ISSN 1682-8356
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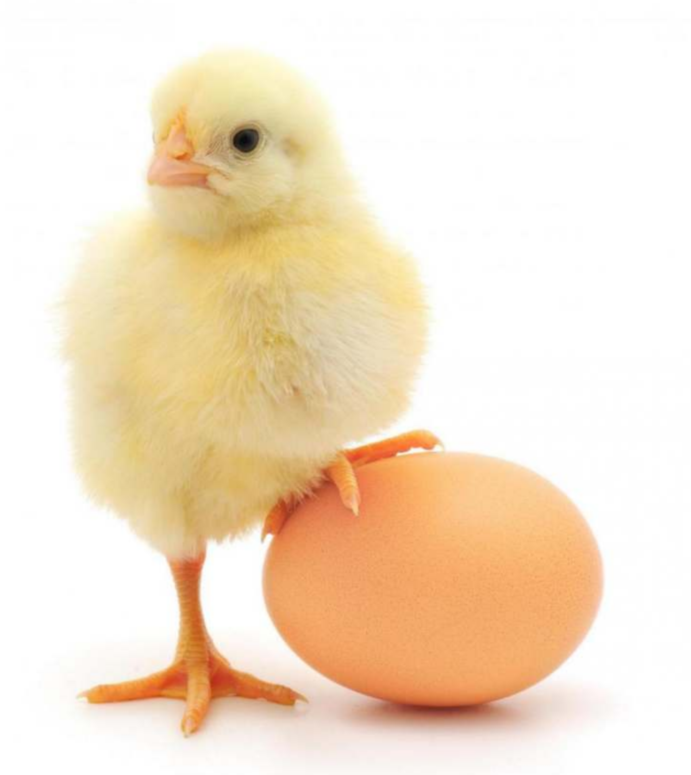

INTERNATIONAL JOURNAL OF POULTRY SCIENCE

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International Journal of Poultry Science 4 (12): 982-985, 2005
ISSN 1682-8356

Effect of Different Levels of Full-Fat Canola Seed as a Replacement for Soybean Meal on the Performance of Broiler Chickens

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Abstract: This experiment was conducted to study the effects of different levels of full-fat canola seed substituted for soybean meal in diet on the performance of 300 day-old male Arian chickens. The experiment was performed in a completely randomize design (CRD) with five treatments and three replicates for each treatment. The experimental treatment included 0, 3, 6, 9 and 12 percent canola seed in diets, and were respectively designated as diets A, B, C, D and E, fed to chickens from 1 to 42 days of age. All of the experimental diets were iso-caloric and iso-nitrogenous. The criteria measured were the growth rate, feed intake, feed conversion and liver weight. Average feed intake and weight gain, were measured weekly .For comparison between means Duncon method (P<0.05) was used. The mean total body weight was not significantly(P >0.05) influenced by canola seed inclusion levels. Feed intake, was significantly (P>0.05) influenced as the percent canola seed substitution increased from 0 to 12%, where group fed with a diet containing 12% canola seeds, had the highest (4016g) and control chicks had the lowest feed intake (3583g). Feed conversion ratio (feed-to-gain) was significantly (P>0.05) affected. Diet A gave the best value (1.74) followed by diet B(1.85), D (1.87) and C (1.88) respectively, while diet E had the poorest value (1.96). Percentage of liver to carcass weight was not significantly (P >0.05) influenced by canola inclusion levels.

Key words: Canola, Full-fat seed, soybean meal, Broiler chicks, weight gain, feed conversion

Introduction

During the past 20 years, canola has passed peanut, sunflower and, most recently, cottonseed in worldwide production. In 2000–2001, world production of rapeseed/canola totaled 33.86 million tonnes (t) or 13% of oilseeds production (ERS, 2001). According to Apata and Ojo (2000), the high cost of compound feeds for poultry is derived largely from the exorbitant prices of feed ingredients, increasing competitive demand for them by man and animals and scarcity of the conventional ingredients. Such ingredients include maize, soybean meal and fish meal. Therefore, to reduce the feed cost, which accounts for 60 to 70% of total cost (Nworgu *et al*., 1999; Singh, 1990; Banerjee, 1992), research efforts are being geared towards evaluating alternative feed ingredients for poultry (Igwebuike *et al*., 2001; Ojewola *et al*., 2003). However, these grains are not grown in some countries due to the unfavorable weather subjected to the laws of international trade. According to Atteh and Ologbenla (1993) such alternatives should have comparative nutritive value but cheaper than the conventional protein sources. They should also be available in large quantities. In Iran, in recent decade, rising demand for canola seed, has considerably increased canola cultivated area In 2003. One of alternative ingredients in both broiler chicks and layer hens are canola seed and meal (Newkirk and Classen, 2002; Najib and Al-Khateeb, 2004).

The canola seed has following proximate composition: Whole canola seed contains high levels of lipid (approximately 55%), of which over 85% is 18-carbon fatty acids; 18:1 is the predominant fatty acid (>60% of total fatty acids; Ackman, 1990). Whole canola seed also contains a large amount of protein (20.6% CP; Murphy *et al*., 1987). Seeds of these species commonly contain 40% or more oil and produce meals with 35 to 40% protein (Raymer *et al*., 1990). TME contents vary from 4.50 to 5.63 kcal/g (Sibbald, 1977a,b; Sibbald and Price, 1977; Mutzar *et al*., 1978; Mutzar and Slinger, 1980; Salmon 1984) and AME values from 4.33 to 4.45 kcal/g (Mutzar and Slinger, 1980) on dry matter basis. For canola oil, Sibbald (1977) indicated AME values ranging from 8.89 to 9.36 kcal/g. The goal of this research is to investigate the effect of replacing soybean meal with full-fat canola seed as a protein source.

Materials and Methods

Three hundred 1-d-old male commercial broiler chicks (Arein strain) were weighted, and distributed randomly to 5 treatments with 3 replicates (20 chicks in each replicate/pen). In each treatment Double zerro Full-fat canola seed (FFCS) were used. Five experimental isocaloric and isonitrogenous diet, were formulated to contain 0, 3, 6, 9, and 12% CS (Table 1). Broiler starter diet was fed from 1 to 3 week and broiler grower was fed from 4 to 6 week. The experiment was performed in a completely randomized design (CRD). Means were

Table 1: Ingredient and nutrient compositions of experimental diets

	Level of FFCS included (0–3 wk) (%)					Level of FFCS included (3–6 wk) (%)				
Item	0	3	6	9	12	0	3	6	9	12
Ingredient[1]										
Corn	57.3	57.7	56.5	55.2	54	66	65	64	62.5	61.2
SBM (%44)	36	33	30	27	24	28	26	23	21	19
Fish meal	4	3.53	4.78	6	7.2	3	3	2.7	4.5	4.9
DCP	1	1	1	1	1	1	1	1	1	1
Vitamin-premix[2]	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Mineral-premix[3]	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Salt	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
oyster	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Methionine	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Calculated value(%)										
ME(kcal/kg)	3,020	3,020	3,020	3,020	3,020	3,100	3,100	3,100	3,100	3,100
Crude protein	23.6	23	23	23	23	20.5	20	20	20	20
Calcium 1	1	1	1	1	0.92	0.92	0.92	0.92	0.92	
Phosphorus	o.4	o.4	0.4	0.4	0.4	o.4	o.35	0.35	0.35	0.35
Sodium o.18	o.18	o.2	0.2	0.2	0.14	0.14	0.14	0.14	0.14	
Methionine	0.68	0.56	0.55	0.61	0.7	0.6	0.6	0.6	0.6	0.6
Price(rial)[4]	2,672	2,654	2,723	2,788	2,854	2,570	2,580	2,545	2,676	2,712

[1]SBM = soybean meal; DCP = dicalcium phosphate;FF CS = full-fat canola seed. [2]Supplied per kilogram of diet: vitamin A, 3,600,000 IU; vitamin D_3, 800,000 IU; vitamin E 7,200 mg; vitamin K_3, 800 mg; pantothenic acid 4,000 mg; thiamine, 1 mg; B_6 1,200 mg; biothin 40 mg; B_2 2,640 mg; nicothenic acid 12,000 mg; folic acid 400 mg; B_{12} 6 mg; antioxidant, 100,000 mg; [3]Supplied per kilogram of diet:iodine 400 mg; selenium 80 mg; Mn, 40,000 mg; Zn, 33,800 mg; Fe, 20,000 mg; I_2, 0.2mg; Cu, 4,000 mg; Co, 0.1 mg.

compared with Duncon's Multiple Range Test at (P<0.05). During first ten days, the chicks were vaccinated against area prevailing diseases. The chicks were reared in deep litter on wood hulls in 1x1.5-m pens. Water and feed were provided *ad libitum*. Body weight and feed consumption were determined weekly. Feed conversion was calculated as the ratio of the feed consumed to the total body weight of live birds in that pen. At the end of experiment, 3 chicks randomly selected from each pen and slaughtered.

Results and Discussion

Body weight: The results are presented in Table 2. There is no significant difference (P>0.05) in body weight between experimental groups in the comparison with control. The results are in agreement with the result of other researchers (Zeb *et al.,* 1999; Summers *et al.,* 1988). Most probably this is due to presence of fish meal, keeping amino acid moderation and no exchange in anion-cation balancing at the ration. Roth Maier *et al.* (1988) indicated that use of 5, 10, 15, 20 and 25 percents of full-fat Canola seed in the broiler ration has the negative effect on the chicken growth so that, body weight in experimental groups in comparison with control has showed 6.7-24% reduction. researcher has mentioned the decreasing of feed consumption is the cause of body weight decreasing (Sosulski, 1974; Roth Maier *et al.*, 1988). According to Najib and Al-Khateeb (2004) with the exception of protein level, canola seed are very much similar to canola meal. High level oil in Canola seed in comparison to its meal, will cause dilatation of other nutrient and anti-nutrient in the seed and this point can reduce unpleasant effects of inhibitor and anti-nutrient in canola seed.

Feed intake: Feed intake data showed significant difference (P<0.05) only in starter and whole experimental periods in canola fed chicks in comparison with control group (Table 2). Group fed diet E, had the highest (4016g) while group fed A had the lowest feed intake(3583g). Probably, the less amounts of Soy bean meal and fish meal in starter diet and low level protein ratio, had adjusted feed consumption in experimental and control groups from 1 to 21 days of study. This issue do not support some results of researchers and with some other has conformity. This is in such a manner that it has no conformity with the results of researches (Roth Maier *et al.*, 1988; Lee *et al.*, 1984 and Nassar and Arscott, 1986). Roth Maier *et al.* (1988) used 5, 10, 15, 20 and 25 full-fat canola seed in the broiler diets, has observed that increasing proportion of Canola seed in the diet reduce continuously performance. No particular cause has been reported for decreasing of feed consumption yet, but the existence of phytic acid in canola seed and meal will cause reduction in calcium ability absorption and consequently, the feed consumption reduction (Semmers *et al.*, 1988). The results of this study supports other studies (Semmers *et al.,* 1988; Semmers *et al.*, 1977; Clark *et al.*, 2001). Zeb *et al.* (1999) reported that due to securing of amino acids in ration, feed consumption will not show any reduction by adding canola meal. Also, Hill (1979) has reported

Table 2: Effect of different levels of full-fat canola seed on some traits of broiler

	Liver Weight (% of BW)				
	3.8	3.2	3.1	3.1	3.3
Whole period(1-42 days)					
Feed conversion (g/g)	1.74^{c}	1.85^{b}	1.88^{b}	1.87^{b}	1.96^{a}
Feed consumption (g/bird)	3583^{c}	3868^{b}	3967^{ab}	4038^{a}	4016^{a}
Body Weight (g)	2050	2083	2103	2150	2046
Grower(22-42 days)					
Feed conversion (g/g)	1.79^{b}	1.88^{b}	1.91^{ab}	1.90^{b}	2.03^{a}
Feed consumption (g/bird)	2679	2805	2953	2966	3003
Body Weight (g)	1496	1488	1548	1555	1479
Starter(1-21days)					
Feed conversion (g/g)	1.63	1.79	1.82	1.80	1.79
Feed consumption (g/bird)	904^{b}	1063^{a}	1014^{a}	1071^{a}	1012^{a}
Body Weight (g)	553	594	555	595	567
Experimental groups	0% canola seed (A)	3% canola seed (B)	6% canola seed (C)	9% canola seed (D)	12% canola seed(E)

that the taste and odor o f feed has little importance, due to incompletely development of odor and visual senses in poultry, feeds with unsuitable odor and taste will cause less feed consumption in poultry. We can inference from results of researches that, unpleasant taste of Canola seed can not be an inhibitor and reducer factor in feed consumption.

Feed conversion: Our results with FFCS, are in agree with those that shows significant differences (P<0.05) between experimental and control groups. this results are agreement with Dora-Roth Maier study (Roth Maier *et al*., 1988). No significant difference (P>0.05) observed among all experimental and control groups during 1 to 21 days of study. But numerically diet A and C gave the best and poorest value respectively. From 22 to 42 days, the best feed conversion ratio has been belonged to the groups that fed A, B, D, C and E diets respectively. The results also indicates, closely results between growth period and whole experimental period (1 to 42 days). So that diet A gave the best value (1.74) followed by diet B (1.85), D (1.87) and C (1.88) respectively, while diet E had the poorest value (1.96). This results has similarity with other results (Roth Maier *et al*., 1988). In spite of high feed consumption in experimental groups (Table 2), results do not show any body weight increasing due to continuously consumption.

Liver weight: Carcass and liver were weighted in both experimental and control groups. liver weight results presented as a percentage of carcass weight (Table 2). Results shows that there is no significant difference (P>0.05) between experimental and control groups that are agreement with Elwinger study (1986). In spite of these results, numerically increasing in liver weight in group fed diet A observed. Probably, higher liver weight in control has been due to the lower fat content, that liver are subjected to produce energy from carbohydrates so its weight will be higher in comparison with other experimental groups which received different levels of full-fat CS. The fat can secure a major part of required energy and will less liver tension for lipogenesis (Leeson and Summers, 1997).

Higher liver weight in control groups in contrast to experimental groups which has showed in Table 2 are similar with other studies (Leeson and Summers *et al*., 1997) .

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