EFFECT OF FEEDING VARIOUS LEVELS OF CANOLA MEAL ON THE PERFORMANCE OF BROILER CHICKS

M. Z. Naseem, S. H. Khan and M. Yousaf*

Poultry Research Institute, Rawalpindi, *University of Agriculture, Faisalabad.

ABSTRACT

A total of 1905 mixed sex day old broiler chickens were reared in environmentally controlled house for 5 weeks to study the production performance of chicks by feeding different levels of canola meal in their diets. The chickens were randomly allocated to five dietary treatment groups (A, B, C, D and E) having three replicates of 127 birds in each group. Groups A, B, C, D and E were fed pelleted diets containing 5, 10, 15, 20 and 25 percent canola meal (with 85% KOH solubility and 36% crude protein), respectively. Experimental diets and fresh water were offered *ad libitum*. Feed intake during 0-35 days of age was reduced ($P< 0.01$) in chickens fed diets with increasing level of canola meal. Weight gain and feed utilization efficiency was better ($P< 0.01$) in chickens fed diet containing 25% canola meal compared to all other treatment groups. Dressed carcass weight and other slaughtering parameters of chickens among all treated groups were found to be similar ($P>0.05$). The price per kilogram weight gain to market age was lowest in diet containing high level of canola meal indicating maximum inclusion of canola meal in broiler diet is economical. It may be suggested that canola meal (with 85% KOH solubility) upto 25% can be incorporated in broiler diets without any adverse effect on production parameters. For optimizing the profits from feeding of canola meal, it may be used upto 25% in the diets of commercial broiler chicks.

Key words: Canola meal, broiler chicks, performance, carcass percentage.

INTRODUCTION

Poultry industry in Pakistan is expanding rapidly to meet the protein demand of the people. At present, per capita availability of poultry meat and eggs in country is 3.5 kg and 52.74 no, respectively (MinFAL, 2003-2004). In order to increase the per capita availability of poultry products, a growth rate of 15 percent per annum is required (Khan, 2003). This growth rate is being largely handicapped due to limited availability of feed resources for poultry feed. The major component of poultry diets are vegetable protein sources, which are available in comparatively greater quantity and can be efficiently incorporated in poultry diets. Among vegetable protein sources the soybean meal is well known due to its best profile of certain essential amino acids (Cromwell, 1999). The use of soybean meal in poultry diets in Pakistan is limited due to its high cost, dependency on import, tariffs and import duties, with no quality assurance and anti-nutritional factors like trypsin inhibitors and presence of complex polysaccharides (Swick, 1999). These reasons led nutritionists to search for some alternate good sources of vegetable proteins. Among vegetable protein meals, canola meal stands second (Nowlin, 1991). Over the past 30 years, rapeseed meal has successfully produced high quality (canola) cultivator with low erucic acid (< 2 percent) in the oil and low glucosinolates (< 30 micro moles / gram) in the meal (Bell and Keith, 1991), which increased the use of the oil in the vegetable oil market, and the meal in animal feeds (Bell, 1982).

Pakistan is facing shortage of the edible oil due to which oil is imported every year. Government has decided to import canola as such for extraction of oil within the country. The byproduct obtained from the processing of canola seed is canola meal, which is being used in the poultry industry. The canola meal is available at low price and being used in a limited quantity in poultry feed, but the inclusion level of canola meal can be increased to reduce the cost of production of the feed. How much inclusion can be best for optimum performance of poultry? The present project is designed to investigate various levels of canola meal and their impact on production performance of broiler chickens.

MATERIALS AND METHODS

Birds and Management: A total of 1905 day-old broiler chickens (Star bro) having 44 g average body weight were randomly divided into 15 separate floor pens (each10x15 feet) comprising of 127 chicks and three pens (replicates) per treatment group following completely randomized design. The experimental house was thoroughly cleaned and disinfected before the arrival of chicks. Experimental chickens were maintained under standard managemental conditions i.e., temperature, relative humidity, light, floor space, ventilation etc., for 35 days in an environmentally controlled poultry house. The brooder temperature was maintained at 95^0F upto 7 days of age and gradually decreased to 75^0F by 21st day of age, after which the chickens were kept at room temperature.

The experimental chicks were fed broiler starter from day old to four weeks and broiler finisher rations in the fifth week *ad-libitum*. They had free access to feed and clean drinking water. A 24-hour's lighting schedule was followed. Uniform recommended vaccination and management practices were adopted for all the birds.

Experimental diets: Five isonitrogenous and isocaloric broiler starter and finisher diets in the form of crumbs and pellets were prepared at Islamabad Poultry Feed Mills as per (NRC, 1994) standards. Canola meal was procured from Kashmir Edible Oil Mills, Sahiwal, for experimental diets. All other ingredients were used from the existing stocks of the Islamabad Feed Mill, which were purchased from the local market after analyzing each consignment randomly at their feed testing laboratory. Five different levels of canola oil meal (containing crude protein 36 % with 85 % KOH solubility) such as 5,10, 15, 20, and 25 % were used in both the broiler starter and finisher diets fed to experimental groups A, B, C, D and E, respectively. Each diet was analyzed for proximate composition, minerals and aflatoxin (AOAC, 2000) at feed testing laboratory of Islamabad Feed Mills. All analyses and determinations were done in triplicate. Experiment lasted for 35 days.

Parameter measured: Body weight gain and feed intake per pen were recorded at weekly intervals. The efficiency of feed utilization was calculated as feed intake per unit body weight gain. Daily mortality (if any) was recorded. Etiology of the dead birds if any was also recorded after conducting the post-mortem examination. At the termination of the experiment, three birds from each replicate were randomly selected and slaughtered and eviscerated to record dressing weight, weight of breast, liver, legs, heart, gizzard, intestinal and abdominal fat. All weights were converted into percentages of the average live weight of the birds slaughtered.

Economics: Costs per kg of the diets were calculated from the composition of the diets (exclusive of feed milling expenses). Economics of the trial was worked out at the completion of the experiment. As all the birds were kept in the same shed, all the managemental costs were same except of that feed. For comparison of the groups, all costs were divided with number of chicks to calculate the cost of one chick and then cost of 1000 chicks for each group was calculated. From the FCR, feed required to raise 1000 broiler chicks of 1.75 kg live weight each was calculated to find out the feed cost for each group.

Statistical analysis: The data obtained through this experiment were analyzed by using analysis of variance technique (Snedecor and Cochran, 1980) in completely randomized design. Least significant difference test was applied for multiple mean comparisons.

RESULTS AND DISCUSSION

Weight gain: The chickens fed diet contained 25% canola meal gained maximum weight followed by chickens fed diets contained 20, 15, 10 and 5 % canola meal, respectively as shown in Table 1. However, the difference was non-significant ($P>0.05$) among the diets. These results are supported by the findings of Lee *et al*. (1991) and Idrees (1998), who reported that canola meal can be used from 15 to 25% without any adverse effect on growth of broiler chickens. However, Franzon *et al*. (1998) reported that weight gain in broiler chickens was reduced with higher concentrations of canola meal (30 to 40 %) due to effects of growth inhibiting factor i.e. glucosinolates (>30 µmol/g) while, in the present study, canola meal contained <30 µmol glucosinolate/g due to better processing techniques.

Feed intake: The broiler chickens ate less ($P<0.01$) diet containing 25% canola meal whereas chickens consumed maximum ($P<0.01$) diets containing 5% canola meal (Table 1). The results of the present study substantiated the findings of Rojas *et al*., (1985) and Leeson *et al*., (1987) who fond that no reduction in feed intake was observed when canola meal was used upto 15%. However, Nassar and Arscott (1986) and Franzon *et al*. (1998) reported that broilers chicken fed less diet from 0 to 21 days and from 36 to 40 days when higher level (up to 40%) of canola meal was used in the diets. They explained that exact reason of decrease in feed intake is not known but it may be due to its taste and high fibre content.

Feed conversion ratio (FCR): The broilers chicken fed diet containing 25% canola meal had better ($P<0.01$) FCR values compared to other diets during 0-35 days of trial (Table 1). The broilers chicken fed diet contained 5% canola meal had the poorest ($P<0.01$) FCR values compared to diet contained 25% canola meal (Table 1). The results are in line with the findings of Gawecki *et al*. (1986), Franzon *et al*. (1998) and Trappett (2001), who reported that layers chicken fed diets containing canola meal had better FCR values with increasing the canola meal level (20 to 40%) in diets. It might be due to better protein quality (increased availability of proteins due to 85 percent KOH solubility) of canola meal that was superior to other vegetable meals, which resulted in the positive effect on feed efficiency.

Mortality: During trial, average mortality of chickens fed diets A, B, C, D and E was 3.8, 5.0, 5.0, 6.0 and 6.5%, respectively. The maximum mortality was noted in chickens fed diet E with 25% canola meal while minimum mortality was found in chickens fed diet A with 5% canola meal. This was consistent with the observation of Campbell and Slominski (1999). The main reason of mortalities was Ascites because of rapid growth, high feed efficiency and large pectoral muscle mass, all require high

oxygen level. Modern chicken has a small lung volume: body weight ratio causing an inability of the respiratory system to respond to the broilers elevated oxygen needs, which can lead to Hypoxia and respiratory acidosis (Kiiskinen, 1985). Acidosis affect cellular membrane integrity and reduce free radical elimination into, transude leakage of blood vessels and accumulation in the abdominal cavity, hence the ascites develops (Proudfoot and Hulan, 1987).

Slaughtering data: Apparently better dressed weight and other slaughtering parameters were found in chickens fed diet containing 25% canola meal compared to those fed diets which contained 5, 10, 15 and 20% canola meal (Table 2). However, the difference was non-significant (P>0.05) among the groups. These findings are supported by those of Kozlowski *et al*., (1989) and Lee *et al*., (1991), who reported that carcass characteristics of broilers chickens were not different with various levels of canola meals.

Economics: The maximum net returns in raising 1000 broilers was noted in chickens fed diet which contained 25% canola meal, followed by chickens fed diets with 20%, 15%, 10% and 5% canola meal, respectively (Table 3). Low price of canola meal and its better feed efficiency with increasing levels in diets are two major factors which resulted in decreased the cost of production. The findings of this study are in line with Nascimento *et al*., (1998), who reported that average diet cost decreased with increasing dietary canola meal and also found the largest gross margin (US$ / head) with 30% canola meal in diet.

The findings of this experiment suggested that canola meal (with 85% KOH solubility) upto 25% can be incorporated in broiler starter and finisher diets without any adverse effect on production parameters.

Table 1: Performance of broilers fed diets containing different levels of canola meal

Parameters	Diets				
	A	B	C	D	E
Weight gain (g/chick)	1734.70	1736.76	1745.15	1750.18	1787.94
Feed intake (g/chick)	3172.27^{b}	3136.22^{b}	3063.46^{ab}	3057.82^{ab}	2981.11^{a}
Feed conversion ratio	1.82^{b}	1.81^{b}	1.77^{ab}	1.75^{ab}	1.67^{a}

A: 5% CM, B: 10% CM, C:15% CM, D: 20% CM and E: 25% CM
Means with different letters differ significantly (P < 0.01) in a row.

Table 2: Slaughtering parameters of chickens fed diets of different levels of canola meal

Parameters	Diets*				
	A	B	C	D	E
Average live weight (gm)	1728.66	1731.33	1740.10	1744.00	1782.66
Dressed Weight %	58.15	58.47	59.44	59.788	60.11
Gizzard weight %	1.52	1.84	1.42	1.70	1.74
Heart weight %	0.67	0.69	0.76	0.66	1.09
Liver weight %	2.41	2.60	2.68	2.41	2.68
Intestinal length (cm)	184.66	184.66	188.66	172.66	172.00
Intestinal weight %	5.84	5.70	5.59	4.88	4.44
Abdominal Fat %	2.36	2.26	2.12	2.02	1.64
Shank length (cm)	7.56	7.19	7.38	7.41	7.08
Breast weight %	27.77	27.97	28.52	28.73	29.27
Leg weight %	23.95	24.22	24.43	24.67	25.40

*A: 5% CM, B: 10% CM, C:15% CM, D: 20% CM and E: 25% CM

Table 3: Economic analysis for raising thousand broiler chicks of 1.75 kg weight each fed on experimental diets (0-5 Weeks)

Treatments	Feed: gain ratio	Feed bags (50 kg) required	Expenditure* (Rs.)	Sale **amount (Rs.)	Profit (Rs.)	Price per kg gain (Rs.)
A	1.82	63.70	61465.00	77000.00	15535.00	35.12
B	1.81	63.35	61272.50	77000.00	15727.50	35.01
C	1.77	61.95	60502.50	77000.00	16497.50	34.57
D	1.75	61.60	60310.00	77000.00	16690.00	34.46
E	1.67	58.45	58577.50	77000.00	18422.50	33.47

*Feed (Rs/bag)= 550.00; Chick (Rs./No.)= 12.00; Overhead (Rs/bird)= Vaccine(2.47)+ Medicine(1.00) + Brooding (2.22) + Labour (3.00)+ Electricity (2.52)+ Litter (1.11)+Disinfection (1.00) +Misc.(1.11)= Rs.26.43
** Sale of chicks (Rs/kg) =44.00

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