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EFFECT OF DIFFERENT LEVELS OF CANOLA MEAL AS SOYBEAN MEAL REPLACEMENT IN BROILER RATIONS

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A performance trial of six weeks was conducted to study the effect of different levels of canola meal as a replacement of soybean meal on growth rate of broiler chicks. Five isocaloric isonitrogenous broiler starter and finisherrations containing 0, 5, 10, 15 and 20 % canola meal replacing soybean meal were fed to three experim~ntal u.nits of 10 c~icks e~ch, ~or the first 4 weeks and subsequent 2 weeks, res~ectively. Average body weight gam was the highest m chicks fed starter and finisher rations without canola meal, while it was the lowest in chicks fed ration containing 20% canola meal. The difference in body weight gain was non-significant (P>0.05) between rations containing 0 and 5% canola meal. Almost similar observations were recorded in respect of feed consumption and feed:gain ratio.

Key words: canola meal, feed:gain ratio, Hubbard broiler, soybean meal

INTRODUCTION

By manipulating the genetic make up of rapeseed a new variety was developed which has low erucic acid in the oil and reduced glucosinolate concentration in the oil meal. The first double zero rapeseed, containing less than 5% erucic acid and not more than 3 mg of glucosinolates per gram of dry meal was released for commercial production in 1974 by the Govt. of Canada. The name "canola" (implying "Canadian Low Acid Seed" or "Canadian Oil") was officially recognized in 1980. Canola meal (CM) contains 40% protein which was believed to be *of* very high quality (Bell, 1982; Mosthagi-Nia and Ingalls, 1995). Canola meal can thus be used as a good source of high quality protein for various classes of poultry including turkeys, water fowl, broiler, layers and breeder chickens (Clandinin and Robblee, 1983).

Canola meal can be used to replace soybean meal (Nassar and Arscott, 1985), a part of cottonseed meal (Campbell, 1988) and flaxseed meal (Lee et al., 1991) very successfully, thus proving it as a good protein source. The study under report was conducted to determine the effects of higher levels of CM as a replacement of soybean meal in broiler rations on their growth performance.

MATERIAL AND METHODS

One hundred and fifty, day-old Hubbard broiler chicks, after wing banding, were randomly divided into fifteen experimental units of ten chicks each. Five isocaloric and isonitrogenous starter (Table 1) and finisher (Table 2) rations were prepared according to the recommendations for nutrient requirements of National Research Council (NRC, 1994). Broiler starter rations were designated as A, **B,** C, D and E and finisher as *Ai, B/, Cl, DI* and *El.* These rations *A,Ai, B,B/, C,C/, D,DI* and *E,El* contained 0, 5, 10, 15 and 20% canola meal, respectively. On first. day of the experiment, starter rations were randomly allotted to 15 experimental units in such a way that each experimental ration was fed to three units of ten chicks each. Starter rations were fed during the 0-4 week period, while finisher rations were fed during the 5th and 6th weeks of the experiment.

Body weight of individual birds and feed consumption by the birds in a pen were recorded at weekly intervals. Feed-gain ratio of all experimental units was worked out, and data were subjected to analysis of variance technique using completely randomized design. Treatment means were compared by using Duncan's multiple range test (Steel and Torrie, 1981).

RESULTS AND DISCUSSION

Body Weight Gain: At the end of 4th week, average body weight of broiler chicks fed starter rations A, **B,** C, D, and E (containing 0,5, 10, 15, and 20% CM) was 968.7, 941.7, 931.7, 861.3 and 848.3 g, respectively (Table 3). Maximum weight gain (968.7 g) was observed in birds fed ration without CM and minimum (848.3 g)' was in those fed rations containing 20% CM. The difference in weight gain was found to be non-significant (P>0.05) between rations A and B (968.7 vs 941.7 g). Similarly, no difference in weight gain was observed between birds fed rations Band C (5 and 10% CM). However, compared to other rations a marked reduction in weight gain was observed in birds fed rations containing 15 and 20% CM. Body weight gains of broiler chicks fed during the finishing phase (5-6

Table 1. Composition of different starter rations

Ingredients	Rations (% composition)				
	A	B	C	D	E
Corn	25	25	30	30	40
Rice broken	15	15	10	10	-
Rice polishings	11	11	11	10	10
Cottonseed meal	4	4	4	4	4
Corn gluten 60%	8	8	8	8.5	8.5
Soybean meal	20	15	10	5	0
Canola meal	0	5	10	15	20
Fish meal	8	8	8	8	8
Soy oil	2.5	2.5	2.5	3	3
Molasses	4	4	4	4	4
Limestone	1	1	1	1	1
DCP	1	1	1	1	1
Vitamin mineral premix!	0.5	0.5	0.5	0.5	0.5
Nutrient composition					
Crude protein (%)	23	23	23	23	23
Metabolizable energy (Kcal/kg)	3000	3000	3000	3000	3000
Crude fiber (%)	4	4	4	4	4
Calcium (%)	1	1	1	1	1
Total phosphorus (%)	0.5	0.5	0.5	0.5	0.5
Lysine (%)	1	1	1	1	1
Methionine(%)	0.5	0.5	0.5	0.5	0.5

lFor each kg ofthe mixed ration: Vitamin (Vit.) A, 1500 LV; Vit. D3,200 ICV; Vit. E, 10 IV; Vit. K, 0.5 mg; Thiamine, 1.8 mg; Riboflavin, 3.6 mg; Pyridoxine, 3.0 mg; Vit. B12, 0.009 mg; Pantothenic acid, 10 mg; Niacin, 27 mg; Choline, 500 mg; Biotin, 0.15 mg; Folic acid, 0.55 mg; Manganese, 60 mg; Zinc, 40 mg; Copper, 8 mg; Iron, 80 mg; and antioxidant Ethoxyquin (Santoquin®), 125 mg.

weeks) were 926.7, 916.7, 904.3, 828.6, and 812.7 g on rations *AI, BI, CI, DI,* and *FI,* respectively (Table 3). During finishing phase, again a similar trend in weight gain was found between different rations as was during the starter phase (0-4 weeks). However, the difference in weight gain was found to be non-significant between rations A, B and C, but it was significantly ($P<0.05$) higher than with rations D and E. Average total weight gain of broiler chicks from 0-6 weeks of age was 1895, 1858, 1836, 1690 and 1661 g for rations containing 0, 5, 10, 15 and 20% CM, respectively (Table 3). Birds fed ration without CM had the maximum body weight gain (1895g), while those fed ration containing 20% CM had the minimum (1661g). The differences in body weight gain between rations containing 0 and 5% CM were non-significant ($P>0.05$). Similar was the case with rations containing 5 and 10% CM. Significantly ($P<0.05$) less body weight gain was observed in birds fed rations containing 15 and 20% CM, when compared with other rations.

The results of this study indicated that performance of broiler chicks was not affected significantly when the level of canola meal was not more than 10 % of the ration. A number of workers including Nwokolo and Sim (1989), Darroch et al. (1990), Lee et al. (1991) and Lee and Sim (1996) tried to use CM at much higher levels but failed to get comparable performance at levels higher than 10 to 15 % of the ration, particularly when it was used to replace soybean meal. When CM was used at 20-30 % of ration (Koncicki et al., 1991), lesions were seen on liver of birds and their blood serum was found to contain higher level of cholesterol with increased

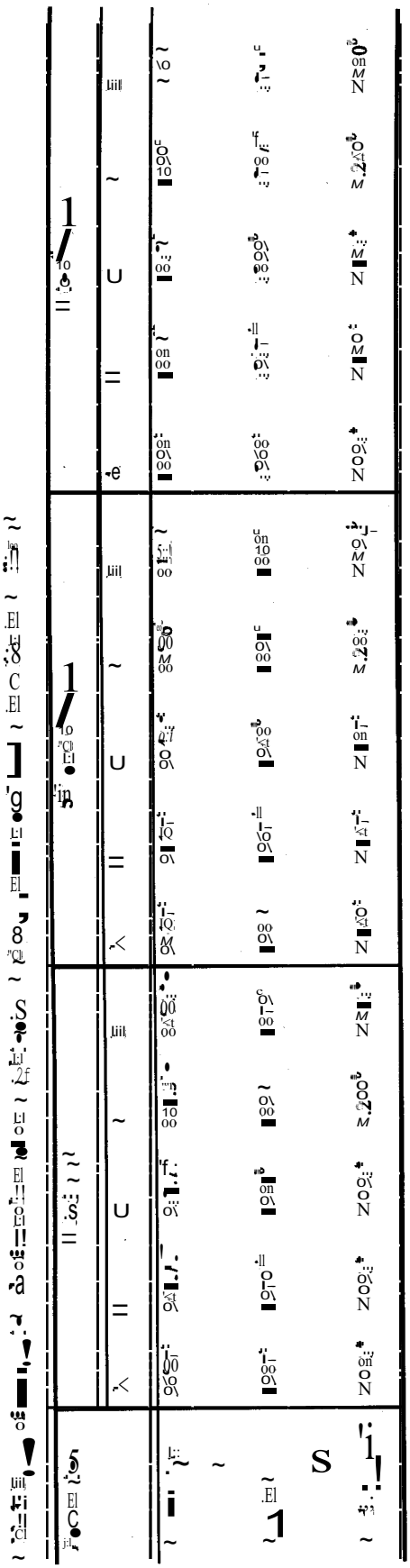
Table 2. Composition of different finisher rations

Ingredients	Rations (% composition)				
	A	B	C	D	E
Corn	51.5	51,5	50	50	49.5
Rice POlishings	11	11	11	10	10
Corn gluten 60%	-	-	1	1	1.5
Soybean meal	20	15	10	5	0
Canola meal	0	5	10	15	20
Fish meal	8	8	8	8	8
Soy oil	4.5	4.5	5	5	5
Molasses	2.	2.5	2.5	2.5	2.5
Limestone	1	1	1	1	1
DCP	1	1	1	1	1
Vitamin mineral premix 1	0.5	0.5	0.5	0.5	0.5
Nutrient composition					
Crude protein (%)	18	18	181	18	18
Metabolizable energy (Kcallkg)	3000	3000	3000	3000	3000
Crude fiber (%)	4	4	4	4	4
Calcium (%)	1	1	1	1	1
Total phosphorus (%)	0.5	0.5	0.5	0.5	0.5
Lysine (%)	1	1	1	1	1
Methionine(%)	0.5	0.5	0.5	0.5	0.5

IFor each kg of the mixed ration: Vitamin (Vit.) A, 1500 I,U; Vit. D3,200 ICU; Vit. E, 10 IU; Vit. K, 0.5 mg; Thiamine, 1.8 mg; Riboflavin, 3.6 mg; Pyridoxine, 3.0 mg; Vit. B12, 0.009 mg; Pantothenic acid, 10 mg; Niacin, 27 mg; Choline, 500 mg; Biotin, 0.15 mg; Folic acid, 0.55 mg; Manganese, 60 mg; Zinc, 40 mg; Copper, 8 mg; Iron, 80 mg; and antioxidant Ethoxyquin (Santoquin®), 125 mg.

alkaline aminotransferase and alkaline phosphatase activity. Summers et al. 0990b) obtained poor performance of chicks fed on CM compared with soybean meal due to higher concentration of sulphur in CM, particularly inorganic sulphur fraction.

Feed Consumption: Average feed consumption by broiler chicks during the starter phase (0-4weeks) was the highest 0987 g) in birds fed ration without CM, while the lowest 0879 g) was observed with 20% CM in the ration. The increase in feed consumption followed the same pattern as was in case of weight gain (Table3). Almost similar pattern of feed consumption was observed during the finishing phase (5-6 weeks). During this phase feed consumption was again minimum 0891 and 1865 g) in birds fed rations containing 15 and 20% CM, respectively. The overall feed consumption during the entire experimental period (O-6weeks) had the same trend as was during 5-6 weeks (Table3). Feed consumption was a bit higher (3968 vs 3937) in birds fed ration without CM as compared to 5% CM, but the difference was non-significant (P>0.05). Birds maintained on ration with 5 and 10% CM had also non-significant difference in feed consumption. However, feed consumption in these two groups was higher as compared to birds fed rations with 15 and 20% CM. Increasing the level of canola meal in broiler rations beyond 10 % had an adverse effect on feed intake similar to those reported by Nassar and Atscott (1985), Leeson et al, (987), Summers et al. 0990a). Since CM contains higher level of sulphur (Summers et al., 1990b) which can interact with calcium causing reduction in feed intake (Summers et al:, 1990a). High fibre content of CM could be another reason of decreased feed intake by birds (Baidoo and Aherene, 1986).



Values within a classification in the same row followed by different letters are significantly different (P<0.05).

Feed-Gain Ratio: At the end of starter phase feed-gain ratio was found to be 2.053, 2.093, 2.093, 2.200, and 2.213 in broiler chicks fed rations containing 0, 5, 10, 15 and 20% CM, respectively (Table1). The best (2.053) feed-gain ratio was obtained in birds fed ration without CM, while the poorest (2.213) was with ration containing 20% CM. Feed-gain ratio of rations containing 5 and 10 % CM was found similar (2.093).'However, the differences in feed-gain ratio were non-significant (P>0.05) for rations containing 0, 5 or 10 % CM. After the completion of fmisher phase, the feed-gain ratio was again found similar to starter phase (TableS). Average feed-gain ratio of broiler chicks from 0-6 weeks was also better (2.093) with ration without CM and the poorest (2.24 and 2.25) with rations containing 15 and 20% CM, respectively. However, the difference between feed-gain ratios of rations containing 0, 5, and 10 % CM was non-significant, but better than other rations (Table 3).

High levels of CM in broiler rations resulted in decreased feed intake and thus less nutrients were available for growth of birds, after the basic supplies for maintenance. Thus the feed-gain ratio was also adversely affected at higher levels of CM in the ration. Similar were the findings of Lee et al. (1991) and Koncicki et al. (1991) when they incorporated CM at levels more than 15 % of the poultry rations. The results of the present study indicate that CM may be used to replace a part of the soybean meal at a level not more than 10 % of the broiler rations.

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