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Effect of Supplementation of Ration with Neem Seed Cake on the Growth of Broilers

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Abstract: In order to ascertain the effect of various levels of neem seed cake (NSC) in ration on the growth, carcass and feed efficiency of broilers, the study was undertaken during August-September, 2006 at Poultry Experimental Station. Birds were divided into four groups: group A was kept as control (without NSC) and broilers in groups B, C and D were fed on ration with NSC at the level of 0.5, 1.0 and 1.5% /kg of feed, respectively. The results showed that all the parameters were significantly ($P<0.01$) different due to inclusion of NSC in broiler ration. The lowest feed (3779.8 g/bird) was consumed by the group C and highest (3838g/bird) by the group A. Better weight gain (1940g/bird), 1.94 FCR, 61.50 dressing % and Rs.30.32 net return was recorded in group C. The lowest morbidity, mortality and parasitic count were also noted in group C whereas non-significant results were obtained from edible parts. It was concluded that NSC has positive effects on broiler growth and its overall health. 1.0%/kg level of NSC produced optimally positive results and considered as cost effective.

Key words: Broilers · Supplementation · Growth · Neem Seed Cake

INTRODUCTION

Poultry is major source in world food production with the highest proportion of manufactured feed of all species. The dynamic growth and success of poultry industry is based on a high degree of vertical integration, improved production efficiency standards (e.g., increased market values, reduced days-to market and improved feed conversion) and greatly automated processing combined with successful marketing (e.g. low fat, high-protein convenience products) and changed consumer habits e.g. health considerations [1]. In Pakistan, poultry is the second largest industry of the country after textiles and its production enjoyed a tremendous scope on commercial scale during past decade. The total poultry population of Pakistan is 63198 million, out of which Sindh province shares 11549 million birds i.e. 18.7 percent of the total poultry population in the country. The egg production in the country is 8529 million and poultry meat 416000 tonnes [2]. Feed is the basic unit of poultry production and broiler is the most efficient convert of inedible proteins into edible. Broiler converts 2.5 1bs of feed into one 1b of chicken and 2.46 1bs of feed into one 1b of egg. Chicken food consist of cereals (Coarse grains), plant protein source, animal protein source, agro-based industrial by-products, vitamins, antibiotics, maize sorghum, broken rice, fish meal, meat meal, blood meal, decorticated cotton seed meal, til cake, toria cake, guar meal, ground-nut cake, sunflower cake, soybean meal and maize gluten meal, feather meal and minerals [3]. The economic analysis of poultry production states that the feed is a major expense in poultry production amounting to about 70 to 75 percent of the total cost. Hence, the most important factor in poultry production is the ratio between the feed and egg/meat. Different feeds give different results in terms of growth and egg production. A broiler chick grown to 6 - 8 weeks of age may require 3 - 4 kgs of feed per kilogram gain. One of the main factors involved in achieving efficient production is the quality of ration given to the birds. Ration should suit the objective like using laying ration for egg production, broiler ration for the production of broilers [4]. The studies have

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indicated good effects of feeding neem cake to broilers [5]. Considering the importance of alternate sources of vegetable protein in production of broiler, the present investigation has been planned to examine the effect of various levels of neem seed cake in broiler ration on the growth, carcass and feed efficiency of broilers.

MATERIALS AND METHODS

In order to ascertain the effect of various levels of neem seed cake in broiler ration on the growth, carcass and feed efficiency of broilers during August-September, 2006 at the Poultry Experiment Station. Two hundred (200) day-old Olympia broiler chicks were purchased and individually weighed initially and divided into A, B, C and D groups, having 50 chicks in each group. Broilers in all the groups were fed ration included various levels of neem seed cake. Groups A (Control), B, C and D were fed on ration with neem seed cake at the level of 0, 0.5, 1.0 and 1.5%/kg respectively.

Feed was given *ad Libitum* and the feed refused was subtracted from the feed offered to record daily feed consumption. Similar technique was used for water intake. For first four weeks, a starter ration was offered and for later two months a finisher ration was given to the broiler. The broiler chicks were housed in a shed where dried wooden dust used as litter. Chick-paper (Horka-200) was used to cover the litter and also to provide comfort to chicks during first week of the brooding. Temperature ranged from 90 to 95°F during first week and it was reduced by 5°F each week and maintained at 70°F as house temperature. The humidity was maintained around 60 percent and light was given 24 hours. Broilers were individually weighed each week by using electrical balance. Temperature and humidity was recorded by means of hygrometer and thermometer. Strict monitoring of the flock was ensured against disease, problems and the chicks were vaccinated properly. The chicks were subjected to analysis for the following parameters such as, Initial weight of chicks (g), Live body weight each week (g), Feed intake (g/bird), Water intake (ml/bird), Feed efficiency (FCR), Examination of faeces for parasites. At completion of experimental period of 6 weeks, the 10 broilers from each group were selected at random and slaughtered to record observations on the following parameters such as, Live weight, Carcass weight, Dressing %age, Weight of giblets (g/bird) and economics.

The data was collected and subjected to analysis of variance to see the overall significance of differences, while LSD was applied to see the significance of differences within treatments. MSTATC Computer Software was used to perform statistical analysis following [6].

RESULTS

Since medicinal plants are of multiple use and in a complex forms for cure and health maintenance of human beings and it has been reported that neem *(Azadirachta indica)* has been found very useful when fed in certain farms to animals. The study was conducted to ascertain the effect of various levels of neem seed cake in ration on the growth, carcass and feed efficiency of broilers. The results are presented in Tables 1-8.

Feed Consumption: Feed is the basic unit in broiler production and it dominates to influence the efficiency of a ration fed to broiler. It was noted that average feed consumption was significantly highest 3838 g in group A, where the birds were given no neem seed cake (Control). The birds in groups B, C and D, consumed feed quantity of 3805.96, 3779.82 g and 3795.32. This indicated that the lowest feed quantity (3779.82 g) was consumed by the broilers of group C (Table 1). However, statistically the differences in feed consumption of different broiler groups were significant ($P<0.05$).

The results of Table 2 showed that broiler in group A consumed high feed quantity and it was decreased significantly in group C when birds were fed to 1% level of neem seed cake.

Water Intake: Water is essential for life and its intake. Average weekly water intake of the broilers (Table 2) in group A was 9233.62 ml, where the birds were given no neem seed cake. The birds in groups B, C and D, consumed 9327.17, 8726.28 and 9296.65 ml, respectively.

Table 1: Average feed consumption (g/bird) of broilers

	Groups			
Weeks	A	B	C	D
1	135.33	126.00	124.00	116.60
2	306.56	326.30	313.00	298.90
3	440.00	410.00	458.00	438.16
4	663.33	643.53	711.00	664.66
5	1095.33	1088.33	1029.16	1044.33
6	1198.13	1204.33	1144.66	1183.13
Total	3838.00	3805.96	3779.82	3795.32

Note: P-value = 0.0243*, LSD = 41.350

Table 2: Average water intake (ml/bird) of broilers

	Groups			
Weeks	A	B	C	D
1	248	250	245	240
2	635.33	775.33	711.23	772.06
3	1050.00	1145.66	1016.46	1178.00
4	1776.60	1466.66	1303.33	1413.33
5	3050.33	3443.33	3269.93	3333.33
6	2684.33	2459.33	2415.33	2563.00
Total	9233.62	9327.17	8746.28	9296.65

Note: P-value = 0.0031* LSD = 102.45

Table 3: Weight gain (g/bird) of broilers

Week	A	B	C	D
WO	41.0	41.0	40.0	42.0
W1	147.9	145.0	148.0	142.0
W2	386.0	360.0	355.0	340.0
W3	710.0	658.0	662.0	654.0
W4	1179.0	986.0	1040.0	923.0
W5	1545.0	1510.0	1526.0	1490.0
W6	1800.0	1825.0	1940.0	1829.0

Note: P-value = 0.0203, LSD = 69.31

Table 4: Average feed conversion ratio of broilers

Groups	Feed consumed (g/bird)	Final weight (g/bird)	FCR
A	3838.0	1800.0	2.13
B	3797.9	1825.0	2.08
C	3779.8	1940.0	1.94
D	3795.3	1829.0	2.06

Note: Group P = 0.002, LSD = 0.0998

Table 5: Average dressing percentage of broilers

Groups	Live body weight (kg/bird)	Dressed weight (kg/bird)	Dressing percentage
A	1800.0	1055.0	58.6
B	1825.0	1085.0	59.4
C	1940.0	1200.0	61.5
D	1829.0	1080.0	59.0

Note: P-value = 0.0043, LSD = 0.8318

Table 6: Average Liver, Heart and Gizzard weight (g/bird) of broilers

Groups	Liver	Heart	Gizzard
A	50.3	14.1	32.1
B	52.2	15.4	33.4
C	54.1	16.5	34.0
D	48.5	13.3	31.3

Note:
P-value = 0.01 ** LSD = 3.653

Table 7: Average morbidity, mortality percentage and parasitic count of broilers

Groups	Morbidity (%)	Mortality (%)	Parasitic count (%)
A	20.0	12.0	18.0
B	15.0	8.0	15.0
C	12.0	4.0	10.0
D	25.0	15.0	25.0

Note: P-value = 0.0029, 0.001 0.0036
LSD = 5.321 4.041 7.621

It is obvious from the results that the lowest water quantity (8746.28 ml) was consumed by the broilers of group C which fed on ration containing 1% level of neem seed cake. The differences in water consumption of different broiler groups were significant (P<0.01) statistically.

Weight Gain: In an experiment on broiler production related aspect weight gain posses prime importance. The results on average weight gain as affected by different levels of neem seed cake are reported in (Table 3). The weight gain was remarkably (P<0.05) higher (1940.0 g/bird) in broiler of group C, fed on ration containing neem seed cake at 1%. However, the weight gain was 1800, 1825 and 1829 g/bird in group A, B and D when birds were fed on ration containing 0, 0.5 and 1.5% neem seed cake, respectively. The difference were significant (P<0.05) statistically between groups.

Feed Conversion Ratio: The results regarding the average feed conversion ratio of the broilers (Table 4) were statistically significant (P<0.01). The results showed that average feed conversion ratio was significantly better (1.94) in broilers of group C. The birds in groups B and D, resulting feed conversion ratio of 2.08 and 2.06, respectively. The poorest feed efficiency of 2.13 was recorded from the birds group A. (Control).

Dressing Weight: Dressing percentage is considered as a quality parameter in broiler production. The results pertaining the average dressing percentage of the broilers (Table 5) were statistically significant (P<0.01). The results revealed that average dressing percentage was significantly higher (61.5) in broilers of group C. The broilers in group B and D, recorded dressing percentage of 59.4 and 59.0 percent, respectively. The lowest dressing percentage of 58.6 percent was recorded from group A.

Weight of Edible Parts

Liver Weight (g/bird): The results regarding the average liver, heart and gizzard weight of the broilers (Table 6) were significant (P<0.01). It can be seen that average liver weight was (50.3 g) in broilers of group A (control), followed by average liver weight of 52.2 g and 54.1 g, recorded in groups B and C and 48.5 g was recorded birds of group D.

Heart Weight: The average heart weight was (14.1 g) in broilers of group A (control), followed by average heart weight of 15.4 g and 16.5 g, observed in broilers of groups B and C then 13.3 g was recorded in birds of group D.

Table 8: Economics of broilers

S.No.	Economic Parameter	Groups A	B	C	D
1	Cost of day old chicks (Rs/birds)	32.5	32.5	32.5	32.5
2	Cost of feed per bird (Rs.)	49.90	49.46	49.12	49.33
3	Cost of Neem seed cake (Rs.)	0	0.38	0.75	1.13
4	Miscellaneous expenditure (Rs.)	15.00	15.00	15.00	15.00
5	Total cost of Production (Rs.) (1+2+3+4)	87.40	87.34	87.37	87.96
6	Average weight of birds at 42 days (kg)	1.80	1.82	1.94	1.82
7	Income on sale (Rs) (6x7)	81	81	81	81
8	Total income (Rs)	145.80	147.42	157.14	147.42
9	Net profit (Rs/birds) (8-5)	58.4	60.08	69.77	59.46

Gizzard Weight: The average gizzard weight highest (32.1 g) in broilers of group A (Control), followed by average gizzard weight of 33.4 g and 34.0 g, observed in broilers of groups B and C and 31.3 g was recorded birds of group D. It was observed from Table 7 that there was significant effect of neem seed cake in liver, heart and gizzard weight.

Morbidity: Morbidity is referred to the total number of sick birds in a certain group of chicks. The results regarding the morbidity percent of the broilers (Table 7) were statistically significant ($P<0.01$). The results showed that the morbidity was significantly (25%) in group D whereas 20%, 15% in A and B. The lowest morbidity of 12.00% was recorded from the birds in group C. The results of L.S.D. test suggested that differences in morbidity level in groups were statistically significant ($P<0.003$).

Mortality Rate: Mortality rate denotes to the number of birds died from a flock of certain number of birds. The results pertaining the mortality rate of the broilers (Table 8) were statistically significant ($P<0.01$). The results showed that the mortality was significantly higher (15%) in group D broilers. The broilers in group A and B suffered with mortality of 12, 8 respectively. The lowest mortality of 4% was recorded from the Group C.

Parasitic Infection: The broilers fed on different levels of neem seed cake and they were also investigated for parasitic infection (Table 7) and it was noted that there was 18, 15, 10 and 25% parasitic infection in birds of group A, B, C and D. This indicated that birds in groups A (Control) suffered with more parasitic infection followed by the birds group B, C and D. The lowest parasitic infection of coccidiosis recorded in group C where 1% of neem seed cake was supplemented to the broiler ration.

Economics: After covering all the production aspects of broiler, the economics of the ration was also worked to ascertain the effect of different levels of neem seed cake. The results (Table 8) indicated that group C proved to be most economical where the birds were fed on ration containing neem seed cake at the rate of 1.0% kg feed where the net profit was Rs. 69.77 per bird. However, the groups A (Control), B and D, recorded net profit of Rs. 58.4, Rs.60.08 and Rs.59.46 respectively.

DISCUSSION

Poultry farming is gaining great importance day by day both in the business sense and for bridging up the gap of protein in human diet. Besides various advantages in poultry farming, a number of stresses existed also to confront the profitable business. Research has proved that use of medicinal plants in different forms is not only beneficial for birds health, but their use results highly profitable and cost effective [5]. Use of neem products has been recognized and in the present investigation, neem seed cake has been supplemented to broiler ration to investigate its effects on the growth and carcass production. In the present investigation, the neem seed cake at moderate level obviously has positive effect on broilers feed consumption and water intake probably due to improved digestibility. However, statistically the differences in feed consumption of different broiler groups were significant ($P<0.01$). Addition of neem seed cake in broiler ration obviously had positive effect on weight gain, carcass weight and dressing percentage of the broilers and this was mainly due to improvement in their general health and digesting system as well. Moreover, highest level of neem seed cake was not beneficial and weight gain reduced when neem seed cake was given. In case of weight of giblets, the liver, heart and gizzard weight was significant with increasing level of

neem seed cake. Considerable research has been conducted and published on use of neem products for broiler production in various parts of the world. In India, Gowda *et al.* [7] used NSC in a broiler diet which appeared to be safe and cost-effective, while [8] used neem seed cake which produced remarkably higher values for gained weight, carcass quantity and feed efficiency and [9] argued that neem seed cake improved the digestive system of the birds and remained efficient in weight gain, dressing percentage and carcass content as compared to other rations or low neem seed cake contained diets. Similarly, Chakravarty and Prasad [10] recommended that neem leaf extract should be included in drinking water for broilers, while [11] advocated that there were no marked pathological changes at any level of neem seed cake contained ration in broilers. Furthermore, Deepika *et al.* [12] mentioned that quantitative and qualitative characteristics of the broilers were promising when added to broiler ration which was considered as most cost effective inclusion. Kijoti and Chamshama [13] stated that although neem seed cake produced better weight gain.

Similarly, the morbidity and mortality was significantly ($P<0.01$) higher in groups either received neem seed cake. The results of L.S.D. test suggested that differences in morbidity level in birds of group A and group B were statistically significant. However, birds received neem seed cake above level suffered with higher rate of morbidity and it is suggestible that neem seed cake may be given to broilers at 1.0%/kg feed in ration (C).

Supporting the above findings, studies on the effect of neem seed cake on broiler production carried out by Adedeji and Hassan [14] concluded that for all variables, broilers given NSC 1% kg were superior to controls. Feed intake, weight gain, feed conversion efficiency and protein efficiency ratio did not differ between controls and the diet. From the results of the experiment, the optimum inclusion level of NSC in broiler diets is 1%.

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