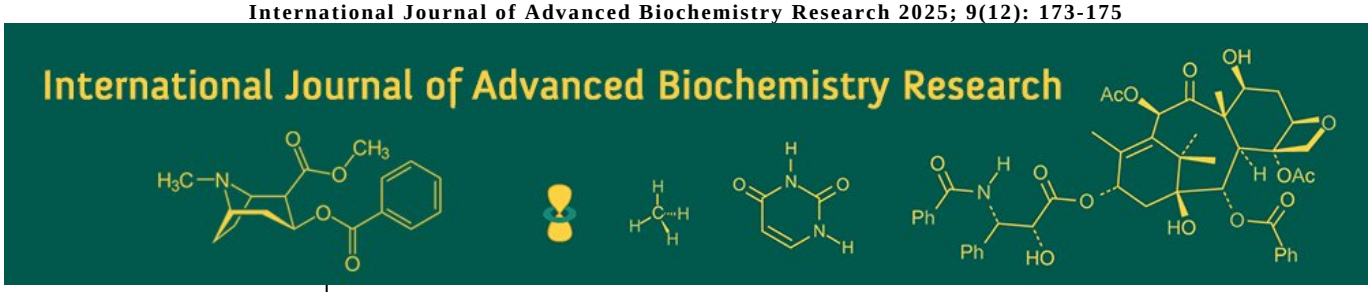

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Effect of turmeric powder supplementation on carcass characteristics of Japanese quails

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Abstract
The present study was conducted to investigate the effect of different levels of dietary supplementation of turmeric powder on carcass characteristics of quails. A total of one hundred and fifty day-old quail chicks were randomly assigned to three dietary treatment groups viz. T_0, T_1 and T_2 containing 0, 1 and 2 per cent turmeric powder of basal diet. Five birds from each replicate and treatment groups were further selected randomly for carcass characteristics study such as dressing percentage, carcass weight and weight of different body organs. One-way ANOVA was used for data analysis and significant means separated using the least significant difference methods. Statistical analysis revealed that inclusion of turmeric powder in the diet had no significant effect on carcass traits among the three groups.

Keywords: carcass characteristics, carcass weight, dressing percentage, Japanese quail, turmeric powder

Introduction
Poultry industry is one of the most dynamic agri-business trades in the world due to its participation in achieving food security. The Japanese quail (*Coturnix coturnix japonica*) is gaining attention as the ideal poultry species for meeting the animal protein needs in most developing countries (Agiang *et al*., 2011) [1]. It is suited for commercial rearing, meat and egg production under intensive management. It´s relatively faster rate of maturity, high laying intensity, high resistance to diseases, low space requirement, egg of high nutritional value, cheaper production cost etc. make commercial quail farming a choice of the farmers. Maximum production potential of the bird can be achieved through scientific feeding practices. Turmeric (*Curcuma longa*), a natural herb of the ginger family, Zingiberaceae has been used in livestock feed as a potential alternative growth promoter. The main yellow bioactive substances isolated from the rhizomes of Curcuma are curcumin, demethoxycurcumin and bisdemethoxycurcumin which is present to the extent of 2 to 5 per cent of the total spice in turmeric powder. Curcumin has been shown to have several biological effects, exhibiting antioxidant (Pal *et al*., 2001; Iqbal *et al*., 2003) [8, 4], anti-inflammatory (Holt *et al*., 2005) [3], activities. Keeping the value of turmeric in the diet of poultry in view, the present study was conceptualized to study the effect of turmeric powder supplementation on carcass characteristics of quails.

Materials and methods
The present study was carried out at the Poultry farm, Instructional Livestock Farm Complex, College of Veterinary Sciences and Animal Husbandry, Central Agricultural University, Selesih, Aizawl, Mizoram, India. The duration of the study was of 6 weeks. For the experimental purpose, 150 chicks were randomly selected which were divided into 3 treatment groups having 5 replicates each. The first treatment was designated as T_0 in which no turmeric was supplemented while the other treatment groups were T_1 and T_2 supplemented with 1 per cent and 2 per cent turmeric of the basal diet. For examination of carcass characteristics after 6 weeks, 5 chicks from each 5 replicates were randomly selected and humanely slaughtered for the study of dressing percentage, carcass weight and weight of different body organs.

Feeding and rearing

The feed of T_0, T_1 and T_2 group contained 0 per cent, 1 per cent and 2 per cent of turmeric powder mix in the feed. Battery brooders, waterer and feeding troughs were thoroughly cleaned, disinfected and sprayed before placing the experimental chicks in the brooders. Chicks were kept in separate compartments, reared under the same growing conditions in battery brooders for 0-3 weeks and thereafter in battery cages from 3-6 weeks to evaluate their growth performance. The birds were fed twice daily at 7:00 am in the morning and 4:30 pm in the afternoon with basal diet of pre-starter crumbs from 1st - 2nd week of age and starter crumbs from 3rd - 6th week of age. Clean drinking water was made available round the clock throughout the experimental period. Feeding was withheld for 12 hours before slaughtering but fresh water was provided throughout. Weight of the carcass was taken immediately after slaughter. Slaughtering and bleeding of the birds were done in the animal slaughter area of the Department of Livestock Product Technology, College of Veterinary Science & Animal Husbandry. The birds were bled, plucked, singed, washed and eviscerated. Weight was recorded between each step in order to determine the weight of carcass and different organs.

Carcass characteristics

1. Dressing percentage

After slaughtering the birds dressing percentage was calculated by using the following formula.

$$\text{Dressing percentage} = \frac{\text{Carcass weight}}{\text{Live weight}} \times 100$$

2. Carcass weight

The individual carcass weight was recorded by using digital weighing balance after slaughtering.

3. Weight of different body organs

After separating the different body organs, each of them were weighed separately for individual bird by using digital weighing balance.

Statistical analysis

Results were analysed by using ANOVA and means were compared by Duncan's multiple range test in SPSS version 25.

Results and Discussion

The mean (± SE) carcass characteristics of quails under different levels of dietary turmeric supplementation are presented in Table 1.

Table 1: Carcass characteristics (Mean ± SE) of quail chicks under different levels of dietary turmeric supplementation

Carcass traits	Treatment groups			P-value
	T_0	T_1	T_2	
Dressing %	71.64±1.41	71.74±1.73	71.60±0.59	0.997^{NS}
Carcass weight (g)	107.37 ±1.43	108.16 ±1.90	109.33 ±3.47	0.308^{NS}
Breast (g)	40.120±0.34	40.40±0.35	40.98±0.28	0.193^{NS}
Back (g)	18.35±0.74	18.33±0.41	18.48±0.15	0.974^{NS}
Leg (g)	23.01±0.35	23.28±0.21	23.50±0.07	0.369^{NS}
Wing (g)	7.01±0.25	7.02±0.26	7.05±0.04	0.989^{NS}
Head (g)	5.41±0.29	5.58±0.18	5.68±0.08	0.649^{NS}
Neck (g)	6.32±0.31	6.36±0.14	6.38±0.07	0.978^{NS}
Liver (g)	2.36±0.04	2.36±0.03	2.39±0.02	0.788^{NS}
Gizzard (g)	3.81±0.13	3.84±0.15	3.88±0.16	0.949^{NS}
Heart (g)	0.98±0.02	0.99±0.03	0.99±0.02	0.955^{NS}

NS: Non-significant

Dressing percentage

The dressing percentage was found to be 71.64±1.41, 71.74±1.73 and 71.60±0.59 in T_0, T_1 and T_2 group respectively. No significant difference was observed between the three treatment groups in regard to the dressing percentage. Mousa *et al.* (2019) [7] also reported non-significant difference in dressing percentage in laying hens fed garlic and turmeric powder @ 0, 0.25, 0.5 and 1 per cent. Hady *et al.* (2013) [2] also observed non-significant difference in dressing percentage of broilers fed with feed added with 0.75 per cent turmeric. Contrary to our findings, Mondal *et al.* (2015) [6] reported significant ($P<0.05$) difference in dressing yield in broiler chicks (Ross 308) at 28 days of age fed with 0, 0.5, 1.0 and 1.5 per cent of turmeric powder with highest dressing yield in 0.5 per cent turmeric supplemented group.

Carcass weight (g)

The carcass weight was recorded as 107.37 ± 1.43, 108.16 ± 1.90 and 109.33 ± 3.47 g in T_0, T_1, and T_2 group respectively. The carcass weight among the three treatment groups were not affected ($P>0.05$) by dietary supplementation of turmeric powder. Kennedy *et al.* (2020) also reported non-significant effect in carcass weight fed with turmeric rhizome powder @ 0.00, 0.25, 0.50, 0.75 and 1 per cent into the sorghum-soybean starter (7 - 21days of age) and grower (22- 42 days of age) diet in Japanese quails.

Weight of different body organs (g)

The mean weight of different body organs in T_0, T_1 and T_2 group were recorded as 40.12±0.34, 40.40±0.35 and 40.98±0.28 g respectively for breast weight, 18.35±0.74, 18.33±0.41 and 18.48±0.15 g respectively for back weight, 23.01±0.35, 23.28±0.21 and 23.50±0.07 g respectively for leg weight, 7.01±0.25, 7.02±0.2 and 7.05±0.04 g respectively for wing weight, 5.41±0.29, 5.58±0.18 and 5.68±0.08 g respectively for head weight, 6.32±0.31, 6.36±0.1 and 6.38±0.07 g respectively for neck weight, 2.36±0.04, 2.36±0.03 and 2.39±0.02 g respectively for liver weight, 3.81±0.13, 3.84±0.10 and 3.88±0.16 g respectively for gizzard weight, 0.98±0.02, 0.99±0.03 and 0.99±0.02 g respectively for heart weight. The weight of different body organs did not reveal any significant differences between the treatment and control groups. Mousa *et al.* (2019) [7] also

recorded non-significant changes in liver, heart and gizzard weight in laying hens when fed with feed added with garlic and turmeric powder @ 0, 0.25, 0.5 and 1 per cent Hady *et al.* (2013) [2] reported significant difference in the weight of liver and heart, whereas non-significant difference was observed for the weight of gizzard in broilers fed with feed added with 0.75 per cent turmeric.

Conclusion
Dietary supplementation of turmeric powder at the level of 1 and 2 per cent can be practiced in quails without any adverse affect on the carcass characteristics.

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