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## Effect of neem (*Azadirachta indica*) leaf powder and fruit powder as herbal feed additive on carcass characteristic of broiler chicks

**Om Prakash, Dinesh Jain, Tara Bothra, Bhupendra Kaswan, Umesh Kumar Prajapat and Nirmala Kumari Dhaka**

**Abstract**

The aim of this study was to determine the optimum level of supplementation of Neem (*Azadirachta indica*) leaf powder and fruit powder in the ration of broiler chicks (cobb-400) and to assess the effect of supplementation of Neem (*Azadirachta indica*) leaf and fruit powder as herbal feed additive on performance of broiler chicks at poultry farm, College of Veterinary and Animal Science, Bikaner. A feeding trial of six weeks using 210 birds of day-old broiler chicks was conducted followed by five days metabolic trial. They were divided into seven treatment groups with three replicates of ten chicks in each replicate. The control group (T<sub>1</sub>) was fed on basal diet without any supplementation and other six treatment groups were supplemented with 0.5% Neem leaf powder, 1% neem leaf powder, 0.5% Neem fruit powder, 1% Neem fruit powder, 0.25% Neem leaf powder+0.25% Neem fruit powder and 0.5% Neem leaf powder + 0.5% Neem fruit powder and designated as T<sub>2</sub>, T<sub>3</sub>, T<sub>4</sub>, T<sub>5</sub>, T<sub>6</sub> and T<sub>7</sub> groups, respectively. Statistical analysis of data revealed highly significant ( $P < 0.01$ ) effect of Neem leaf powder and Neem fruit powder supplementation alone or in combination on dressing percent and non-significant effect on eviscerated percent, and on per cent liver weight, heart weight, gizzard weight and giblet weight. The highest dressing percent was found in T<sub>3</sub> followed by T<sub>7</sub>, T<sub>5</sub>, T<sub>2</sub>, T<sub>6</sub>, T<sub>4</sub> and Control (T<sub>1</sub>).

**Keywords:** broiler, dressing weight, eviscerated weight, neem leaf, neem fruit

**1. Introduction**

Broiler production the fastest growing section of the poultry industry in the country and poultry industry has evolved as agro based industry in India. Poultry today not only acts as income stabilizer but also provides regular and timely income as compared to other livestock farming. The economics of poultry industry depends upon the feed. Over a long period, extensive efforts have been made to reduce the cost of production by reducing the expenses on feed. Feed additives are one of the important tools used for improving feed conversion ratio, growth rate and disease resistance. Lots of herbal preparations help the birds to fight stress arising due to various reasons. Adaptogenic herbs like ashwagandha, tulsi, amla, ginseng etc. are being used as anti-stress factors for long years in human and animal medicines with proven results (Ranade and Desai, 2005) [8].

Neem (*Azadirachta indica*) is one of the most versatile medicinal plants, widely distributed in the Indian subcontinent. Neem is a rich source of limonoids that are endowed with potent medicinal properties predominantly antioxidant, anti-inflammatory and anticancer activities (Biswas *et al.*, 2002) [2]. Azadirachtin, gedunin, and nimbolide are more extensively investigated relative to other neem limonoids. In ancient time, medicines of neem were backbone of herbal therapy. It is used in ayurvedic treatment, homeopathy pattern of medicine, unani principles of medicine and also used in allopathic treatment for human health so it is also known as wonder tree, God off all diseases, divine tree or so many regards in the form of name as locality. All parts of neem tree have various type of medicinal properties.

There are various chemical components of neem leaves, which are divided in to two major categories one is isoprenoids which includes diterpenoids, triterpenoids, steroids and second is non isoprenoids which contains proteins, amino acids, flavonoids, polysaccharides etc. The major active principles are quercetin,  $\beta$ - sitosterol as well as number of limonoids like nimbin and its derivative ingredients. Quercetin have antibacterial, antiprotozoal, antiparasitic and antifungal properties.

These have beneficial effect in humans, animals as well as poultry as a growth promoter and immune booster. It also acts as an antioxidant, antiprotozoal (Pandey *et al.*, 2014) [7] and increases the number of antibodies against the viral diseases in poultry like infectious bursal disease (I.B.D.) and ranikhet disease (Durrani *et al.*, 2008) [3] etc.

Neem fruit contain high lipid content with a large number of active ingredients like azadirachtin, nimbin like various active ingredients in remarkable amount. Azadirachtin is effective against various insect species and act as non-toxic to human and animals. Neem kernel contains various important unsaturated fatty acids like stearic acid, palmitic acid etc. In Veterinary, it is used in livestock and as well as in poultry as a growth enhancer, immunomodulator, antifungal and antiprotozoal medicine. It also have antioxidant and anti stress properties (Landy *et al.*, 2011) [6]. It is helpful in preventing various diseases so it improves the overall performance and carcass characteristic of broiler chicks.

## 2. Materials and Methods

Two hundred and ten, day-old unsexed, apparently healthy broiler chicks (Cob-400 strain) purchased from commercial hatchery were used in the present study. Study was carried out from 23 February to 04 April 2019. For proper identification, all birds were wing banded on 3<sup>rd</sup> day of age. Broilers were vaccinated against Ranikhet (F<sub>1</sub> strain) and Infectious bursal disease (IBD) at the age of 4<sup>th</sup> and 14<sup>th</sup> days, respectively as per routine schedule. All the chicks were individually weighed and randomly divided into seven groups of 30 chicks in each group having almost similar average body weight. Each group of 30 chicks was further subdivided into two replicates having 15 chicks in each replicate. Neem leaf powder (*Azadirachta indica*) and fruit powder were supplemented @ 0.5% and 1% alone and in combination in the experimental broiler starter and finisher rations subjected to 7 treatment groups *i.e.* T<sub>1</sub>, T<sub>2</sub>, T<sub>3</sub>, T<sub>4</sub>, T<sub>5</sub>, T<sub>6</sub> and T<sub>7</sub> with 30 chicks in each experimental group. Each group of 30 chicks were subdivided into two replicates having 15 chicks in each replicate. Groups were designated as T<sub>1</sub>R<sub>1</sub>, T<sub>1</sub>R<sub>2</sub>, T<sub>2</sub>R<sub>1</sub>, T<sub>2</sub>R<sub>2</sub>, T<sub>3</sub>R<sub>1</sub>, T<sub>3</sub>R<sub>2</sub>, T<sub>4</sub>R<sub>1</sub>, T<sub>4</sub>R<sub>2</sub>, T<sub>5</sub>R<sub>1</sub>, T<sub>5</sub>R<sub>2</sub>, T<sub>6</sub>R<sub>1</sub>, T<sub>6</sub>R<sub>2</sub>, T<sub>7</sub>R<sub>1</sub> and T<sub>7</sub>R<sub>2</sub>, respectively. The T<sub>1</sub> *i.e.* control group were fed on basal diet and T<sub>2</sub> and T<sub>3</sub> treatment group were supplemented with 0.5% and 1% of Neem (*Azadirachta indica*) leaf powder in the experimental broiler starter and finisher ration, respectively. Likewise T<sub>4</sub> and T<sub>5</sub> treatment group were supplemented with 0.5% and 1% of Neem (*Azadirachta indica*) fruit powder in the experimental broiler starter and finisher ration, respectively. T<sub>6</sub> and T<sub>7</sub> treatment groups were supplemented with 0.25% and 0.5% of both in combination, respectively. Experimental starter rations were offered up to 3 weeks of age and thereafter experimental finisher rations were offered up to 6 weeks of age as per the treatments to the respective groups. Feed was offered *ad libitum* to each group throughout the experimental period and group-wise feed consumption was recorded at weekly intervals.

### a) Dressed Weight (Per cent)

The birds were weighed immediately before slaughtering. The slaughtering was done by severing the jugular vein and 5 minutes bleeding time was allowed for each bird. Dressed weight was calculated as-

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

### b) Eviscerated Weight (per cent)

The dressed birds were eviscerated by giving a median cut in the abdomen and removing the crop, gullet, trachea and viscera. The lungs were scrapped off. Heart, liver, pancreas, spleen and gizzard were separated from GI tract. The giblets (heart, liver and gizzard) were cleaned and retained along with the carcass to record eviscerated weight and expressed as percentage of pre-slaughter weight.

$$\text{Eviscerated weight (\%)} = \frac{\text{Dressed weight} - \text{weight of visceral organ}}{\text{Live wt.}} \times 100$$

### c) Liver Weight (Per cent)

$$\text{Percent weight of liver (\%)} = \frac{\text{Liver weight (g)}}{\text{Live wt. (g)}} \times 100$$

### d) Heart Weight (Per cent)

$$\text{Percent weight of heart (\%)} = \frac{\text{heart weight (g)}}{\text{Live wt. (g)}} \times 100$$

### e) Gizzard Weight (Per cent)

$$\text{Percent weight of gizzard (\%)} = \frac{\text{gizzard weight (g)}}{\text{Live wt. (g)}} \times 100$$

### f) Giblet Weight (Per cent)

$$\text{Percent weight of giblet (\%)} = \frac{\text{giblet weight (g)}}{\text{Live wt. (g)}} \times 100$$

## 2. Statistical Analysis

Data collected during the present investigation were subjected to statistical analysis by adopting appropriate methods of analysis of variance as described by Snedecor and Cochran (1994) [11]. Wherever, the variance ratio (F-values) were checked for significance at 5 per cent and 1 per cent levels of probability, the significance of mean differences were tested by Duncan's New Multiple Range Test (Duncan's Range Test) as modified by Kramer (Kramer 1956).

## 3. Results and Discussion

The per cent means of dressed weight and eviscerated weight for various treatment groups were recorded to be 75.23% and 62.93% in T<sub>1</sub>, 77.42% and 63.38% in T<sub>2</sub>, 78.76% and 62.15% in T<sub>3</sub>, 75.81% and 63.32% in T<sub>4</sub>, 77.80% and 64.16% in T<sub>5</sub>, 75.86% and 63.32% in T<sub>6</sub>, 78.34% and 61.10% in T<sub>7</sub>, respectively presented in Table 1. The statistical analysis of data Table 1. revealed significant (P<0.01) effect of supplementation of Neem leaf powder (*Azadirachta indica*) and fruit powder alone and in combination on dressed weight % but non-significant on eviscerated weight %. On observing the data, highest dressed weight % was recorded in T<sub>3</sub> which was followed by T<sub>7</sub>, T<sub>5</sub>, T<sub>2</sub>, T<sub>6</sub>, T<sub>4</sub>, respectively and lowest recorded in control group T<sub>1</sub>.

The results of study in text for carcass characteristic are in agreement with the findings of Ansari *et al.* (2012) [11], Ravi *et al.* (2015) [9] and Shihab *et al.* (2017) [10], they also reported significant improvement on per cent dressed weight and no significant effect on per cent eviscerated weight due to incorporation of neem leaves powder in the ration of broilers. These results also get support from the observations of Landy *et al.* (2011) [6], who reported significant improvement on %

dressed weight and no significant effect on % eviscerated weight due to supplementation of neem fruit powder in ration of broiler chicks. On contrary, Kharade *et al.* (2014) [5] reported no significant effect on carcass traits in broilers due to neem leaves powder supplementation in broilers. The means of per cent weight of heart was calculated and it was found to be 0.53, 0.55, 0.53, 0.53, 0.54, 0.60 and 0.51 per cent in T<sub>1</sub>, T<sub>2</sub>, T<sub>3</sub>, T<sub>4</sub>, T<sub>5</sub>, T<sub>6</sub> and T<sub>7</sub> treatment groups. The means per cent weight of liver was calculated and it was found to be 1.80, 1.73, 1.56, 1.81, 1.44, 1.72 and 1.50 per cent in T<sub>1</sub>, T<sub>2</sub>, T<sub>3</sub>, T<sub>4</sub>, T<sub>5</sub>, T<sub>6</sub> and T<sub>7</sub> treatment groups, respectively. The means of per cent weight of gizzard in T<sub>1</sub>, T<sub>2</sub>, T<sub>3</sub>, T<sub>4</sub>, T<sub>5</sub>, T<sub>6</sub> and T<sub>7</sub> groups were calculated and it was found to be 1.23,

1.38, 1.30, 1.38, 1.41, 1.25 and 1.31 per cent, respectively. The means per cent weight of gible in T<sub>1</sub>, T<sub>2</sub>, T<sub>3</sub>, T<sub>4</sub>, T<sub>5</sub>, T<sub>6</sub> and T<sub>7</sub> groups were calculated and found to be 3.54, 3.65, 3.38, 3.70, 3.38, 3.56 and 3.32 per cent. The results obtained from present investigation fall in line with findings of Kharade *et al.* (2014) [5] and Landy *et al.* (2011) [6], they also reported no significant effect in heart weight %, liver weight %, gizzard weight % and gible weight % due to incorporation of neem leaves powder and neem fruit powder, respectively in diet of broiler chicks. On contrary, Esonu *et al.* (2006) [4] observed significant improvement in heart weight %, liver weight %, gizzard weight % and gible weight % due to supplementation of neem leaves meal in ration of broilers.

**Table 1:** Carcass characteristic of broilers birds in different dietary treatments

Parameter	T <sub>1</sub>	T <sub>2</sub>	T <sub>3</sub>	T <sub>4</sub>	T <sub>5</sub>	T <sub>6</sub>	T <sub>7</sub>	SEM
Dressing weight %	75.23 <sup>a</sup>	77.42 <sup>bc</sup>	78.76 <sup>c</sup>	75.81 <sup>ab</sup>	77.8 <sup>bc</sup>	75.86 <sup>ab</sup>	78.34 <sup>c</sup>	0.6648
Eviscerated weight %	62.93	63.38	62.15	63.32	64.16	63.71	61.1	1.4198
Liver weight %	1.80	1.73	1.56	1.81	1.44	1.72	1.50	0.1459
Heart weight %	0.53	0.55	0.53	0.53	0.54	0.60	0.51	0.0256
Gizzard weight %	1.23	1.38	1.30	1.38	1.41	1.25	1.31	0.0633
Gible weight %	3.54	3.65	3.38	3.70	3.38	3.56	3.32	0.1734

Means bearing different superscripts (a, b, c, d) in a row differ significantly ( $P < 0.01$ )

#### 4. Conclusion

Considering the carcass characteristic of broilers, the findings of present study indicated that incorporation of Neem leaf powder and fruit powder alone and in combination could be effectively use in the ration of broiler chicks for intensive broiler production and dressing weight percent with improved eviscerated weight per cent. However, supplementation of Neem leaf powder and Neem fruit powder alone and also in combination has no significant impact on organometry in broilers. It could be concluded that inclusion of 1% Neem leaf powder as herbal feed additive is the best viable proposition for beneficial rearing of broilers for meat production.

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