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Effect of turmeric (*Curcuma longa*) powder and neem (*Azadirachta indica*) leaf powder on some blood parameters and carcass traits of broiler chicks

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Abstract

A feeding trial of 35 days was carried out on day old broiler chicks (cobb-400) (n=210) to evaluate the effects of Turmeric (*Curcuma longa*) and Neem (*Azadirachta indica*) leaf on some haematological parameters and carcass traits of broiler chickens. The seven treatment groups were designed as T₁ i.e. control group served as basal diet, T₂ and T₃ treatment groups supplemented with 0.5% and 1% levels of Turmeric powder, similarly T₄ and T₅ supplemented with Neem leaf powder in the experimental broiler starter and finisher ration, respectively. T₆ and T₇ treatment groups were supplemented with 0.2 % and 0.5 % levels of both Turmeric powder and Neem leaf powder in combination, respectively. All the treatment groups were further divided in two replicates namely R₁ and R₂ having 15 birds in each replicate. At the end of experiment, Significant ($p < 0.05$) effect observed on dressed weight per cent and on eviscerated weight per cent. The highest dressed and eviscerated weight were recorded in group T₇ which was comparable with all their herb supplemented groups in statistical terms but higher than control. However, there was no significant effect on haemoglobin and packed cell volume recorded and the values were fall within normal physiological range.

Keywords: Turmeric, neem-leaf, dressed weight, eviscerated weight

1. Introduction

As the population increases, the demand for food items increases accordingly. The meat industry is a billion-dollar industry and in meat products broiler chicken is the first choice of people. This profoundly increasing demand encouraged the researchers to improve genetic traits which has a potential to enhance the feed conversion ratio (FCR) and or growth rate of broiler chicks. Besides use of a high calorie diet (Sadeghi, 2005) [16], the addition of antibiotics and or synthetic growth promoters in poultry feed were also reported to enhance the FCR eventually the weight gain efficiency of chicks. With intensification of farming, the use of these growth promoters arose at a significant level. The antibiotics may destroy or inhibit bacteria and can improve digestion. However, the indiscriminate use of antibiotics at sub lethal concentration may result in emergence of drug resistant microbes. Besides, due to their long residual properties, they may also be associated with carcinogenesis and other health issues in humans or birds as well (Butaye *et al.*, 2003) [7]. So, the focus of researchers now is on the use of our holistic medicinal system to find beneficial herbs and plants which are the best alternative to these chemicals with no side effects. Herbs or their secondary metabolites are found to improve productivity of poultry as they improve digestion, stimulate body metabolism and have bactericidal and immunostimulant action. A number of herbs were identified to improve performance and health of reared birds when supplementing poultry diets (El-Gendi, 1996) [8]. In the current study we also evaluated the potential beneficial effect of Turmeric and Neem on poultry. The medicinal plant Turmeric (*Curcuma longa*) is perennial in nature and belongs to the Zingiberaceae family and is usually utilized in human food as a spice. The active principles present are Curcuminoids, such as curcumin, demethoxycurcumin and bisdemethoxycurcumin. Curcumin ranged from 2-5% in turmeric (Bagchi, 2012). The curcumin known to have antibacterial, antioxidant, anticoccidial, hypolipidemic hypocholesterolemic (Hussein, 2013, and El-Khtam *et al.*, 2014) [11, 9], antidiabetic, anticoagulant and antiulcer properties (Rafatullah *et al.*, 1990) [15]. Neem (*Azadirachta indica*) is an indigenous plant of the Indian subcontinent belonging to the family Meliaceae. There are many chemical components of neem leaves which are categorised as isoprenoids which includes steroids, diterpenoids, triterpenoids and non-isoprenoids which contain flavonoids, amino acids,

proteins, polysaccharides etc. Neem leaves also contain nimbin, azadirachtin, quercetin etc. they have several beneficial effects for humans as well as poultry and can be used as a growth promoter and immune booster. In this trial, we evaluated the potential role of Turmeric (*Curcuma longa*) and Neem (*Azadirachta indica*) as a feed additive in broiler chickens by measuring their haematological parameters and carcass traits.

2. Material and Methods

2.1 Experimental chicks and design

In the present study, day-old unsexed, apparently healthy broiler chicks (Cob-400 strain) (n=210) were used, purchased from commercial hatchery. For proper identification, on 3rd day of age all birds were wing banded. Broilers were vaccinated as per routine schedule. All the chicks were weighed individually and randomly divided into seven groups [each group have 30 chicks (subdivided into two replicate; n=15), group having almost similar average body weight]. Identical standard managemental practices were followed for all groups during the experimental period. Turmeric (*Curcuma longa*) rhizome powder and Neem (*Azadirachta indica*) leaf powder were supplemented at different inclusion level alone and in combination in the experimental broiler starter and finisher rations subjected to 7 treatment groups i.e. T₁, T₂, T₃, T₄, T₅, T₆ and T₇. Groups were designated as T₁R₁, T₁R₂, T₂R₁, T₂R₂, T₃R₁, T₃R₂, T₄R₁, T₄R₂, T₅R₁, T₅R₂, T₆R₁, T₆R₂, T₇R₁ and T₇R₂, respectively. T₁ i.e. control groups were fed on a basal diet. Treatment group T₂ supplemented with 0.5 % and group T₃ supplement with 1% of Turmeric (*Curcuma longa*) rhizome powder in the experimental broiler starter and finisher ration, respectively. Likewise, T₄ and T₅ treatment groups were supplemented with 0.5% and 1% of Neem (*Azadirachta indica*) leaf powder in the experimental broiler starter and finisher ration, respectively. T₆ and T₇ treatment groups were supplemented with 0.25% and 0.5% of both in combination, respectively.

2.2 Composition of experimental ration and feeding

Commercially available broiler starter and broiler finisher feed were procured from poultry farm, College of Veterinary and Animal Science, Bikaner. Herbal feed additives such as Turmeric (*Curcuma longa*) rhizome powder and Neem (*Azadirachta indica*) leaf powder were procured from the local market and then supplemented in the basal feed. Proximate composition of herbs Turmeric (*Curcuma longa*)

rhizome powder and Neem (*Azadirachta indica*) leaf powder on % DM basis was estimated as per AOAC (2005) [4] and has been presented in Table 1. To the corresponding groups, experimental starter diets were provided up to 21 days, and experimental finisher rations were provided up to 35 days. Feed was offered *ad libitum* to each group throughout the experimental period.

2.3 Haematological parameters

Blood was collected (two birds per replicate) from wing vein at 35th day of trial in an aseptic manner and haemoglobin per cent and packed cell volume were estimated as per standard procedure.

2.4 Carcass Characteristics

To evaluate the effect of different treatments on carcass traits two broiler chicks per replicate were sacrificed after the end of experiment, i.e., 35th days to evaluate the carcass characteristics.

Eviscerated yield (%)

By giving a median cut in the abdomen removed the crop, gullet, trachea and viscera. Heart, liver, pancreas, spleen and gizzard were separated from gastrointestinal tract after scrapping of lungs. Cleaned giblets (heart, liver and gizzard) were retained along with the eviscerated carcass to record weight and calculate as-

$$\text{Eviscerated weight (\%)} = \frac{\text{Eviscerated weight}}{\text{Live wt.}} \times 100$$

Dressed weight (%)

The birds were weighed immediately before slaughtering. After severing the jugular vein and 5 minutes bleeding the feathers, Shank and Head were removed to calculate the dressed weight.

Dressed weight was calculated as:

$$\text{Dressed weight (\%)} = \frac{\text{Live wt.} - \text{Wt. of blood, feather, shank and head (g)}}{\text{Live wt. (g)}} \times 100$$

2.5 Statistical analysis

Data collected during the current investigation were subjected to standard statistical analysis.

Table 1: Proximate composition (% DM basis) of Turmeric (*Curcuma longa*) rhizome powder and Neem (*Azadirachta indica*) leaf powder

S. No.	Proximate principle	Turmeric (<i>Curcuma longa</i>) rhizome powder	Neem (<i>Azadirachta indica</i>) leaf Powder
1.	Dry Matter (%)	88.64	94.10
2.	Crude Protein (%)	6.82	17.00
3.	Ether Extract (%)	2.79	6.30
4.	Crude Fiber (%)	6.01	6.00
5.	Total Ash (%)	4.67	10.50
6.	Nitrogen Free Extract (%)	79.71	60.20

3. Results and Discussion

3.1 Haematological parameters

The Haematological parameters of broilers recorded in different treatment groups have been presented in Table 2. The means of percent hemoglobin recorded for different treatment groups were to be 7.93, 8.28, 8.33, 8.00, 8.40, 7.98 and 8.03 g/dl in T₁, T₂, T₃, T₄, T₅, T₆ and T₇, respectively, which were comparable among all the groups. The average value of packed cell volume for T₁, T₂, T₃, T₄, T₅, T₆ and T₇ treatment groups were observed to be 24.18, 24.88, 24.65, 24.90, 25.00, 25.03 and 24.70 respectively, which were also

comparable among all the groups. This suggested that the supplementation of Turmeric powder and Neem (*Azadirachta indica*) leaf powder in poultry feed had no effect on birds Hb and PCV value.

The result of haemoglobin and packed cell volume in present study absolutely collaborates with previous findings of Barad *et al.* (2016) [6] and Khatun *et al.* (2013) [12], who reported no significant effect on hematological parameters in broiler chicks when supplemented with Turmeric powder and Neem leaves extract respectively. On the contrary, Sethy *et al.* (2016) [17] and Nnenna and Okey (2013) [14] found a positively

significant effect on hematological parameters in broiler chicks.

3.2 Carcass traits

The percent means of dressed weight and eviscerated weight recorded for different treatment groups were presented in Table 3. The results of the statistical analysis of the data showed that supplementation with turmeric powder and neem (*Azadirachta indica*) leaf powder, both separately and together, had a significant ($p>0.05$) influence on clothed weight percent and eviscerated weight percent. The group T₇, which statistically was comparable to all of their herb supplemented groups but higher than control, had the greatest dressed weight percent. The group T₇, which statistically was equivalent with T₁, T₂, T₃, T₄, T₅ and T₆ but greater than the remainder of the other groups, had the greatest eviscerated weight percentage observed.

The findings of Ansari *et al.* (2012) [3] and Mondal *et al.* (2015) [13], who also reported a significant improvement on percent dressed weight due to the incorporation of Neem leaf powder and Turmeric powder respectively in the ratio of broilers, are consistent with the results of the study for carcass characteristics. The percentage of eviscerated weight in chickens fed a diet supplemented with Neem leaf powder also increased significantly (Adeyemo and Akanmu 2012) [1]. On the other hand, when broilers were supplemented with Turmeric powder and Neem leaf powder, respectively, Al-Kassie *et al.* (2011) [2] and Hardy and Zaki (2012) [10] found no discernible impact on carcass attributes.

4. Conclusion

In conclusion, results of the current study showed that supplementation of diet with a combination of 0.5% Turmeric rhizome powder and 0.5% Neem leaf powder improved weight dressing percentage and carcass yield without affecting the health of broiler chicks. Therefore, this combination of Turmeric rhizome powder and Neem leaf powder can serve as an effective replacement for antibiotics and other synthetic chemical-based growth promoters in broiler production.

Table 2: Effect of supplementation of Turmeric powder and Neem leaf powder on Hemoglobin and PCV in broiler chicks

Main effects	Hb%	PCV %
T ₁	7.93	24.18
T ₂	8.28	24.88
T ₃	8.33	24.65
T ₄	8.00	24.90
T ₅	8.40	25.00
T ₆	7.98	25.03
T ₇	8.03	24.70
SEM	0.156296	0.306667

Table 3: Effect of supplementation of Turmeric powder and Neem leaf powder on carcass traits in broiler chicks

Main effects	Dressing weight %	Eviscerated weight %
T ₁	74.11 ^a	69.84 ^b
T ₂	75.34 ^{ab}	70.93 ^{ab}
T ₃	77.24 ^{ab}	72.91 ^{ab}
T ₄	77.93 ^{ab}	73.43 ^{ab}
T ₅	78.02 ^{ab}	73.63 ^{ab}
T ₆	78.03 ^{ab}	73.58 ^{ab}
T ₇	78.23 ^b	74.01 ^b
SEM	0.86220	0.90566

a, b, - Means superscripted with different letters within a column differ significantly from each other

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