# Effects of *Moringaoleifera* leaf extract on the carcass traits, growth and physiological biomarkers of broiler chicken.

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***Abstract:***Aspire of the present study was to scrutinize the effects of *Moringaoleifera*leaf extract (MOLE) on various growth biomarkers (feed intake,final live weight,weight gain and feed conversion ratio)of broiler chicks.A 6 weeks trials study was done on Day old broiler chicks (Hubbard) with 350 in number distributed into 5 equal groups. Group 1st were named as Control group was fed on basal feed common to other groups and water without MOLE.The othertreatment groups $MOLE_2$, $MOLE_4$, $MOLE_6$ and$MOLE_8$ were provided with the basal feed with2, 4, 6 and 8mL of*Moringaoleifera*leaf extract per liter of their drinking water respectively.It was observed through the results that the broilers chicks provided with4% MOLEin watershowed significant ($P$<0.05) highestfinal and net body weight in comparison to control and other treatment groups. A significant ($P$<0.05) increased trend in live and dressed body weight was observed as compared to control group. As compared to control group, significant increased values of Hemoglobin and Packed cell volume were observed in broiler chicks fed on 2, 4,6, 8% of MOLE. Same trend was observed for white blood cells. However it was observed through the experiment that chicken of control group had lower counts of RBC and WBC, PCV and lymphocyte levels. It was concluded in the study that adding of 4% MOLE in drinking water caused an increase in growth performance and carcass traits. The broiler fed on feed with 4% Moringa showed highest performance compared to others .

**Keywords:** Broiler, *Moringaoleifera* leaf extract, Physiological biomarkers, Carcass traits, growth

## I.INTRODUCTION

Poultry production is a mean of earnings; that is an excellent protein source and immediate income on investment [40, 41]. Poultry production represents a significant pillar of food safety measures development. Similarly it plays a key role in socio-economic and cultural development in various countries [1, 3, 12]. But there are few confronts faced by the emergent countries; which comprise ratio of high feed to gain and expensive feed ingredients that are becoming costly day by day. A number of efforts have been done to trounce these confronts which one includes the providing of antibiotics through nutrition [1, 9, 20, 44].

The antibiotics are being used as growth promoters and as preventive measures for diseases [18, 25, 31]. Beyond using antibiotics as growth enhancer, these have few drawbacks including residual effects, drug toxicity and rise in bacterial resistance [24, 23, 18, 33]. Such ills have guided the European Union to prohibit antibiotics use like growth promoters [8]. Therefore, awareness to natural plus safe choices such as herbs alternate to antibiotics is increasing day by day [15, 42].

*Moringaoleifera* is a well renowned easily cultivable plant. The treeof *M. oleifera* is indigenous to South Asia particularly Pakistan, Bangladesh, India, Afghanistan, Sri Lanka, Africa, Arabia and Madagascar [27, 30, 43]. Being enriched with nutrition due to existence of a diversity of essential phyto-chemicals, the various segments of the plant are utilized like a fine resource of nutrition for human being and in conventional food in various regions of the globe [39, 44]. There is a broad use of different segments of moringa in the therapeutics and feed industry [12, 13]. It is well-liked for its leaves, seeds, pods and flowers in human feed and herbal medicine [6, 7, 36].

Though, the data regarding the effects of extract of leaf meal of the plant in the feed on growth and meat quality of broiler is incomplete and differing. [28] and [4] concluded a reduced ingestion however enhance in feed conversion ratio (FCR). It was reported that when the concentration of *Moringa oleifera* leaf meal content was beyond 5% in the feed, a decrease in growth graph of broiler chickens was observed [19, 26]. [21] and [37] approved it the using *Moringa oleifera* leaf meal to 10% level had no adverse effect on the prolific act of broiler chicken, on the other hand higher than 10 % cause unhealthy things. It might be due to impure extraction of leaf meal, cooked or tinctured as a leaf extract [17]. Additionally, the poor production at increased constituent level might be owing to increased levels of anti-nutritional factors, poor digestibility of the energy fiber [16], dustiness and occurrence of protein in the raw leaf [1, 14].

## II. METHODOLOGY

***Study location**:*
The current study was conducted at postgraduate laboratory of Faculty of Veterinary & Animal Sciences, Gomal University Dera Ismail Khan.

***Test ingredients and preparation of the extracts:***
Fresh *Moringa oleifera* leaves were obtained from the local farmers. The leaves were washed thoroughly and dried in air by spread on a polythene paper sheeth in shady zone. The dried leaves were ground into powder using an electric grinder at department of Animal and Poultry production, Gomal University Dera Ismail Khan. 100 g of the powder was then soaked for 24 hrs in 01 liter of absolute fresh water and was shaken regularly. Using a muslin cloth, the preparation was then filtered to remove the remains. The extractwas kept in dirt free air tight container at 4°C for further use.Aqueous extractof different concentrations 2mL, 4mL, 6mL and 8mL was made by *M.oleifera.*

The body weight was measured at the start of experiment. Then at the end of each week, the body weight was recorded. Feed intake was measured weekly. Feed conversion ratio (FCR) was determined based on feed consumption and body weight gain.

**Housing management:**
After washing with detergent and water, the walls and floors of the bird keeping units were disinfected. The wood shavings were used as litter materials and old newspapers spread on for 1st one week of the chicks. Dry, disinfected and clean drinkers and feeders were set in a position reachable to the chicks. Proper labeling of each pen was done for easy recognition of groups. At start of 02 weeks, Super starter mash was given to the birds and starter mash throughout the third and fourth week. At the fifth week of age, finisher feed pellets was given till the sixth week. The respective feeds were offered *ad libitum* and changing one type of feed to next was done slowly to avoid digestive problems. Proper medications as well as vaccinations were done also to the birds.

**Experimental Design:**
The 350 birds were divided into five groups as follows;C;Control group fed on conventional feed plus fresh drinking water,"$MOLE_2$" groupfed on conventional feed with*M. oleifera* leaf extract at the rate of 2mL/L,"$MOLE_4$" added with *M. oleifera* leaf extract at the rate of 4mL/L."$MOLE_6$" with *M. oleifera* leaf extract at the rate of 6mL/L,"$MOLE_8$" with *M. oleifera* leaf extract at the rate of 8mL/L.

**Carcass traits and blood analysis:**
At the end of experiment; 5 birds selected randomly from each group was taken and were fasted overnight and slaughtered. The dressing percentage was calculated by live body weight and dressed after removal of viscera, feet and skull.

Total 3ml blood was collected in EDTA coated vaccutainers for further analysis. Complete blood count (CBC) was determined using hematology analyzer.

**Statistical Analysis:**
Data was analysed through one way ANOVA using statistical package SPSS 21. Association between variables was considered statistically significant at $P<0.05$. Tukey's test was applied to compare the means.

## III. RESULTS

Different birds of various treatment groups of C, $MOLE_2$, $MOLE_4$, $MOLE_6$ and $MOLE_8$ consumed the feed 4986.54±10.3, 4852.23±11.2, 5062.13±12.4, 5048.9±10.45 and 4887.21±11.6g/bird respectively. No significant difference was observed among the groups. Table No. 1 showing the summary of final body weight, total weight gain and FCR of different treatment groups. It was observed that the birds supplemented with 4% *Moringa* aqueous extract have the highest body weight as compared to other groups. On the other hand the birds treated with 8% MOLE were with the lowerfinal body weight.Similar pattern wasobserved for daily weight gain that was higher in the group $MOLE_4$ as compared to birds of other groups.FCR was significantly better in group $MOLE_4$. The group $MOLE_4$ showed the lowest FCR ratio as compared to other treatment groups including control group.

A significant increase in dressing weight and %age was observed. The birds of group $MOLE_4$ showed significant increased dressed weight (Table No.2). No significant difference ($P<0.05$) was observed in different treatment for dressing percentage. A significant decline in relative weight of proventriculus was observed but non-significant difference was noted in relative weight of heart, gizzard and spleen of birds fed on MOLE.

**Physiological parameters:**
Blood profile is biomarker of an animal for nutritional, physiological and pathological status. The effect of MOLE on different blood parameters of treatment groups is shown in (Table No.3). As compared to control group, significant ($P<0.05$) increased values of Hemoglobin and Packed cell volume were observed in broiler chicks fed on 2, 4,6, 8% MOLE. Same trend was observed for white blood cells. Significant ($P<0.05$) increased values of WBC were observed for all the treatment groups as compared to control group while a non significant difference was observed for RBCs.

## IV. DISCUSSION

Feed intake, Body weight gain and FCR ratio were evaluated and implicated as key markers for growth performance of experimental chickens. The results of current study highlighted that significant increased concentration of *Moringaoleifera* significantly enhanced the water intake in the treatment groups MOLE2, MOLE4 but decreased in MOLE6 and MOLE8. The findings in the study are in parallel to the conclusions made by [11, 5, 29]. The results showed that significant increased concentrations significantly enhanced the feed intake. As leaves of the plant are enriched naturally with vitamins, minerals and proteins especially 8 essential amino acids [24]. The increased feed intake with increased concentration of *Moringa oleifera* leaves extract might be due to its maximum digestibility and lack of any factor that reduce the feed intake [45].

It was observed through the current study that 4% of leaf extract supplemented in feed enhanced the gain in body weight. Concentrations higher than 4% declined the graph. Same observations were observed by a most recent research [32]. [17] also endorsed the conclusion but opposed by [10] and [47]. Hence it is still questionable that why MOLE impacts negatively on weight gain on higher concentrations. It might be due to presence of some anti-nutritional factors to an extent to impair the digestibility ultimately inhibiting the growth of broiler. These substances may be the tannins [48] which impede the nutritional digestion which consequences in slowing down of absorption and metabolic activities [32]. In another study conducted previously by [22] that tannins may interfere the growth of broiler negatively when their concentration becomes higher than 5g/kg of feed.

FCR was significantly better in treatment group "MOLE4" supplemented with MOLE at the rate of 4mL/L of drinking water. The treatment group MOLE4 showed the lowest FCR ratio as compared to other treatment groups including control group "C". The calculations found in current study are endorsed by a most recent study [32] opposite to the findings of [2]**.**

Blood plays a crucial role in physiology of broiler poultry [31]. In our current study it was revealed that comparing the control group, significant increased values of Hemoglobin and Packed cell volume were observed in broiler chicks provided with 2, 4,6, 8% MOLE. Same trend was observed for white blood cells [35] but there was no significant difference in Packed Cell Volume (%PCV), levels of White Blood Cell (WBC) count and Red Blood cell (RBC) counts among the experimental broiler chicks [38]. As observed in current study that blood hematological values were in the range of reference values. Thus *Moringaoleifera*does not contain such anti-nutritional factors which may potentiate the threat to growth of broiler. The findings of current study are strongly endorsed by [15]**.**

**Table No.1 Growth performance of broilers at different experimental diets**

| Item | Groups | | | | |
|---|---|---|---|---|---|
| | C | $MOLE_2$ | $MOLE_4$ | $MOLE_6$ | $MOLE_8$ |
| Water Intake (L) | $8648\pm15.47^{a}$ | $8512\pm14.44^{a}$ | $8961\pm15.48^{b}$ | $9018\pm13.38^{b}$ | $8316\pm14.19^{c}$ |
| Initial body weight(g) | $50.14\pm0.51^{a}$ | $51.88\pm0.76^{a}$ | $50.11\pm0.63^{a}$ | $52.17\pm0.42^{a}$ | $49.58\pm0.88^{a}$ |
| Final body weight (g) | $2276\pm9.31^{a}$ | $2367\pm10.12^{b}$ | $2492\pm11.26^{c}$ | $2403\pm12.16^{bc}$ | $2041\pm14.16^{a}$ |
| Weight gain (g) | $2242\pm9.39^{a}$ | $2305\pm9.01^{a}$ | $2517\pm10.52^{b}$ | $2382\pm15.06^{ab}$ | $1983.12^{c}$ |
| Feed intake | $4986.54\pm10.3^{a}$ | $4852.2\pm11.2^{a}$ | $5062.13\pm12.4^{b}$ | $5048.9\pm10.45^{b}$ | $4887.21\pm11.6^{a}$ |
| FCR | $2.15\pm0.001^{b}$ | $2.01\pm0.002^{a}$ | $1.85\pm0.001^{c}$ | $2.06\pm006^{a}$ | $2.38\pm0.003^{b}$ |

*****Values in rows having dissimilarity in superscripts (a, b & c) are significantly ($P<0.05$) differ

**Table No.2 Carcass characteristics of different groups**

| Characteristic | Groups | | | | | *P-value* |
|---|---|---|---|---|---|---|
| | C | $MOLM_2$ | $MOLM_4$ | $MOLM_6$ | $MOLM_8$ | |
| Live body weight | 2272±9.21 | 2345±9.62 | 2478±10.56 | 2248±13.56 | 2135±14.96 | 0.036 |
| Dressed weight | 1797±10.51 | 1927±9.16 | 1964±10.26 | 1629±12.92 | 1445±14.67 | 0.000 |
| Dressing % | 79.09±0.52 | 82.17±2.87 | 79.25±1.62 | 72.46±1.26 | 67.68±0.89 | 0.002 |

**Table No.3 Hematology profile of broilers of different treatments groups**

| Parameter | Groups | | | | |
|---|---|---|---|---|---|
| | C | $MOLE_2$ | $MOLE_4$ | $MOLE_6$ | $MOLE_8$ |
| Hb (g/dL) | 12.65±1.61[a] | 11.47±1.32[a] | 11.29±1.85[a] | 11.22±1.07[a] | 10.12±1.41[b] |
| RBC ($\times10^{12}$/L) | 2.18±1.02[a] | 2.24± 1.29 [a] | 2.18±1.01 [a] | 2.13±1.12 [a] | 2.01±1.08 [a] |
| WBC($\times10^9$/L) | 5.38±1.42[a] | 5.59±1.38 [a] | 5.88±1.61[a] | 5.98±1.72 [a] | 6.48±1.93 [a] |
| PCV (%) | 38.93±3.16 [a] | 36.64±2.21 [a] | 36.98±2.25 [a] | 35.02±2.04 [a] | 32.15±2.26 [b] |
| MCV (fL) | 143.73±12.54[a] | 140.54±12.24[b] | 141.23±12.48[a] | 143.53±13.01[a] | 144.13±14.23[a] |
| MCH (pg) | 40.18±2.13[a] | 41.12±2.07[a] | 41.23±2.51 [a] | 39.78±2.84 [a] | 40.89±2.86 [a] |
| MCHC (g/dL) | 28.35±2.82 [a] | 28.46±2.11 [a] | 28.93±2.35 [a] | 29.11±2.13 [a] | 29.76±2.82 [a] |

*Values presented as Mean ± Standard Error Mean(SEM). The mean in rows having differ superscripts are dissimilar to each other significantly ($P$<0.05).

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