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## Studies on supplementation of *moringa oleifera* leaf powder on gut health of broilers and moisture percentage of litter in poultry shed

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#### Abstract

The present study was conducted to evaluate effect of supplementation of *moringa oleifera* leaf powder on gut health of broilers and moisture percentage of litter in poultry house. The research work was conducted on day old four hundred straight-run broiler chicks. The day old Vencobb-400 chicks were randomly distributed into 4 treatment groups and each treatment group had 4 replicates of 25 chicks each. A control group (T0) was fed basal diet adequate in all nutrients as per BIS (2007) and birds in treatment groups T1, T2 and T3 were offered basal diet containing *Moringa oleifera* leaf powder at 0.2, 0.4 and 0.6%, respectively. Results of study revealed that, the total viable and coliform counts in treatment group were slightly decreased than control but having non significant difference at 42<sup>nd</sup> day of experiment. The mean weekly litter moisture percentages were found significantly reduced at 21<sup>st</sup> day age. However, the mean weekly litter moisture percentage was reduced at 42<sup>nd</sup> day age but differences are statistically non-significant. Thus, the supplementation of *Moringa oleifera* leaf powder was found helpful in boosting up gut health of birds and maintain lower moisture percentage of litter material in poultry shed.

**Keywords:** *Moringa oleifera* leaf powder, broiler, moisture percentage, gut health

#### Introduction

Feed is a major component affecting net return from the poultry enterprise. Various strategies like feed supplements and additives are being used to ensure more net return and to minimize expenditure on feed. Economical broiler production largely depends on optimum utilization of feed, improved body weight, prevention of diseases and reduced mortality rate. Use of chemical feed additives as growth promoters has criticism due to adverse effects on consumers and there is increasing demand for organic meat and eggs. In view of this, herbal and plant derivatives would be a valuable alternative to promote growth and health in poultry as there is no residual toxicity. Due to the higher amount of polyphenols the leaves of moringa tree have been reported to have an antioxidant activity <sup>[1, 2]</sup>. The HPLC analysis indicated the presence of phenolic acids such as gallic, chlorogenic, ellagic and ferulic acid and also having flavonoids such as kaempferol, quercetin and rutin. *Moringa oleifera* leaves are a rich source of vitamins. *Moringa oleifera* leaves may be a promising source of natural antioxidants for broiler meat. Due to principle component pterygospermin it, possesses antimicrobial activity. The use of affordable alternative plant materials that possess medicinal properties which can be used to replace the expensive modern antibiotics in developing countries becomes a necessity. The nutritional and medicinal property of *Moringa oleifera* leaves suggest it as a good option for the replacement. *Moringa oleifera* leaf is rich in vitamins (especially vitamin A), amino acids, energy, crude protein, low levels of tannins, trypsin and amylase inhibitors <sup>[3, 4]</sup>. *Moringa* is a potential plant that could be used to enhance immune response and to improve intestinal health of broiler chicken <sup>[5]</sup>. Keeping above facts in view, the present investigation was planned to study the effects of supplementation of *Moringa oleifera* leaf powder on gut health of broilers and moisture percentage of litter in poultry shed.

#### Materials and Methods

The experiment was conducted on 400 straight-run commercial day-old broiler chicks of Vencobb-400 strain for 6 weeks. The chicks were randomly distributed into four dietary treatments groups with four replicates of 25 birds each. The birds were reared on deep litter system in pens for six weeks period. The rations were formulated for three phases viz.

prestarter (0-7 days), starter (7-21 days) and finisher (22-42 days) for all treatment groups as per BIS (2007) [6]. The details

of the dietary treatments are given below-

**Table 1:** Different dietary treatments of groups

Treatment groups	Details of treatment	No. of birds/ replicate	No. of replicates	No. of birds/ Treat. group
A	Control – Basal Diet	25	4	100
B	Basal Diet + 0. 2% <i>Moringa oleifera</i> leaf powder	25	4	100
C	Basal Diet + 0. 4% <i>Moringa oleifera</i> leaf powder	25	4	100
D	Basal Diet + 0. 6% <i>Moringa oleifera</i> leaf powder	25	4	100

The feed supplement *Moringa oleifera* leaf powder was supplied by Famestar Impex India Pvt. Ltd., Mumbai, and Maharashtra.

### Total viable count and *E. coli* count

The total viable count and Coli form count in all the treatment groups was studied at 42<sup>nd</sup> day age following standard laboratory procedures. For determination of total viable count and coliform count one bird from each replicate was scarified by severing the jugular vein and carotid artery on one side of neck and allowed to bleed for 1 to 2 minutes. Large intestine was opened immediately after sacrificing and weighed 1 g of ceacal contain collected in sterile glass vial diluted in 9 ml Normal saline and then 2 serial dilutions were made for inoculation. Then, 10 $\mu$ l content from the last test tube was poured on the Macconky's media plate and kept for incubation for 24 hrs at 37 °C. After incubation, total bacterial colonies were counted as colony forming units (CFU /per gram) of samples. To obtain the total viable count the average number of colonies in a particular dilution was multiplied by the dilution factor. The total viable count was calculated according to ISO (1995) [7]. The results of the total bacterial count were expressed as the number of organism of colony forming units per gram (CFU/gm) of ceacal samples.

### Determination of moisture % in litter

The moisture % in litter samples from all treatment groups was studied at 21<sup>st</sup> and 42<sup>nd</sup> day age For determination of moisture % in litter, samples were collected by compositing litter from four locations in each pen, mixing and obtaining a 100 gram litter subsample was placed in tray and oven-dried for 48 hours at 60 °C. The percentage of moisture was calculated by using the weight loss between initial and dried litter [8]. By using following formula moisture percentage of litter material estimated at day 21<sup>st</sup> and 42<sup>nd</sup> in laboratory of Animal Nutrition Department, PGIVAS, Akola.

Method:-1 Weigh empty dish and about 100 gm litter sample to tray. Spread the sample to the uniformity 2. Place the dish with sample in the oven for 48 hours at 60 °C after drying; transfer the dish with partially covered lid to the desiccators to cool. Reweigh the tray and its dried sample.

Calculation: Moisture (%) =  $(w1-w2) \times 100$

W1 = weight (g) of sample before drying

W2 = weight (g) of sample after drying

### Statistical Analysis

The data obtained was subjected to statistical analysis as per standard procedures of Snedecor and Cochran, (1994) [9] and

Duncan's multiple range test for verifying significance of treatment means were used.

## Results and Discussion

### Total Viable Count and *E. coli* count

The mean value of ceacal content was examined for establishment of intestinal total viable count of and coliform count at the end of 6<sup>th</sup> week presented in Table 2 and Analysis of variance of total viable count of and coliform count present in Table 3 and Table 4. The statistical analysis revealed that the total viable count values was not differ significantly in different treatment groups compared to control group (Table 2). Treatment group T2 showed numerically lower total viable count among all treatment groups but the difference was statistically non-significant. The coliform count was non significantly reduced in treatment groups. The supplementation of *Moringa oleifera* leaf powder at higher doses i.e @ 0.4%, 0.6% level may be helpful for gut health of birds in terms of reduced coliform counts and total viable counts of the intestinal contents of birds.

The present findings are corroborating with Sherief *et al.* [10] found that the total aerobes and coliform colony count were not significantly affected in 0.5, 2, and 3 g/kg of prebiotic dietary treatment. *Moringa* is concentrated in nutrients and reduce the activity of pathogenic bacteria and moulds and improves the digestibility of other foods, thus helping chickens to express their natural genetic potential Gaia, [11]. The beneficial effects are recognized to the supplementation of dry moringa leaves because it contains phytochemical compounds which is having potential role as alternatives to antibiotic growth promoters (AGPs). *Moringa* leaves also have shown some positive effects such as antimicrobial, antioxidant and regulator of the gut flora in poultry production.

**Table 2:** Bacterial count log 10 (CFU / gm) of broiler chicken intestine at 42<sup>nd</sup> day fed with *moringa oleifera* leaf powder

Treatment	TVC	Coliform
Control (T0)	6.7	5.5
T1	6.0	5.1
T2	5.2	4.4
T3	5.7	5.0
SEM	5.93 $\pm$ 0.31	5.05 $\pm$ 0.22
p- value <sup>NS</sup>	0.69	0.85

SEM- Standard Error for Mean, NS- Non-significant

**Table 3:** Analysis of variance for total viable count log 10 (CFU/gm) of Broiler Chicken Intestine at 42<sup>nd</sup> day fed with *moringa oleifera* leaf powder

Source of variation	Degrees of freedom	Sum of squares	Mean sum of squares	F cal	Sign.
Treatments	3	4.634	1.545	0.14	NS
Error	12	132.028	11.002	-	
Total	15	-	-	-	

NS- Non-significant

**Table 4:** Analysis of variance for coliform count log 10 (CFU/gm) of broiler chicken intestine at 42<sup>nd</sup> day fed with moringa oleifera leaf powder

Source of variation	Degrees of freedom	Sum of squares	Mean sum of squares	F cal	Sign.
Treatments	3	2.403	0.801	0.098	NS
Error	12	98.152	8.179	-	-
Total	15	-	-	-	-

NS- Non-significant

**Litter moisture percentage at 21<sup>st</sup> and 42<sup>nd</sup> day**

The data on mean of the litter moisture percentage of broilers at 21<sup>st</sup> & 42<sup>nd</sup> with different dietary treatment are presented in Table 5 and 6 respectively, The ANOVA in Table 7 & 8, respectively. The analysis of variance revealed that the mean litter moisture percentage at age 21<sup>st</sup> day between the treatment groups showed highly significant difference ( $P < 0.01$ ) (Table 6). The reduced mean weekly moisture percentage of litter material was observed for treatment groups as compared to control. The findings in the present study are in accordance with litter moisture can effectively be manipulated by feed formulation strategies, diet ingredients and feed additives, Hernandez *et al.* [12].

The analysis of variance revealed that the mean moisture percentage at 42<sup>nd</sup> day between the treatment groups showed non-significant difference at this age (Table 8). The highest mean moisture percentage of litter material was observed in treatment group T0 compared to control and other treatment groups. The supplementation of the herbal natural feed additives to broiler diets significantly affected the moisture % of litter on day 21<sup>st</sup> although the dietary treatments did not significantly affect moisture % of litter on 42<sup>nd</sup> day of age. However, the moisture of litter was within ideal limit which should be maintained between 20-25% (Glebocka, [13]. David *et al.* [14] found that feed additives can also be useful tools for drying poultry litter when birds have microbial or dietary intestinal challenges. The effectiveness of herbal dietary additives might be affected by internal factors such as infections and also external factors such as environmental conditions as reported by Giannenas *et al.*, [15] and Lee *et al.*, [16]. Chick quality, health conditions and environmental management also play important roles in the usefulness of herbal additives Hashemi *et al.*, [17]. Thus, in present result the supplementation of *Moringa oleifera* leaf powder @ 0.4% and 0.6% level help to maintain lower moisture percentage of litter material as compared to supplementation of *Moringa oleifera* leaf powder @ 0.2% and without *Moringa oleifera*

Leaf Powder, i.e. Control group.

**Table 5:** Moisture percentages of litter material at 21<sup>st</sup> day with different treatment group

Treatment Sr. no	Litter Moisture %			
	T0	T1	T2	T3
1	26.6	24	24.7	22.4
2	27.3	24.7	23.3	24.7
3	26.44	25.2	20.7	21.03
4	28	26.4	22.6	25.6
Pooled mean	27.085 <sup>a</sup> ±0.35	25.075 <sup>ab</sup> ±05	22.825 <sup>b</sup> ±0.83	23.435 <sup>b</sup> ±1.04

Means bearing different superscripts within a row or column differ significantly ( $P < 0.01$ ).**Table 6:** Analysis of variance for moisture percentage of litter material at 21<sup>st</sup> day different treatment groups

Source of variation	Degrees of freedom	Sum of squares	Mean sum of squares	F cal	Sign.
Treatments	3	43.658	14.556	6.700	**
Error	12	26.053	2.170	-	-
Total	15	-	-	-	-

\*\* Significant ( $P < 0.01$ )**Table 7:** Moisture percentages of litter material at 42<sup>nd</sup> day age with different treatment group.

Treatment Sr. no	Litter Moisture %			
	T0	T1	T2	T3
1	27.8	23.3	22.4	22.6
2	23.2	28.9	22.1	23.6
3	23.8	22.3	22	21.3
4	25.5	21.1	21.1	21.42
Pooled mean	25.07 ±1.03	23.9 ±1.72	21.9 ±0.27	22.23 ±0.54

Treatments found to be Non Significant

**Table 8:** Analysis of variance for moisture percentage of litter material at 42<sup>st</sup> day different treatment groups

Source of variation	Degrees of freedom	Sum of squares	Mean sum of squares	F cal	Sign.
Treatments	3	26.450	8.816	1.991	NS
Error	12	52.983	4.411	-	-
Total	15	-	-	-	-

NS - Non significant

**Conclusions:**

Thus it can be concluded, that dietary supplementation of *Moringa oleifera* leaf powder in broilers may helpful improving gut health of birds and also maintains lower moisture percentage of litter material in poultry shed.

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