new plant species.

The source of protein for poultry feed are expensive and they constitute about 30-35% of their diet. The over dependence on the use of sesame and groundnut cakes as amajor sources of protein in poultry feed has led to bothsociety and competition with man for these ingredients and consequently high cost of poultry feeds (Mukhtar, 2007). These competition lead animal nutritionists to search for alternative protein feed ingredients.

Pigeon pea (Cajanus cajan) seed has been found asatisfactory protein ingredient (Amaefule and Obioha, 2001). However pigeon pea seed like most tropical legume seeds contain anti-nutritional substances, like trypsin inhibitors and hemagglutinins, which affect their utilization in monogastric animals, specially the raw seeds (Girmand, 1988; Santosa *et al.*, 1987; Eneobong, 1995; Onu and Obongwa, 2006). Purdue (2006) observed 4.8 mg/g trypsin inhibitor activity. Diarra *et al.*, (2008) observed that phytic acid is lost more through hydrolysis than the action of heat. Phytic when consumed without adequate processing, cause flatulence (Singh, 1988). Amaefule and Nowaghara (2004) reported that processing of pigeon pea seed caused reduction or elimination of anti-nutritional factors, but on the same time reduce the total contents of nutrients to some extent. Many researchers studied the effect of feeding pigeon pea seed meal on the performance of broilers and layers (Ahmed and Abdel Ati, 2006; Amaefule and Obioha, 2007; Saeed *et al.*, 2007).

Essential oils in aromatic plants possess biological activities and stimulate effect on animal digestive system (Ramakrishna *et al.*, 2003) to increase production of digestive enzymes and improve utilization of digestive products through enhancing liver function (Langhout, 2000; Hernandez *et al.*, 2004).

The objective of this study is to evaluate the performance of broiler chicks fed on diets containing graded levels of raw pigeon peaseeds supplemented by essential caraway oil.

MATERIAL AND METHODS

The experiment was conducted in Poultry Farm, College of Agriculture, Sudan University of Science and Technology. One hundred and twenty unsexed commercial chicks (Ross 308)

Corresponding Author: Mukhtar A, College of Agriculture Studies, Department of Animal Production, Sudan University of Science and Technology, Khartoum North, Shambat, P.O.Box:407. **Email:** mukhtarahmed@susttech.edu, mukhtarahmed18201169@yahoo.com.

were selected after a week of adaptation in which they were fed on a broiler pre-starter. Chicks were weighed and randomly assigned to five experimental diets (A, B, C, D and E) in a completely randomized design. Each treatment was further subdivided into four replicates of six chicks per each and kept in an opened ventilated house.

Pigeon pea seeds were purchased from the local market, milled then five experimental diets were formulated (Table 1) to meet the nutritional requirement of broiler chicks according to NRC (1994). The diets were approximately iso-nitrogenous and iso-caloric. Diet A as a control diets B,C,D and E contained graded levels of pigeon pea seeds at 5, 10, 15 and 20% respectively and supplemented with 200ml/kg caraway oil (table 1). Allroutine vaccinations and poultry management practices were maintained. Feed and clean water supplied *ad-libitum*.

Average live body weight and feed intake were recorded weekly, body weight gain feed conversion ratio (FRC) were also calculated and mortality was recorded daily. At the end of the experiment four birds from each treatment were randomly selected, individually weighed after an overnight fast except from water, slaughtered, allowed bleeding, defeathered manually eviscerated, weighed again and the individual organs (liver, heart, and gizzard) were separately weighed and they were expressed as apercentage of live weight.

The data collected were subjected to analysis of variance, means separation was carried out using Duncan's multiple range tests (1955).

Table 1: Percent inclusion of dietary ingredients in the experiment

Ingredients	Control	5% PPS	10%PPS	15%PPS	20%PPS
Sorghum	65.75	63.9	62.46	56.66	51.0
Sesame cake	15.0	12.0	8.0	7.67	7.0
Groundnut cake	13.0	13.0	13.0	13.0	12.67
Pigeon pea seed	-	5.0	10.0	15.0	20.0
Concentrate	5.0	5.0	5.0	5.0	5.0
Oyster shell	1.0	0.65	0.69	0.9	0.9
Salt	0.25	0.25	0.25	0.25	0.25
Methionine	-	0.05	-	0.05	0.1
Vitamine	-	0.2	0.2	0.2	0.2
Vegetable oil	-	0,2	0.4	1.17	1.88
Calculated Composition					
ME kcal/kg	3133.0	3131.9	3133.7	3132.5	3132.2
CP%	22.0	22.2	22.0	22.0	22.0
Lysine%	1.15	1.14	1.18	1.19	1.22
Methionine%	0.47	0.46	0.48	0.47	0.47
Calcium%	1.18	1.0	1.0	1.0	1.0
AV.phosphorus%	0.65	0.63	0.6	0.6	0.6

RESULTS AND DISCUSSION

The performance of the broiler chicks fed on graded levels of raw pigeon pea seed supplemented with 200 ml/100 kg caraway oil presented in table 2. The feed intake 0f chicks increased with the increase of age of chicks and the level of pigeon pea seed in diets.Chicks fed on diets contained 20% PPS supplemented ECO had asignificant ($p \leq 0.05$) higher feed intake althrough the experiment periodcompared to other tested groups. While, chicks fed on control diet recorded the lowest feed intake, The average feed intake of chicks approximately exceed the control group by 30.89% This improve in feed utilization of chicks fed on PPS supplemented with ECO could be due to asweet and pleasant flavor and intense taste of CO and to these positive efficiency of CO on the digestive system, These results were agreed with the report of Ani and Okeke (2011) who recorded significant differences among broiler chicks performance fed on different levels of roasted pigeon pea seed meal in broiler starter, although they reported no significant for broiler chicks fed on different levels of pigeon pea seed meal finisher stage. Results were in line with those obtained by Ciftic *et al.*, (2005) who found that the essential oils improved feed intake weight gain and carcass yield.

Inclusion of raw PPS supplemented with ECO had significant ($p \leq 0.05$) increase on weekly live weight and weight gain. Highest body weight and weight gain were obtained from control chicks fed on diet contained 20% PPS supplemented with 200ML/100Kg ECO compared to group, which exceed by 16.2% and 22.3% respectively. This performance improvement might be due to the active ingredients of CO such as carovine and limonine which have digestive stimulating effects, by stimulating secretion of gastric juice, acids and bile into the stomach and so the digestive tract acting the directly on the intestinal muscles to relive bloating and flatulence, and showed

increasing effect on live body weight and body weight gain, These results were in line with the results recorded by Hernandez *et al.*, (2004) and Ramakrishna et *al.*, (2003). These results were similar to that observed by Iorgyer *et al.*, (2009) but in contrast, with Yisa *et al.*, (2010) records which were significant effects on dressing and carcass cut-up parts of cockerels fed on boiled dried pigeon pea seed meal.

Regarding to the FCR there were no significant ($p>0.05$) difference between tested groups. For body components, there were no significant ($p>0.05$) difference between treatments in weights of liver, heart and head. These results were agree findings of Bamgbose *et al.*, (2009) and Yisa *et al.*, (2010) who revealed no significant effect of pigeon pea seed on carcass yield but chicks fed on 20% PPS recorded a significantly more ($p\leq0.05$) for gizzard compared to control group (Table 3).

From the results obtained it can be concluded that raw PPS supplemented ECO can be used as avegetable protein source in broiler diets up to 20%. Also results showed that addition of ECO instead of processing methods is suitable and more effective in reducing various anti-nutritional factors without affecting the nutritional quality of raw PPS.

Table 2: Effect of graded levels of pigeon pea seeds supplemented with ECO on the broiler chicks performance

Parameters	Control	5%PPS(B)	10%PPS(C)	15%PPS(D)	20%PPS(E)	SE
Final body weight g/b	1833.1^{b}	1893.75^{bc}	1933.42^{bc}	2000.63^{ac}	2129.38^{a}	50.18
Body weight gain g/b	1608.63^{a}	1672.54^{a}	1767.79^{a}	1831.09^{ab}	1967.5^{b}	60.75
Feed intake g/b	2869.59^{ac}	3150.41^{ac}	3239.15^{ac}	$3411,63^{ab}$	3754.17^{b}	121.72
Feed conversion ratio	1.68^{a}	1.95^{b}	1.82^{c}	1.96^{b}	1.88^{d}	0.013
Mortality%	0.83	0.83	1.6	1.6	1.6	-

Table 3: The effect of feeding on experimental diets on broiler non carcass components

Item	Control(A)	5%PPS(B)	10%PPS(C)	15%PPS(D)	20%PPS(E)	SEM
Hot dressing[a]	1090.0^{a}	1230.0^{ab}	1353.75^{b}	1488.75^{b}	1520.0^{b}	4.86
Gizzard[a]	42.5^{a}	52.5^{ab}	50.5^{ab}	58.75^{b}	57.5^{c}	6.28
Liver[a]	31.25^{a}	41.25^{a}	45.0^{a}	51.25^{a}	48.75^{a}	5.31
Heart[a]	5.0^{a}	5.0^{a}	5.0^{a}	5.0^{a}	5.0^{a}	-
Head[a]	38.75^{a}	41.25^{a}	43.75^{a}	46.25^{a}	47.5^{a}	5.73

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