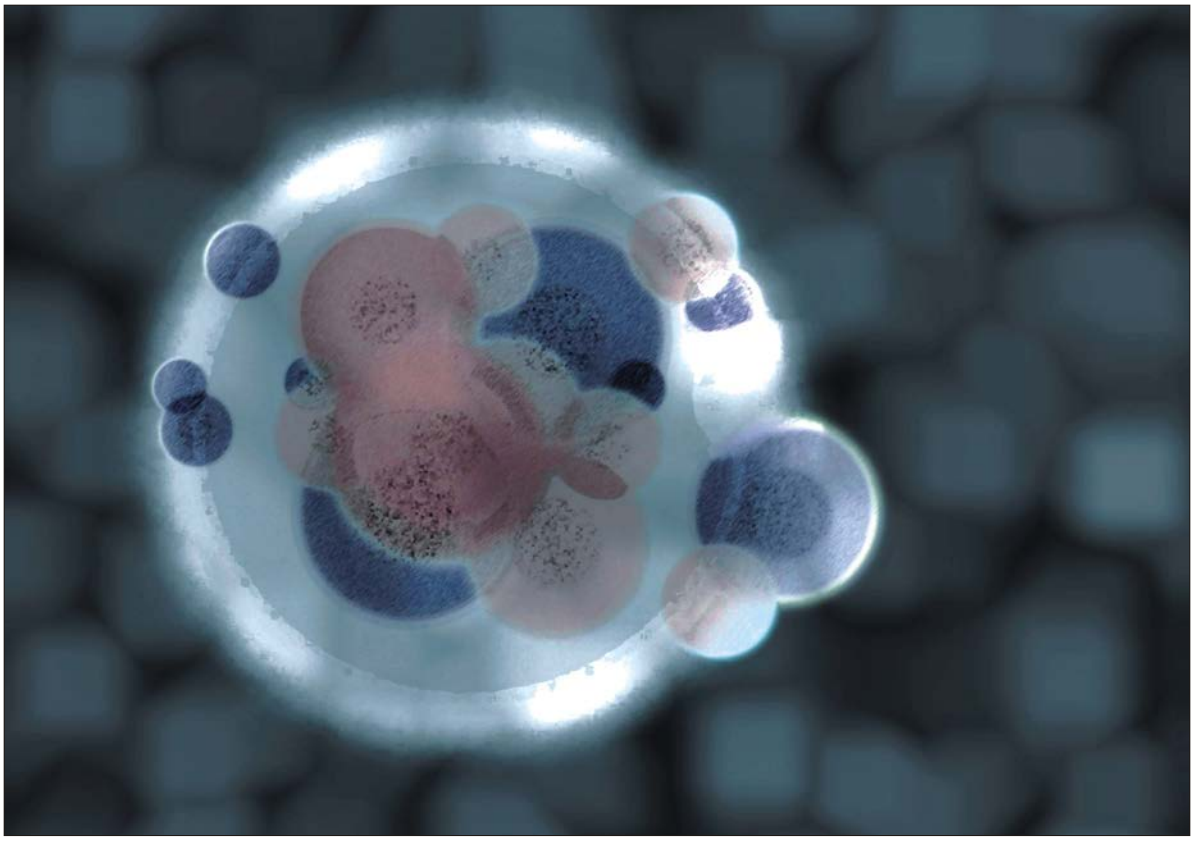

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Effect of Substitution of Soybean Meal With Sunflower and Canola Meal on Dressing Quality of Broilers

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Abstract: The study was designed to evolve certain ways and means for effective substitution of Soybean meal with locally available sunflower and canola meals. The effect of substitution was proposed in terms of carcase quality and weight of different vital organs. Carcase yield was significantly lesser when soybean meal was substituted with sunflower meal. Dressing percentage was maximum with soybean meal which was lesser when canola meal and sunflower meal substituted SBM. However non-significant difference was observed in parts of carcase. The liver was enlarged with sunflower meal where as in case of gizzard and heart weight non-significant difference was observed among different groups.

Key words: Soybean, canola meal, sunflower meal, carcase weight, dressing quality

Introduction

Soybean meal is a superior form of protein (44 to 49%) source for poultry. Its biological value is universally accepted due to excellent source of essential amino acids that is lysine, tryptophane and threonine, although deficient in methionine (NRC, 1994). It can be incorporated in poultry feeds as high as sole source of protein because when compared with other sources of protein that is sunflower meal, canola meal, rape seed meal, cotton seed meal etc., it contains minimum adulterants and other antinutritional toxic factors.

Soybean meal (SBM) is the largest produced oil seed meal in the world with estimated production of 80.2 million metric ton per annum. The largest producers are USA, followed by Thailand, Brazil, Argentina, China and India. (Swick, 1995). At present soybean meal is being imported mainly from India and its import figures vary from 43 million kg to 125 million kg per annum since 1995 to 96. The imported soybean meal has contributed a lot towards improvement of quality of finished poultry feed resulting in better productive performance. But the import of SBM involved huge foreign exchange worth rupees 12 to 25 million U.S. dollars (The Gazette of Pakistan Extra July 28, 1998).

The local cultivation of SBM is very limited. The production of major oil seed meals in Pakistan during the year 1998 to 99 shows that only 1 to 25 thousand tons soybean was produced against an uncompareable figure of 87.5 and 299 thousand tons for canola and sunflower respectively during the same financial year (Economic Survey of Pakistan 1998 to 1999). Thus there is sufficient availability of canola as well as sunflower meal along with other oil seed meals. These meals have also been reported to contain certain growth inhibitory toxic and adulterant factors along with specific amino acid deficiencies. The results significant quality variations depending upon their variety, oil extraction, dehulling and other processing techniques.

The nutritional assessment of locally available oil seed meals necessitates to improve their utilization for poultry feeding so as to save huge foreign exchange in the form of import of soybean meal from India. For the purpose nutritional composition, level of incorporation in poultry feed and its effect on poultry needs proper assessment. Keeping in view the present study was designed to study the effect of levels of substitution of soybean meal with indigenous oil seed meals that is sunflower meal and canola meal. The effect of substitution was studied on the dressing quality of finished broilers in terms of dressing percentage and weight of different body organs.

Materials and Methods

The study was conducted at Nutrition Section, Poultry Research Institute Rawalpindi. Four hundred and twenty broiler chicks were randomly divided into five groups each having 3 replicates of 28 chicks each. Five different experimental rations A, B, C, D, E were prepared for five groups to replace soybean meal with sunflower and canola meal. The compositions of rations is given in Table 1.

Table 1: Composition of experimental rations (%)

Ingredients	R-A	R-B	R-C	R-D	R-E
Maize	31.8	32.5	40.3	32.5	39.0
Rice Broken	8.0	8.0	8.0	8.0	8.0
Wheat	15.0	15.0	15	15.0	15.0
Rice Polishing	10.0	10.0	0.7	10.0	0.0
Cotton Seed Meal	5.0	5.0	5	5.0	5.0
Corn Gluten Meal-60%	2.5	2.5	2.5	2.5	2.5
Corn Gluten Meal-30%	2.0	1.2	2	2.0	2.0
Canola Meal	0.0	7.5	15	3.75	0.0
Guar Meal	0.0	0.0	16	0.1	2.5
Sunflower Meal	0.0	0.0	0	3.75	15.0
Soybean Meal	15.0	7.5	0	7.5	0.0
Fish Meal	4.4	5.9	6	6.0	6.0
Molasses	3.8	3.0	2	3.0	2.0
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	0.0	0.0	0	0.0	0.32
Met. Energy	2840	2840	2840	2840	2840
Crude protein %	20.0	2.0	2.0	2.0	20.0
Fat (%)	3.4	3.7	3.35	3.7	3.5
Fiber (%)	4.5	4.8	4.5	4.95	5.13
Calcium(%)	0.9	0.9	0.9	0.9	0.9
Phosph (%)	0.3	0.3	0.3	0.3	0.3
Lysine (%)	1.0	1.0	1.0	1.0	1.0
Methionine (%)	0.49	0.49	0.49	0.49	0.49

Table 2: Effect of substitution of SBM with SFM and CM on dressing % and Wt of parts of carcase

Gps.	Av. Live Wt	Carcase Wt.	Dressing %age	Av. Wt/Kg Carcase				
				Neck	Breast	Legs	Wings	Back
A	1.166	0.857	57.28	0.060	0.296	0.334	0.099	0.179
B	1.512	0.827	54.71	0.059	0.301	0.355	0.11	0.186
C	1.490	0.788	52.91	0.066	0.300	0.348	0.10	0.189
D	1.430	0.744	52.04	0.063	0.314	0.342	0.099	0.183
E	1.346	0.690	51.35	0.062	0.298	0.337	0.10	0.196

Group A was fed on ration A containing 15% soybean meal, 50% of it (7.5%) was replaced by canola meal in group B. Group C was given 15% of Canola meal only while in group D 50% of soybean meal (7.5%) was replaced by sunflower and canola meal (each 3.75%). Group E was given ration containing 15% sunflower meal only.

All chicks were vaccinated against viral diseases. These experimental birds were fed to allocated rations ad-libitum while fresh and clean water was provided round the clock. Continuous light was also provided 24 hours. The chicks were reared in different pans in experimental house for 6 weeks.

At the end of experimental trial three birds from each replicate were selected randomly and slaughtered to study the carcass weight and weight of different edible parts i.e. legs, wings, breast, back, neck and weight of different internal organs i.e. heart, liver and gizzard.

The data thus collected was subjected to statistical analysis using analysis of variance technique of Snedecor and Cochran (1967). The comparison of mean differences was made by multiple range test (L.S.D) following Steel and Torrie (1981).

Results

The results of experiment are given in Table 2 and 3. The average carcase weight of chicks fed rations A, B, C, D and E were 0.857, 0.827, 0.788, 0.744 and 0.690 Kg respectively. The maximum carcase weight was observed in ration A which gradually decreased in ration B and C when soybean meal was replaced with Canola meal at 50 and 100% respectively. The minimum carcase weight was observed in ration D and E where sunflower meal was in corporate in poultry rations.

Table 3: Effect of substitution of sbm with sfm and cm on wt of internal organs

Groups	Wt of internal organs/Kg Carcase		
	Liver	Gizzard	Heart
A	0.046	0.037	0.008
B	0.051	0.043	0.010
C	0.052	0.040	0.008
D	0.063	0.031	0.007
E	0.064	0.041	0.009

The dressing percentage of Chicks followed the same trend as was observed in case of carcase weight. The dressing %age of chicks fed with ration A, B, C, D and E was 57.28, 54.72, 52.04 and 51.35% respectively. The maximum dressing Percentage was achieved in ration A followed by ration B, C, D and E. The minimum dressing %age was recorded in ration E, when sunflower meal was used in poultry.

The average weight of parts of carcase per kg carcase weight were also recorded. The chicks fed with ration A, B, C, D and E had the weight of necks as 0.06, 0.059, 0.066, 0.063 and 0.062 Kg respectively. The weight of breast was 0.296, .301, 0.300, 0.314 and 0.298 Kg respectively. The weight of wings was 0.099, 0.11, 0.10, 0.099 and 0.10 kg respectively. The weight of back was 0.179, 0.186, 0.189, 0.183 and 0.196 Kg receptively. No wide variation in weight of neck, Breast, legs, wings and back was observed during the experiment.

The average weight of internal organs Per Kg carcase weight was also recovered so as to observe any effect of experimental rations on weight of liver, gizzard and heart. The groups A, B, C, D and E showed weight of liver as 0.046, 0.051, 0.052, 0.063 and 0.064 kg per kg carcasse weight respectively. The weight of gizzard was observed as 0.037, 0.043, 0.040, 0.031 and 0.041 kg per kg carcase weight respectively, while weight of heart per kg carcase weight of respective groups was recorded as 0.008, 0.01, 0.008, 0.007 and 0.009 kg respectively. There was increase in weight of liver in group D and E, while the gizzard and heart showed no variation.

Discussion

The statistical analysis of carcase weight showed a significant ($p<0.05$) difference in carcase weight of different groups. The carcase weights of group A and Group B were significantly ($p<0.05$) higher than group C, D and E. The lowest carcase weight was observed in group E. It indicated that soybean meal had significant contribution towards carcase weight followed by Canola meal and sunflower meal. It can be attributed to better amino acid Profile or biological value of soybean meal as compared with other oil seed meals. The results also indicated that sunflower meal significantly depressed carcase weight. It could be due to comparative poor biological value of protein of sunflower meal, high crude fiber content or high susceptibility of sunflower meal for mycotoxin contamination, which subsequently depressed the growth performance of group E.

The dressing %age of group A was significantly higher than group C, D and E Group B was significantly higher than group E. The results were almost similar to the carcase weight. The same results can be attributed to factors described in carcase weight of chicks.

The statistical data of parts of carcase i.e. neck, breast, legs, wings and back showed non significant difference. The same results were produced by Abbas *et al.* (1988) while substituting soybean meal with sunflower meal with or without multienzyme. It means that increase or decrease in whole carcase was uniform irrespective of the nature of body parts.

The average weight of liver per kg carcase weight also showed significant difference. The liver weights of group D and E were significantly higher then group A, B and C. It can be attributed to the presence of certain toxic factors in sunflower e.g. mycotoxins which had the hepato toxic effect resulting in enlargement of liver. The average weight

of gizzard and heart was found non significant.

The results were different from the observations of Wetscherek *et al.* (1993) who observed non significant difference in carcase composition while comparing soybean meal and canola meal.

El-Sherif *et al.* (1995) while replacing soybean meal with sunflower meal also observed the significant difference in the weight of giblet (internal Organs). In contrast to the present findings Do Nascimento *et al.* (1998) observed decrease in carcase and breast meat yield at different levels of canola meal.

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