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## Effects of Neem leaves powder supplementation on performance and water intake of broiler chicken

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### Abstract

To carry out the present investigation, 200 day old straight run, commercial broiler strain “VENCOB” chicks were procured from a commercial hatchery. These 200 chicks were divided in four groups, i.e. Group 1, 2, 3, 4, each group having 50 chicks. All the chicks from each group were divided equally to form 5 replicates of 10 chicks each in a completely randomized design (CRD). Water and starter diet for the four respective treatments were offered *ad libitum*. The four treatment groups were supplemented with neem leaf powder @ 0g, 1g, 2g and 3g/kg of broiler ration respectively. There was significant difference in water intake of birds among the treatment groups in all the weeks on the trial. The highest water was observed in T<sub>1</sub> followed by T<sub>2</sub>, T<sub>0</sub> and T<sub>3</sub> groups in the whole experiment period. Average final live weight (kg/bird) and the daily weight gain (gm/day/bird) were significantly higher in T<sub>3</sub> followed by T<sub>1</sub>, T<sub>0</sub> and T<sub>2</sub> groups. The lowest FCR was found in the groups of T<sub>2</sub> birds whereas the average daily water intake (ml/bird) was significantly higher in T<sub>1</sub> followed by T<sub>0</sub>, T<sub>2</sub> and T<sub>3</sub>.

**Keywords:** Neem leaves powder, performance, water intake, FCR, water: feed, broiler chicken

### Introduction

It was established that water is an important factor in poultry raising because a bird can survive several weeks without food, but only a few days without water. Broilers drink a great amount of water and a critical fact that producers may not be aware of that feed and water consumption are very closely related (Tabler, 2003) [8], for example a 2.3kg broiler will consume about 8.2kg of water, compared to approximately 4.6kg of feed (Lacy, 2002) [6]. Water consumption can be affected by the number of interacting parameters: birds, water quality, feed quality and poultry house environmental issues (Manning, 2007) [7]. It was estimated that the correlation between feed and water consumption was at 0.98; it means that when water consumption changes, in 98% of the cases feed consumption changes as well. Best on this fact, daily feed consumption can be established by accurate monitoring of daily water intake. Monitoring water intake on daily basis has been shown to be a reliable measure of broiler performance (Defra, 2002) [2]. Water consumption both during a day and during the entire raising period is a key indicator reflecting the state of the birds' health. Therefore, the present study has been undertaken to evaluate the performance and water intake of broiler chickens supplemented with neem leaves powder.

### Materials Methods

To carry out the present investigation, 200 day old straight run, commercial broiler strain “VENCOB” chicks were procured from a commercial hatchery. These 200 chicks were divided in four groups, i.e. Group 1, 2, 3, 4, each group having 50 chicks. All the chicks from each group were divided equally to form 5 replicates of 10 chicks each in a completely randomized design (CRD). Water and starter diet for the four respective treatments were offered *ad libitum*. The four treatment groups were supplemented with neem leaf powder @ 0g, 1g, 2g and 3g/kg of broiler ration respectively.

**Table 1:** Experimental period and climatic conditions

S. No	Climatological parameters	Max Value	Min. Value	Average Value
1.	Environmental Temperature (°C)	27.3	11.1	19.2
2.	Dry Bulb (°C)	26.4	20	23.56
3.	Wet Bulb (°C)	21.4	15.5	18.38
4.	Relative Humidity (%)	68.1	64.9	66.6
5.	Vapour Pressure (mm)	16.8	10.7	13.56
6.	Wind Velocity (Km/Hr)	1.9	1.2	1.54
7.	Total Evaporation (mm/day)	5.5	3.8	4.8
8.	Water Temperature (°C)	24.9	19.1	23.06
9.	Soil Temperature (°C)	26.8	21.8	25.04
10.	Sun Shine (Hrs)	5.9	1.5	2.96
11.	Total Rainfall(mm)	0	0	0

### Feeder Space

For first two weeks, horizontal feeder was provided. Its length was 1.2 m with both sides open. A 2.5 cm of feeder space was allowed per chick for the first 2 weeks and 4-5 cm for the 3 to 6 week of age. After 2 week, the horizontal trough was removed. The hanging conical feeder was used, 3-4 hanging conical feeder for 100 chicks was provided. The diameter of hanging feeder was 35 cm. The hanging conical feeder was hand filling type feeder.

### Waterer Space

Fountain waterers were used. For first two weeks, small manual filling type conical waterer was used. After two weeks, large conical waterer of the same type was used. The capacity of small fountain type conical waterer was 2.5 liter. The number of such waterers used for first two weeks was three but after two weeks, two large waterers were used for 50 birds.

### Feeding Management

**Table 2:** Chemical compositions of feed for broiler

Nutrient	Pre-starter	Starter	Finisher
DM%(max)	88.40	87.82	87.62
CP%(max)	22.40	21.47	18.45
CF%(max)	3.44	3.31	4.07
EE%(max)	4.37	4.14	5.27
Total ash%(max)	7.35	7.39	6.77
NFE%(max)	62.43	63.71	65.51
Ca%(max)	1.82	1.62	1.47
P%(max)	0.938	0.905	0.898

Broiler chicks were raised on standard commercial feed. Mainly three types of broiler feed i.e. pre-starter (mash form), starter (mash form) and finisher (granule form) were used.

### Feeding schedule and other treatments

Just after arrival of chicks, glucose water @ 10g /l water was

provided in each group of birds. *Ad-lib* feeding of pre-starter, starter, and finisher ration of commercial feed was provided according to their age. Feed was provided in morning, afternoon and night hours in each group after proper weighing. Proper medication was done each and every sick bird as per their need. Prophylactic treatment and supportive therapy was done in each group equally. Fresh and clean palatable drinking water was provided *ad-lib* in each group. Vitamin and other medicines were provided in the drinking water as per dose rate recommended.

### Water Intake

Volume of water (ml) for each day was noted before it was offered to the birds. The volume of water left in the drinkers was measured and recorded as water refused. This was deducted from the quantity offered in the previous day as water intake for the day. The figures obtained were summed up and divided by the number of birds per each replicate for the weekly average. This figure was again, divided by seven for average water intake per bird per day.

### Statistical Analysis

Statistical analysis of data was done by using SPSS 20.0 software. The data obtained were subjected to variance (ANOVA) and means were compared using Duncan's Multiple Range Test (DMRT).

### Results

#### Water Intake

The Table 3 represented that water intake (ml/week/bird) of broiler chickens in different treatments groups during the study period. There was significant difference in water intake of birds among the treatment groups in all the weeks under trial. The highest water intake was observed in T<sub>1</sub> followed by T<sub>2</sub> control and T<sub>3</sub> groups in first week. Similar trends were also observed in overall water intake during the whole experiment period.

**Table 3:** Weekly water intake (ml/week/bird) of broiler chickens fed diet supplemented with neem leaf powder (NLP)

Attributes	Control	NLP T <sub>1</sub>	NLP T <sub>2</sub>	NLP T <sub>3</sub>	SEM	P-value
First week	226.60 <sup>b</sup>	249.00 <sup>a</sup>	218.80 <sup>c</sup>	210.40 <sup>d</sup>	3.357	<0.001
Second week	482.20 <sup>b</sup>	505.60 <sup>a</sup>	479.80 <sup>b</sup>	458.00 <sup>c</sup>	4.095	<0.001
Third week	731.80 <sup>b</sup>	774.00 <sup>a</sup>	723.60 <sup>bc</sup>	709.00 <sup>d</sup>	6.207	<0.001
Fourth week	1010.20 <sup>b</sup>	1036.00 <sup>a</sup>	992.60 <sup>c</sup>	957.20 <sup>d</sup>	6.723	<0.001
Fifth week	1255.80 <sup>b</sup>	1278.40 <sup>a</sup>	1243.60 <sup>c</sup>	1188.00 <sup>d</sup>	7.697	<0.001
Sixth week	1512.60	1611.00 <sup>a</sup>	1485.00 <sup>c</sup>	1456.60 <sup>d</sup>	13.404	<0.001
Overall (0-42 day)	5219.20 <sup>b</sup>	5454.00 <sup>a</sup>	5143.40 <sup>c</sup>	4979.20 <sup>d</sup>	39.671	<0.001

Values with different small letter subscripts in a row differ between groups significantly (p<0.05).

The performance of broiler chicken in this experiment has been tabulated in Table 4. The data revealed that the performance of control, T<sub>1</sub>, and T<sub>2</sub> were comparable but these differed significantly from T<sub>3</sub> group during initial week. During 8 to 21 days of trial PI of T<sub>2</sub> was significantly higher than rest of the groups. Almost similar trends were also observed during 22 to 42 days of period. Overall performance index was significantly higher in T<sub>2</sub> group followed by T<sub>1</sub>, control and T<sub>3</sub> groups. The overall performance of broiler fed different levels of neem leaf powder has been shown in the

Table 4. The average final live weight (kg/bird) and the average daily weight gain (g/day/bird) were significantly higher in the birds of T<sub>2</sub> groups followed by T<sub>1</sub>, T<sub>0</sub> and T<sub>3</sub>. However, the average daily feed intake (g/day/bird) was significantly higher in the group of T<sub>1</sub> followed by T<sub>2</sub>, T<sub>0</sub> and T<sub>3</sub>. The higher FCR of T<sub>0</sub> and T<sub>3</sub> were comparable but they were statistically higher than T<sub>1</sub> and T<sub>2</sub> which also differed significantly. The lowest FCR (1.72) was found in the group of birds T<sub>2</sub>. The average daily water intake (ml/bird) was significantly higher in T<sub>1</sub> followed by T<sub>0</sub>, T<sub>2</sub> and T<sub>3</sub>.

**Table 4:** Performance of broiler fed different levels of neem leaf powder (NLP)

Parameters	NLP T <sub>0</sub>	NLP T <sub>1</sub>	NLP T <sub>2</sub>	NLP T <sub>3</sub>	SEM	P value
Average Initial weight (g/bird)	45.18	45.46	46.96	45.98	0.507	0.653
Average final live weight (kg/bird)	2.45 <sup>c</sup>	2.63 <sup>b</sup>	2.72 <sup>a</sup>	2.40 <sup>d</sup>	0.714	<0.001
Average daily feed intake (g/bird/day)	110.5 <sup>c</sup>	114.92 <sup>a</sup>	111.6 <sup>b</sup>	107.92 <sup>d</sup>	0.576	<0.001
Average daily weight gain (g/day/bird)	57.21 <sup>c</sup>	61.61 <sup>b</sup>	63.61 <sup>a</sup>	56.03 <sup>d</sup>	0.714	<0.001
Feed conversion ratio	1.89 <sup>a</sup>	1.83 <sup>b</sup>	1.72 <sup>c</sup>	1.88 <sup>a</sup>	0.015	<0.001
Average daily water intake (ml/bird)	124.26 <sup>b</sup>	129.85 <sup>a</sup>	122.46 <sup>c</sup>	118.55 <sup>d</sup>	0.944	<0.001
Water/feed intake ratio	1.12	1.12	1.09	1.09	0.089	<0.001
Mortality (%)	2%	0%	0%	0%	0.198	<0.001

Values with different small letter subscripts in a row differ between groups significantly (p<0.05).

## Discussion

### Water intake

Water consumption increased progressively in all the treatment diets with the increase in age of the birds. The values recorded here (Table 3) were lower than the average water intake figure of 182.244 ml. per bird per day given by NRC, (1994).

The results showed that birds on the T<sub>1</sub> diet recorded the highest water consumption value which differed significantly (p<0.05) from the birds on the rest diets. Birds on the T<sub>3</sub>, consumed the least volume of water. In general, the broilers on 1 g/kg feed inclusion levels consumed significantly (p<0.05) higher volume of water than the birds on 2 and 3g/kg inclusion levels of NLP. The observed difference in water intake between the birds on the control diets and those on the test diets could be due to the differences in feed intake and body weight gain figures registered by the birds. According to Ferket *et al.* (2006) [4], the amount of water required by poultry depends on the animal's size, growth stage, environmental temperature and relative humidity, feed composition, rate of growth or egg production, and efficiency of kidney re-absorption of water in individual birds. Carter *et al.* (1997) [1] also indicated that there is a close correlation between feed intake and water consumption. Thus, with higher feed intake, poultry would consume relatively higher amount of water to facilitate digestion to meet other physiological needs. This finding confirms what is reported by Uko and Kamalu (2006) [9] and James *et al.* (2009) [5].

### Water/Feed Intake Ratio

The results of the ratio of daily feed intake to water consumption (Table 4) showed that the birds on the control diet recorded the highest ratio though the values obtained were not significantly (p>0.05) different from each other. The values, however, were within the range recorded by William *et al.* (2001) [10] who stated that as a rule of thumb, for water intake, birds will consume 1.5 to 2 times feed intake on weight basis. This means that the inclusion of NLP in the diets did not have any deleterious effect on water intake of the birds fed the test diets.

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