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Original Research Article

Influence of Supplementation of feed Additives on Carcass Characteristics, Mortality and Economics of Broiler Production

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A B S T R A C T

An experiment was conducted with 200 day-old broiler chicks to study the effect of supplementation of vitamin, mineral and probiotic in diet on their performance. The chicks were randomly divided in to 8 groups containing 25 chicks in each group as following treatments: T_1 (control group), T_2 (Supplivit), T_3 (Agrimin), T_4 (Biovet- YC), T_5 (Supplivit + Agrimin), T_6 (Agrimin + Biovet- YC), T_7 (Supplivit + Biovet- YC) and T_8 (Supplivit + Agrimin + Biovet- YC). The results revealed that the effects of feed additives on carcass characteristics on broiler birds at 42 day of age were significant ($P<0.05$) on live weight, dressed weight, shank length and keel length. The value of giblet was also significant ($P<0.01$). The effect was non-significant on eviscerated weight, non-edible weight, drumstick length, thigh length, giblet percent and non-edible per cent. The lower mortality percentage might be due to addition of feed additives in the feed resulting in better growth, immunity and general health status of birds. Economics of broiler production supplemented with different feed additives at six weeks of age indicated that profit/kg was maximum in T_7 (vitamin and probiotic) group and minimum in mineral supplemented (T_3) group. Based on the study, it can be concluded that diet supplementation with feed additives is necessary for better growth rate of birds and lesser mortality and supplementation of diet with vitamin, mineral and probiotic were best economic rearing.

Keywords

Broiler, feed additives, probiotics, vitamin, carcass traits, mortality, economics

Introduction

In the livestock sector, poultry is the most efficient enterprise for increasing the supply of desired proteins, fats and vitamins in a short period. Chicken accounts for more than 90 percent of the total poultry population of the country. The increasing demand for poultry products necessitates augmenting the supply by importing the improved breed of poultry birds. The margin of profit from broiler is reducing due to continuous increase in cost of quality poultry feed ingredients, therefore different types of commercial growth promoter have been tried to enhance the weight gain and to improve feed conversion efficiency. Use of antibiotics produce residual effect and increase the bacterial resistance against other human antibiotics making severe concern to public health. Therefore, the alternative to antibiotics, the growth promoters to improve health and production performance in broiler have been important. Keeping in view of the above ideas, the present investigation has been undertaken to study the effect of probiotics, vitamin and mineral mixture mix on carcass

characteristics of broiler chicken and economics of broiler production.

Materials and Methods

Two hundred (200) day-old broiler chicks were procured and reared at Instructional Livestock Farm Centre of Bihar Veterinary College, Patna. Chicks were weighed individually, numbered with aluminium wing band and divided randomly into eight treatment groups having 25 chicks in each viz. T_1 (Control), T_2 (Supplivit premix (Vitamin) @ 25 g/quintal of feed), T_3 (Agrimin (Mineral) @ 1kg/quintal of feed), T_4 (Biovet-YC (Probiotic) @ 50 g/quintal of feed), T_5 (Supplivit premix @ 25 g + Agrimin @ 1 kg per quintal of feed), T_6 (Agrimin @ 1 kg + Biovet- YC @50 g per quintal of feed), T_7 (Supplivit premix @ 25 g + Biovet-YC 50 g per quintal of feed) and T_8 (Supplivit premix @ 25 g + Agrimin @ 1 kg and Biovet-YC @ 50g per quintal of feed). The standard management conditions and vaccination schedule were followed for all the birds maintained under deep litter system of management. The experimental data on carcass traits such as pre-slaughter live weight, blood loss, dressed weight with viscera, eviscerated weight, giblet weight, non-edible weight, dressing percentage, giblet percentage, non-edible percentage, length of keel bone, thigh, drumstick and shank were recorded at the end of experiment. The economics of broiler production was calculated at 6^{th} week of age. The expenditures incurred on chicks (fixed cost) and feed, labour, electricity, medicine and litter (variable cost) were taken into for the calculation of economics of broiler rearing. The money receipts from sale of birds, gunny bags and manure were considered as total income. The experimental data obtained during the study with respect to different parameters were subjected to statistical analysis in completely randomized design (CRD) with simple analysis of variance (ANOVA) technique following the procedure of Snedecor and Cochran (2004).

Results and Discussion

Carcass Characteristics

Results pertaining to the effect of feed additives on carcass characteristics of broiler chicks at 42 days of age are shown in Table-1. There was considerable changes found in the drumstick length and non-edible percent on addition of feed supplements, however statistically variation among different groups was resulted non-significant ($P<0.05$). The observations in changes pertaining to other carcass traits including pre-slaughter weights were significant ($p<0.05$) in present study. Maximum mean pre-slaughter weight of broiler chicken was observed in T_8 group. The changes in pre-slaughter weight of broiler chicken was statically ($P<0.05$) higher in T_8 than T_1 whereas change was non-significant from T_2, T_3, T_4, T_5, T_6 and T_7 groups. The mean dressed weight with viscera was the maximum for chicks of T_8 groups (l699.36±27.94 g) and lowest in T_3 (1531.48±43.98 g) in present investigation. The variation in value of T_8 group differed non-significantly ($P<0.05$) from those of T_2, T_4, T_5, T_6 and T_7 but there was significant changes observed in between T_1 and T_8 groups. The mean eviscerated weight was the maximum for chicks of T_8 groups and lowest for T_3 (1270.29±38.74 g). The variation in value of T_8 group differed non-significantly ($P<0.05$) from those of T_7, T_4, T_5, T_6 and T_2 but there was significant changes observed in between T_1 and T_8 groups.

Giblet weight was significantly higher ($P<0.05$) in T_8 than those of T_6, T_5, T_4, T_1, T_2 and T_3 groups but statistically similar

with T_7 group of birds. The average weight of non-edible offals was maximum recorded in T_8 (297.12 ±10.11 g) group lowest in T_1 (264.52±4.14 g). However, there was no significant effect of feed additives on weight of non-edible offals. The mean value of shank length of broiler birds was found longest in T_8 group (8.23±0.11 cm) followed by T_7 (8.11± 0.11 cm), T_4 (7.75± 0.11 cm) and T_2 (7.60± 0.22 cm) groups; respectively. But variation in length was found statistically. However in T_1 (7.32±0.13 cm), T_3 (7.17± 0.18 cm), T_5 (7.39±0.15 cm) and T_6 (7.42± 0.24 cm), the variation in shank length were significantly ($P<0.05$) shorter.

The average length of drumstick ranged between 13.49± 0.39 cm (T_8) to 9.59±3.13 cm (T_2). The difference among different groups was found to be non-significant. The mean value of length of the thigh of group T_8 chicks (10.30± 0.59 cm) was highest than other groups with significant differences ($P<0.05$) and followed by T_7 (9.54±.074 cm), T_2 (9.17±0.49 cm), T_3 (8.79±0.54 cm), T_5 (8.51±0.35 cm), T_6 (8.47±0.34 cm) and non-significantly from T_4 (8.30±0.34 cm) and T_1 (7.19±0.31 cm) in decreasing order.

The keel length ranged from 9.35± 0.55 cm (T_3) to 11.95±0.22 cm (T_8) in different groups of chicks in present study. The keel bone was longest among chicks of T_8 groups (11.95± 0.28 cm). However, the keel length differences were recorded statistically non-significant with that of T_6, T_7, T_4 and T_2 groups, whereas in comparison with T_1, T_3 and T_5 groups the differences were significant ($P<0.05$). The average dressing percentage was observed to be non-significantly higher in T_1 (76.32±1.29) followed by T_5 (75.77±0.78), T_4 (75.62±0.33), T_6 (75.15±0.67), T_7 (74.72± 0.51), T_2 (74.36± 1.09) and T_3 (73.84±1.50) groups; respectively, whereas numerically lowest value was recorded in groupT_3 (73.84±1.50). The giblet percentage was significantly more among carcass of T_8 (5.32±0.25) group followed by T_7 (5.20±0.18), T_5 (4.85±0.38), T_6 (4.79±0.96), T_1 (4.77±0.63), T_3 (4.57±0.86), T_4 (4.45±0.1), and T_2 (4.37±0.18) groups, respectively. There was no significant variation observed among different treatment groups. Non- edible percentage ranged from 14.69±0.23 (T_7) to 15.92± 0.29 (T_8). The effects associated with feed additives were found to be non-significant on this trait.

Analysis of results revealed that the effects of feed additives on carcass characteristics on broiler birds at 42 day of age were significant ($P<0.05$) on live weight, dressed weight, shank length and keel length. The value of giblet was also significant ($P<0.01$). The effect was non-significant on eviscerated weight, non-edible weight, drumstick length, thigh length, giblet percent and non-edible per cent. The results of present study are in agreement with the findings of Florou-Paneri *et al.,* (1993), Denli *et al.,* (2003), Rathi (2003), Homma and Taku (2004), Marina *et al.,* (2006), Singh (2008), Raut *et al.,* (2009), Chimote *et al.,* (2009), Ocak *et al.,* (2009), Hassanein and Soliman (2010) and Saiyed *et al.,* (2015) who reported dressing was significantly better on supplementation of feed additive and probiotic. However, the present findings did not agree with findings of Florou Paneri *et al.,* (1993), Samanta and Biswas (1995), Kurnararaj *et al.,* (1997), Chatasavang and Watcharangul (1999), Szezerbiska *et al.,* (2000), Tarasewiz *et al.,* (2005), Arslan and Saatci (2004), Sehu and Cakir (2004), Iyagi and Davies (2005), Cakir *et al.,* (2008), Ghosh *et al.,* (2008), Chumpawadee *et al.,* (2009) and Sarica *et al.,* (2009) who reported non-significant differences for carcass yields on supplementation of feed additives.

Table.1 Carcass characteristics of broiler chicks raised supplemented with Different feed additives

Carcass characteristics	Treatments							
	T_1	T_2	T_3	T_4	T_5	T_6	T_7	T_8 (
Pre-slaughter wt. (g)	1730.48^{a} ±21.95	1886.99^{bc} ±32.67	1756.67^{a} ±42.35	1868.37^{bc} ±26.63	1816.56^{abc} ±11.81	1805.63^{ab} ±11.99	1880.83^{bc} ±42.07	1907.81^{c} ±20.53
Dressed wt. (g)	1535.04^{a} ±20.15	1651.11^{bc} ±26.73	1531.48^{a} ±43.97	1666.37^{bc} ±21.61	1592.29^{ab} ±3.17	1605.54^{ab} ±13.38	1662.13^{bc} ±43.87	1699.36^{c} ±27.94
Eviscerated wt. (g)	1298.93^{a} ±36.66	1398.04^{bc} ±32.97	1270.29^{a} ±38.74	1412.02^{bc} ±23.73	1343.38^{ab} ±4.03	1352.29^{abc} ±7.56	1393.76^{bc} ±32.44	1442.09^{c} ±19.01
Giblet wt. (g)	82.11^{a} ±1.53	82.39^{a} ±0.85	80.14^{a} ±2.87	82.07^{a} ±1.92	88.99^{a} ±6.90	88.99^{a} ±6.90	102.69^{b} ±4.20	113.55^{b} ±2.92
Non edible wt. (g)	264.52 ±4.14	289.48 ±4.61	277.66 ±4.32	292.14 ±3.19	278.92 ±11.54	281.48 ±7.67	277.10 ±4.51	297.12 ±1.011
Shank length (cm)	7.32^{ab} ±0.13	7.60^{ab} ±0.22	7.17^{a} ±0.18	7.75^{bc} ±0.11	7.39^{ab} ±0.15	7.42^{ab} ±0.24	8.11^{cd} ±0.11	8.23^{d} ±0.11
Drumstick length (cm)	11.85 ±0.46	9.59 ±3.13	11.63 ±0.45	12.20 ±0.45	11.80 ±0.32	11.93 ±0.22	12.47 ±0.35	13.49 ±0.39
Thigh length (cm)	7.19^{a} ±0.31	9.17^{bc} ±0.49	8.79^{abc} ±0.54	8.30^{ab} ±0.34	8.51^{ab} ±0.35	8.47^{ab} ±0.34	9.54^{bc} ±0.74	10.30^{c} ±0.59
Keel length (cm)	9.76^{ab} ±0.37	10.62^{a} ±0.30	9.35^{a} ±0.55	10.66^{a} ±0.25	10.53^{a} ±0.24	11.00^{bc} ±0.38	10.83^{bc} ±0.44	11.95^{c} ±0.28
Dressing %	76.32 ±1.29	74.36 ±1.09	73.84 ±1.50	75.62 ±0.33	75.77 ±0.78	75.15 ±0.67	74.72 ±0.51	75.61 ±0.31
Giblet %	4.77 ±0.63	4.37 ±0.18	4.57 ±0.86	4.45 ±0.19	4.85 ±0.38	4.79 ±0.96	5.20 ±0.18	5.32 ±0.25
Non-edible %	15.50 ±0.20	15.61 ±0.20	15.61 ±0.25	15.57 ±0.25	15.42 ±0.17	15.54 ±0.23	14.69 ±0.23	15.92 ±0.29

Values with same superscripts in a row did not differ significantly.

Table.2 Mortality and mortality % of broiler chicks raised supplemented with different feed additives

Treatment group	No. of birds housed	No. of birds died	Mortality %
T_1	25	3	12
T_2	25	1	4
T_3	25	2	8
T_4	25	2	8
T_5	25	1	4
T_6	25	1	4
T_7	25	0	0
T_8	25	1	0

Table.3 Economics of broiler production supplemented with different feed additives at 6 weeks of age

Particulars	T_1	T_2	T_3	T_4	T_5	T_6	T_7	T_8
Cost of chicks (Rs.)	750.00	750.00	750.00	750.00	750.00	750.00	750.00	750.00
Feed cost (Rs.)	2399.40	2363.26	2508.30	2612.30	2480.30	2435.26	2557.56	2450.20
Medicine + Feed additive cost (Rs.)	52.25	57.05	187.25	66.25	212.25	213.25	71.9	218.25
Miscellaneous cost (Rs.)	216.00	216.00	216.00	216.00	216.00	216.00	216.00	216.00
Total Expenditure (Rs.)	2667.65	2636.31	2911.55	2894.55	2908.5	2864.51	2845.46	2884.4
Cost of sold bird @ Rs. 80/kg	2964.00	2978.00	3192.00	3368.00	3436.00	3384.00	3478.00	3518.00
Gunny bag @ Rs. 10/bag	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00
Manure @ Rs. 0.70/kg	31.50	31.50	31.50	31.50	31.50	31.50	31.50	31.50
Total Income (Rs.)	3015.50	3029.50	3243.50	3419.50	3487.50	3435.50	3529.50	3569.50
Profit (Rs.)	347.85	393.19	331.95	524.95	578.99	570.99	684.04	685.09
Profit /Bird (Rs.)	13.91	15.72	13.27	20.99	23.16	22.83	27.36	27.40
Profit /kg (Rs.)	9.38	10.56	8.31	12.46	13.48	13.49	15.73	15.57
Input : Output	1.13	1.14	1.11	1.18	1.19	1.19	1.24	1.23

The differences in the results might be due to differences in composition of feed additive, probiotic, type of birds used in the experiment and the environmental factors.

Mortality

Maximum mortality rate of 12 percent was observed in control group (T1) followed by T3 and T4 (8%), T5, T6 and T2 (4%) groups, respectively in the present study. The mortality percentage of broiler chicken reared with feed additives supplemented with vitamin, mineral and probiotic group (T8) was found to be minimum (Table-2). The results revealed that mortality percentage was less in the birds of treatment groups as compared to control. The lower mortality percentage might be due to addition of feed additives in the feed resulting in better growth, immunity and general health status of birds. Almost similar findings were observed by Aggarwal and Verma (1996), Senani *et al.*, (2004), Pervez and Sajid (2011), Mehmet and Ayhan (2012) and Azza *et al.*, (2012). However, Kumararaj *et al.*, (1997), Asaduzzarn *et al.*, (2005) and Bozkurt *et al.*, (2008) reported that the dietary treatment did not affect the mortality in birds. The differences in the results might be due to differences in feed additives, type of birds used in the experiment and the environmental factors.

Economics

Results on economics of broiler production supplemented with different feed additives at six weeks of age indicates that profit/kg was maximum in T_7 (vitamin and probiotic) group and minimum in mineral supplemented (T_3) group (Table-3). As for as total feed lowest in concerned the birds reared on basal diet with probiotic (T_4) was maximum and birds reared on vitamin (T_2) was minimum. Similarly medicine and additive cost was higher for T_8 group and lesser for T_1 group. Here, except control group, in order group of birds additive cost is more. After study of total expenditure on rearing different group of birds, it was found that rearing expenditure was maximum in T_3 group (2911.55) and minimum in T_2 group (2636.31).

Further, cost of sold bird was maximum in T_8 (vitamin + mineral + probiotic) group and it was minimum in T_1 (control) group. It

means birds with different type of supplementation groups well and their weight was more in comparison to control group. Simultaneously total income was maximum (Rs. 3569.50) in T_8 group and minimum (Rs. 3015.50) in control group. But, when the profit (Rs.) from rearing birds is considered, it was maximum in T_8 group (Rs. 685.09) and minimum (Rs. 331.95) in T_3 group.

As far as, profit per bird is concerned, it shows the similar trend and it was maximum in T_8 group and minimum in T_3 group. Almost similar findings were observed by Naik *et al.,* (2000), Iyayi and Davies (2005), Sabiha *et al.,* (2005), Pakhira and Samanta (2006) and Bhardwaj *et al.,* (2009) who reported that supplementation of feed additive had beneficial effects. The beneficial effects in respect of economic point of view and of cost effective in birds reared with feed additives might be attributed to better growth, feed conversion efficiency, immunity and improve the general health status of broiler birds which ultimately yield more economic profit to broiler farmers.

Based on the results of the study, it can be concluded that diet supplementation with feed additives is necessary for better growth rate of birds and lesser mortality.

Carcass traits couldn't have marked influence by different dietary supplement. Supplementation of vitamin, mineral and probiotic in diet enhance cost, but compensated by increasing live weight gain reflecting economical advantage. Use of non-antibiotic feed additive particularly mixing of both vitamin, mineral and probiotic at recommended dose have the potential to be applied as effective substitute for getting good economical return in the broiler farming.

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