

Performance of *Gallus domesticus* Fed with Different Levels of Canola and Sunflower Meal

Azhar Saeed, Sibtain Afzal
University of Arid Agriculture, Rawalpindi, Pakistan

Abstract: Soybean meal is considered to be the most desirable protein source for poultry on account of its high biological value. Various oilseed meals are available in abundant quantity in the country, which can replace soybean meal. The project was designed with the aim and objective to replace soybean meal with canola and sunflower meal in *Gallus domesticus* rations. For this purpose, four hundred and twenty *Gallus domesticus* chicks were randomly divided into five groups (A, B, C, D, and E). Each having three replicates of 28 chicks each. Five different experimental rations were prepared so as to replace soybean meal with canola and sunflower meal. These rations were assigned to respective groups. The criteria of response were chick body weight, feed consumption and feed conversion ratio. Maximum weight gain was observed in ration where soybean meal was used as vegetable protein source at level of 15%. The feed conversion ratio was adversely affected by substitution of soybean meal with canola and sunflower meal. To minimize dependence on imported soybean, 50% of it can be safely substituted with locally available oil seed meals.

Key words: Performance, *Gallus domesticus*, canola, sunflower, meal

Introduction

Soybean meal is considered as the main source of plant protein in poultry diets. In Pakistan, there is not a sufficient amount of soybean meal for feeding poultry. The local cultivation of soybean is very limited. The production of major oilseed meals in Pakistan during the year 1998-99 shows that only 1 to 25 thousands tons soybean was produced against an incomparable figure of 87.5 and 299 thousand tons of canola and sunflower respectively during the same year (Economic Survey of Pakistan, 1998-99).

Canola has 40% protein and its protein has been found very high quality (Moshtagi-Nia and Ingalls 1995; Bell, 1982). It is also rich in certain amino acids such as lysine, histidine, threonine, isoleucine and leucine even with higher percentage of methionine as compared to soybean meal (Anonymous, 1996). The essential amino acids in canola meal are more available as those in soybean meal (Barbour and Sim, 1991). Canola meal thus can be used as a good source of high quality protein for various classes of poultry (Clandinin and Robblee, 1983).

Sunflower (*Helianthus annuus* L.) is ranked second to soybean in the worldwide vegetable oil production. In recent years there is an increased interest in cultivation of sunflower in Pakistan.

Sunflower is the byproduct obtained after the extraction of oil from decorticated sunflower meal. Being good source of vegetable protein (40% CP) the sunflower meal can be developed as a good source of vegetable protein supplement for different poultry rations.

Keeping in view the nutritional value of sunflower meal and canola meal, soybean meal can be replaced with locally available canola and

sunflower meal. It is expected to save a huge foreign exchange worth 12-25 million U.S. dollars in the form of import of soybean meal from India (The gazette of Pakistan extra July 28, 1998). The present study was therefore, planned to achieve the following objectives:

To determine the optimum level of substitution of soybean meal with canola meal and sunflower meal.

- To evaluate the performance of birds fed different levels of canola and sunflower meal.

Materials and Methods

The study was conducted in nutrition section, poultry research institute, Rawalpindi. Four hundred and twenty chicks were divided randomly into five groups, (A, B, C, D, E). Each having three replicates of 28 birds each. Five different experimental rations were prepared so as to replace soybean meal with canola and sunflower meal (Table 1). These rations were assigned to respective groups. Feed and water was offered to the broilers ad libitum. Continuous light was provided for 24 hours. The birds were reared for six weeks in different pans in experimental house.

The criteria of response were chick body weight, feed consumption, feed conversion. The data thus obtained were subjected to statistical analysis using the technique of analysis of variance (Steel and Torrie, 1981).

Results

The results of biological trials conducted to assess the effect of substitution of soybean meal

Table 1: Composition of Experimental Rations (%)

Ingredients	A	B	C	D	E
Maize	31.8	32.5	40.3	32.5	39
Rice Broken	8	8	8	8	8
Wheat	15	15	15	15	15
Rice Polishing	10	10	0.7	10	0
Cotton Seed Meal	5	5	5	5	5
Coron Gulten Meal-60%	2.5	2.5	2.5	2.5	2.5
Corn Gluten Meal-30%	2	1.2	2	2	2
Canola Meal	0	7.5	15	3.75	0
Guar Meal	0	0	1.6	0.1	2.5
Sunflower Meal	0	0	0	3.75	15
Soybean Meal	15	7.5	0	7.5	0
Fish Meal	4.4	5.9	6	6	6
Molasses	3.8	3	2	3	2
Bone Meal	0.6	0.3	0.3	0.3	1.4
Marble Powder	1.2	1.1	1	1.1	0.5
Salt	0.2	0.02	0.04	0.07	0.11
Lysine	0.08	0.08	0.15	0.11	0.25
Methionine	0.14	0.12	0.1	0.12	0.1
Vit. Min. Premix	0.35	0.35	0.35	0.35	0.35
Oil	0	0	0	0	0.32
Met energy (K cal/kg)	2840	2840	2840	2840	2840
Crude protein (%)	20	20	20	20	20
Fat (%)	3.4	3.7	3.35	3.7	3.5
Fibre (%)	4.5	4.8	4.5	4.95	5.13
Calcium (%)	0.9	0.9	0.9	0.9	0.9
Phosphorus (%)	0.3	0.3	0.3	0.3	0.44
Lysine (%)	1	1	1	1	1
Methionine (%)	0.49	0.49	0.49	0.49	0.94

Table 2: Effect of Substitution of Soybean Meal with Canola and Sunflower Meal on the Performance of *Gallus domesticus*

Groups	Av. Initial weight	Av. final weight	Av. weight gain	Av. feed consumption	Feed conversion ratio
A	0.050	1.391	1.341	3.168	2.462
B	0.050	1.384	1.334	3.196	2.397
C	0.050	1.362	1.312	3.264	2.488
D	0.051	1.376	1.326	3.270	2.467
E	0.051	1.299	1.249	3.312	2.654

with the canola and sunflower meal are given in Table 2. The average weight gains of chicks fed rations A, B, C, D, and E was 1.341, 1.334, 1.312, 1.326 and 1.249 Kg respectively. The maximum weight gain was observed in ration A, where soybean meal was used as vegetable protein source at the level of 15%. The weight gain was reduced when soybean meal was replaced with canola and sunflower meal.

The averages feed consumption of the chicks fed ration A, B, C, D, and E at the end of experiment was 3.168, 3.196, 3.264, 3.270 and 3.312 Kg respectively. The feed consumption was higher in the ration where sunflower meal was incorporated followed by canola meal. It was observed that feed consumption was lowest in ration A where soybean meal was used at the

rate of 15%. The feed consumption of chicks varied from A, B, C, D and E 2.462, 2.397, 2.488, 2.467 and 2.654 respectively. The best-feed conversion ratio was recorded in-group A while poor feed consumption ratio of 2.654 was found in-group E where sunflower meal was used to replace soybean meal. The feed conversion ratio was adversely affected by the substitution of soybean meal with canola as well as sunflower meal.

Discussion

The statistical analysis indicated that there was non-significant difference in the average weight gain of the chicks under the substitution of soybean meal with canola or sunflower meal.

Lee and Lee (1982) observed similar findings and reported non-significant difference in weight gain when soybean meal was replaced with sunflower meal. Similar findings were also recorded by Borcea *et al.*, (1996), and Ijaz (1997). The results were contrary to the findings of Aquilera *et al.*, (1998) who observed growth depression under the substitution of soybean meal with sunflower meal. As far as feed consumption is concerned, the statistical analysis revealed that it increased respectively from group A to E. Feed consumption of group A was significantly adverse ($P < 0.05$) and it was significantly lower than group D and E.

It showed that feed consumption was high when soybean meal was replaced with sunflower meal. It might be due to certain nutritional deficiency, particularly the essential amino acids in sunflower meal. The results were different from the findings of Ijaz (1997) who reported that there was no effect on feed conversion ratio of the chicks when canola meal was incorporated in poultry ration. The feed conversion ratio of chicks fed ration A, B, C, D, and E also showed a significant difference. The use of soybean meal significantly ($P < 0.05$) improved feed conversion ratio. The use of canola meal also affected feed conversion ratio adversely. However canola meal successfully replaced 15% soybean meal as the feed conversion ratio in-group A and B was almost comparable. The use of sunflower meal significantly depressed the feed conversion ratio. It could be attributed to poor nutritional value, high fiber content and mycotoxin effect of sunflower meal. The results were contrary to the findings of Lee and Lee (1992) and Mohme *et al.* (1997) who found non-significant difference in feed conversion ratio. The results were in agreement with Aquilera *et al.* (1989); Musharaf (1999) and Lee and Sim (1996).

The project was conducted to study the effect of substitution of soybean meal with canola and sunflower meal on the performance of broilers. Maximum weight gain was observed in rations where soybean meal was used as vegetable protein source at level of 15%, which could be attributed to better amino acid profit of soybean meal. The feed conversion ratio was adversely affected by substitution of soybean meal with canola as well as sunflower meal. The use of soybean meal significantly ($P > 0.05$) improved feed conversion ratio. However to minimize dependence on imported soybean meal, 50% of it can be safely substituted with locally available oil seed meals.

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