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Replacement of Sunflower Meal with Moringa Oleifera Leaves or Its Combination With Phytase Enzyme on Growth Performance and Blood Profile of Broiler

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Abstract

The present research work was conducted to evaluate the effect of replacement of sunflower meal with Moringa oleifera leaves meal or its combination with phytase enzyme on blood profile of broiler. Two hundred day-old Ross broiler chicks from a commercial hatchery were purchased & after initial weight; birds were arbitrarily separated in groups, i.e. In group A (control), 0% MOLM and Phytase enzyme g/kg, group B, 2.5% MOLM, group C, 2.5% MOLM with combination of 0.075 g/kg Phytase enzyme and in group D, 0.075 g/kg Phytase enzyme were provided in broiler feed. Parameters which selected in present research work as,Result showed that, the live body weight in group C diet recorded significantly ($P<0.05$) the maximum body weight gain, feed intake in group A feed intake was higher than group B, C and D,The water intake of group A (control) was although in different treatments groups B, C and group D. Maximum water intake was recorded in group A (control) and minimum in treated group C (L/chick), the FCR percentage showed non-significantly different from groups A, B from one another while significant from group C and D in feed conversion ratio (FCR) among the groups,The dressing percentage in group C was higher than group B, D and group A (control),Mortality percentage of broiler chicks in different treatment groups was minimum supplement with *Moringa oleiferia* leaves with combination of Phytase enzyme, The highest weight of liver, gizzard, heart, intestine were noted in treated group C comparatively, highest spleen weight was in group B and in group A (control) the minimum weight of spleen was noted and theaverage blood profile of broiler chicks in different groups, the white blood cells was significantly higher in group D followed by group A, group B and C. Red blood cells was significantly ($P<0.05$) better in group C. Haemoglobin was significantly differences in different groups of trial. A significant ($P<0.05$) difference in Packed cells volume in group A followed by group B, C and D. Total protein in group A was minimum followed by group B, C and D, respectively.From the present study, it was concluded that supplementation with 2.5% MOLM with the combination of 0.075 g/kg Phytase enzyme have better effect on growth performance and blood profile of broiler.

Keywords: Broiler birds;Moringa oleifera leaves meals;Phytase Enzyme; Growth performance and blood profile of broiler

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Introduction

Natural nutrition of the tropics the Moringa oleifera plant is a significant food product which has had huge consideration. In many countries of the world China, Pakistan, India, Philippines Hawaii, and many parts of Africa. All parts of MOLM are importance and benefits for poultry and animal nutrient (**Figure 1**), like seeds, leaves, flowers and fruits are used [1]. The medicinal value the leaves of Moringa oleifera are in great demand. Medicinal uses of Moringa oleifera was described a good source of amino acids and vitamins [2]. Carotene are rich in Moringa oleifera leaves and vitamin C, noble profile of amino acid [3]. The testimonial of trees shrubs was founded proximate analysis including CP (crude protein), CF (crude fibers) and mineral/ash contents.

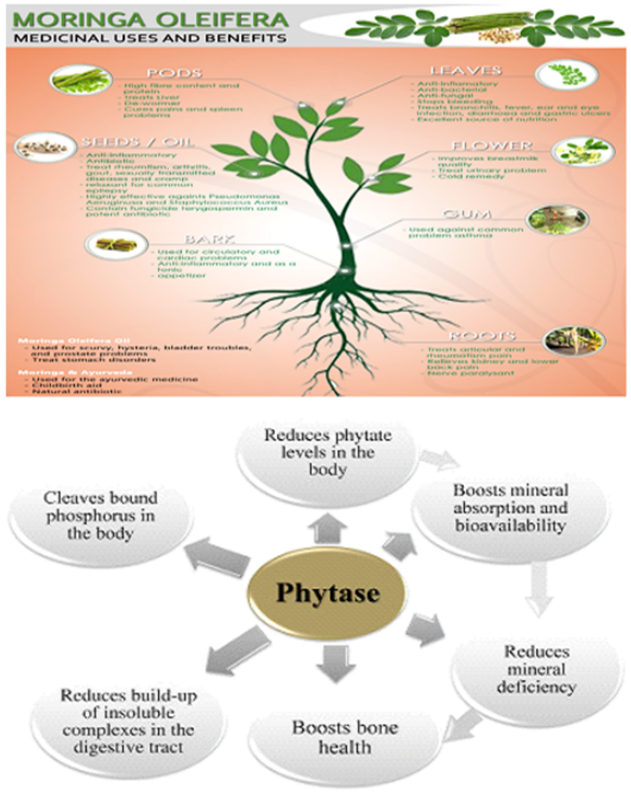

Figure 1 Benefits of Moringaoleifera (Pods, Leaves, Seeds, Follower, Bark and Gum) and Phytase enzyme for poultry and animal nutrient.

High protein profile of Moringa oleifera was mentioned reward of leaves of Moringa oleifera. The dried leaves have following nutrients of palatable protein Moringa oleifera leaves. The leaves of Moringa oleifera meal diet influenced pre-slaughter, dressed (carcass), value of live body weight and the values or weights of the cut carcass parts (thigh, breast and wings) showed better growth performance. In weaner rabbits the growth performance, blood indices and carcass [4]. MOLM are good for on the broilers performance [5]. MOLM in the diets increased then the net income from chicks will dropped. MOLM using also affected on the productive good performance of broiler/layers. The ingestion of numerous dietary components has measurable effects on blood constituents [6,7]. Although nutrient levels in the blood and body fluids may not be valid indication of nutrient function at cellular level, they are considered to be proximate measures of long-term nutritional status [6]. According, blood parameters are important in assessing the quality and suitability of feed ingredients in farm animals [8,9] had stated that haematological constituents reflect the physiological responsiveness of the animal to its internal and external environments which include feed and feeding. Animashahun et al, affirmed that the comparison of blood chemistry profile with nutrient intake might indicate the need for adjustment of certain nutrients upward or downward for different population groups. Phytase enzyme which are produced commercially for utilization and improve nutrient digestibility added to poultry feeds. In the poultry feed industry ideal phytase enzyme is acidic pH unaffected and in the small intestine and stomach, where is cost-effective to produce, phosphorus absorption takes place and high temperatures resistant (65 - 80°C), through feed pelleting are encountered [10]. In many others scientist and scholar's research focused on the testing of efficacy and identification of the former for use of Phytase enzyme in the animal feed industry ability to hydrolyze Phytic acid in the gastro intestinal tract [10]. According to researcher that Phytase enzynme has been hard to achieve native microbial phytase enzymes for poultry use By some processes such as Thermo protective and genetic transformation is an effort to attain these favorite characteristics where, several microbial phytase have been changed [11]. There are much more phytase enzymes which are derived from various types of micro-organisms (fungi and bacteria) and commercially available to the poultry feed industries [12]. In different population groups of poultry chick blood chemistry profile comparison with nutrient intake might designate the need for adjustment of certain nutrients downward/upward [5]. In this research work study and its aimed was at assessing the result of MOLM with combination of phytase enzyme on blood chemistry of broiler (**Table 1**).

Material and Methods

Collection and processing of Moringa oleifera leaves

Moringa oleifera leaves were harvested at its flowering stages in the morning hours of the day from different location of Tandojam. Collected leaves from Moringa oleifera trees spread out under the shade for four days. The Moringa oleifera leaves was removed manually by hand and milled into powder form using a locally made miller machine.

Experimental birds and housing

Two hundred day-old Ross chicks (Gallus gallus domesticus) were purchased from a commercial distributor hatchery of Hyderabad. After initial weight the chicks were first brooded together on deep litter system for one week. Than chicks were randomly distributed into four experimental groups; A, B, C and D. Each group were consisted of 50 birds.

Ration

Initially, the chicks were offered commercial starter/finisher ration. The starter ration was supplied for first three weeks and finisher ration was given for last three weeks. Poultry ration were formulated as (**Tables 2 and 3**) according to the recommendation of NRC (1994).

Vaccination

The following vaccination program were adopt according to the approval of Pakistan Poultry Association.

Table 1 Experimental design.

Groups	A	B	C	D
Supplementation	Basal diet	2.5% MOLM	2.5% MOLM + 0.075 g/kg Phyatse enzyme	0.075 g/ kg Phyatse enzyme
No. of chicks	50	50	50	50

Table 2 Ingredients and formulation of basal diet (Starter/kg).

Ingredients	Starter /kg			
Groups	A	B	C	D
Rice Broken	31.3	31.3	31.3	31.3
Maize	30.5	30.5	30.5	30.5
Fish meal	6.5	6.5	6.5	6.5
Soy bean meal	24.4	24.4	24.4	24.4
Sunflower meal	5	2.5	4.93	2.18
Moringaoleifera meal	0	2.5	2.5	0
Molasses	0.55	0.55	0.55	0.55
Lime stone	0.55	0.55	0.55	0.55
Salt	0.25	0.25	0.25	0.25
Soda Bi Carbonate	0.01	0.01	0.01	0.01
Premix Vitamin	0.05	0.05	0.05	0.05
Premix Minerals	0.05	0.05	0.05	0.05
Dietary Methionine	0.32	0.32	0.32	0.32
L-Methionine	0.05	0.05	0.05	0.05
Lysine Sulphate	0.35	0.35	0.35	0.35
L-Threonine	0.09	0.09	0.09	0.09
Diclazulin	0.02	0.02	0.02	0.02
Antibiotics	0.01	0.01	0.01	0.01
Phytase enzyme	0	0	0.075	0.075
Over-all	100	100	100	100

Table 3 Ingredients formulation of diet (Finisher/kg).

Ingredients	Starter /kg			
Groups	A	B	C	D
Rice Broken	25.6	25.6	25.6	25.6
Maize	38	38	38	38
Fish meal	6.5	6.5	6.5	6.5
Soya bean meal	21.6	21.6	21.6	21.6
Sunflower meal	5	2.5	4.93	2.18
Moringaoleifera meal	0	2.5	2.5	0
Molasses	0.3	0.3	0.3	0.3
Oil	1.38	1.38	1.38	1.38
Lime stone	0.4	0.4	0.4	0.4
Salt	0.19	0.19	0.19	0.19
Soda Bi Carbonate	0.08	0.08	0.08	0.08
Premix Vitamin	0.05	0.05	0.05	0.05
Premix Minerals	0.05	0.05	0.05	0.05
Dietary Methionine	0.31	0.31	0.31	0.31
L-Methionine	0.05	0.05	0.05	0.05
Lysine Sulphate	0.38	0.38	0.38	0.38
L-Threonine	0.1	0.1	0.1	0.1
Diclazulin	0	-	-	-
Antibiotics	0.01	0.01	0.01	0.01
Phytase enzyme	0	0	0.075	0.075
Over-all	100	100	100	100

Time to time which are given under schedule during experiment (**Table 4**).

Data analysis

In Microsoft excel the data was formulated then further analyzed in One-way analysis of difference (ANOVA) through (statistix 8.1 software) and significant variances were associated using the LSD examination procedure ($P<0.05$).

Results and Discussion

In current study, the growth performance and blood profile of broiler was observed high in supplementation of *Moringa oleifera* with the combination of phytase enzyme in different treatment groups as compare to control. The highest live body weight, feed intake, weight of organs, dressing percentage were noted highest in treated group C comparatively to other groups of trial.

Live body weight (g/b)

The presence of *Moringa oleifera* leaf meal with combination of phytase enzyme in group C diet recorded significantly ($P<0.05$) the maximum body weight gain, (**Figure 2**). The reason for the advanced weight gain can be credited to high protein content of *Moringaoleifera* leaf meal as claimed [13,14]. In instances where phytase enzyme is supplemented, the higher body weight gain may be attributable to an increase in P availability and, maybe feed intake [15]. According ,that the higher CP (crude protein) content may be due to greater content of crude fiber (CF), which may impair nutrient absorption and digestion while the reduced weight gain of broilers fed the control diet group A may be ascribed to low crude protein content of the diet compared to other diets [16].

Feed intake (g/b)

The results showed that in group A feed intake was higher than group B, C and D, (**Figure 2**). In view of investigation the visible increase in feed intake might be attributed to increased largeness of the feed and metabolizable energy concentration of the diets.

Table 4 Schedule of vaccination for experimental broiler chicks.

Vaccines	Days	Routes
I.B + N.D	1 – 3	Eye Drops
IBD vaccine	12-Oct	Distal Water
H.P. Syndrome	16 - 17	S/C. (½ cc)
IBD vaccine	22	Distal Water
Newcastle disease (ND)	28	Distal Water
Antibiotics	0.01	0.01
Phytase enzyme	0	0
Over-all	100	100

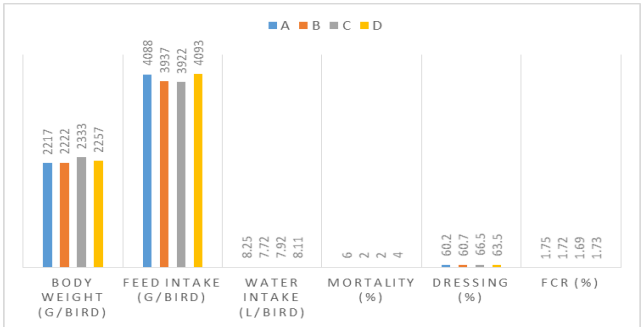

Figure 2 Live body weight + Feed intake + Water intake + Mortality + Dressing + FCR of broiler birds.

The reduced intake of diet may be due to excessive crude fiber content which may invariably decrease palatability [13].

Water intake (L)

The water intake of group A (control) was different from treatments groups B, C and group D. Maximum water intake was recorded in group A (control) and minimum in treated group C, (**Figure 2**). Statistical analysis showed that, there were two groups (B and D) in which the means were non-significantly different from one another while group C was significantly different from control group as well group B and D, respectively. The results shows that in group A (control) water intake was higher than group B, C and group D, respectively.

FCR (%)

In current results statistical analysis showed non-significantly different from groups A, B from one another while significant from group C and D in feed conversion ratio (FCR) among the groups, (**Figure 2**). Better economic gain by feeding MOLM to broilers since it has the potential of reducing feeding cost of broilers. who sated that birds fed on Moringa oleifera leaf meal based diets be heaved considerably improved than the chicks of control group in terms of increased weight gain and fostered feed conversion ratio [17].

Dressing percentage (%)

The dressing percentage in group C was higher than group B, D and group A (control). There was significant ($p<0.05$) difference in dressing percentage between those fed the Moringa oleifera leaf meal diet and birds fed control diet, (**Figure 2**). The reduced dressed weight at increased inclusion level could be as a result of effect of fiber which increased in the diets at higher presence level of MOLM in the diets. The result of the dressing percentage characteristics in this study is similar to the finding of, who reported that there were no significant differences among treatments for dressing percentage characteristic fed Moringa oleifera leaf meal[4].

Mortality Percentage

Mortality percentage of broiler chicks in group C was minimum than different other groups, (**Figure 2**). Statistical analysis showed non-significant difference was founded in different groups. It has been demonstrate that supplementation of high Moringa oleifera does not cause the mortality of broiler, [18].

Relative organs weight (%)

From four dietary treatments show (**Figure 3**), that there is Statistical analysis showed that group A and group D were significant difference in relative weight of liver compare to group B and C. while group B and C non-significant different from one another but with increase percentage of Moringa oleifera leaf, slightly weight of liver increased, also highlighted earlier, that there were no visible differentiation throughout treatment except for spleen, lung, gizzard their weight was higher significantly in chicks provided Moringa oleifera leaf meal [19]. Such morphological changes, supposedly caused by plant feed additives may provide further information on possible benefits to the digestive tract [20]. These results shows non-significant different in heart weight in different treated groups. Similarly, reported that heart weight slightly increased in different treated groups [19]. The intestine weight of different groups analyzed and the intestine weight of groups D was higher than rest of groups. Such morphological changes in gastrointestinal tissues may provide further information on possible profits to the digestive tract [22]. The increase of villous height of different small intestine segment may be attributed to the role of the intestinal epithelium as a natural barrier against pathogenic bacteria and toxic substances that are present in the intestinal lumen [23]. Relative weight of proventriculus decrease with different concentration of Moringa oleifera leaf [24]. Level of blood profile of broiler was analysis, where the red blood cells, Hemoglobin, total protein, packed cell volume were counted higher in treated C group as related others treated group and control (A), respectively. The level of white blood were counted highest in D group and glucose was highest in (A) group compared to other treatments groups respectively.

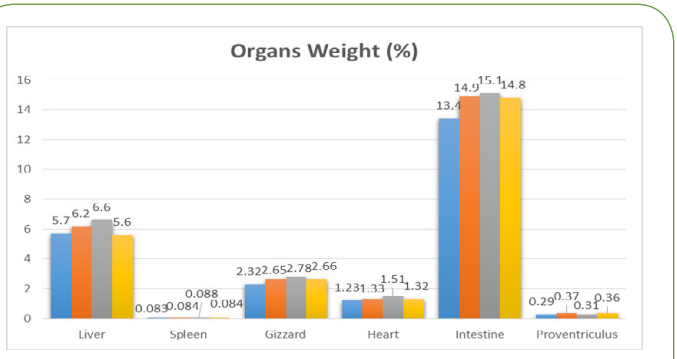

Figure 3 Different organs weight percentage of broiler birds.

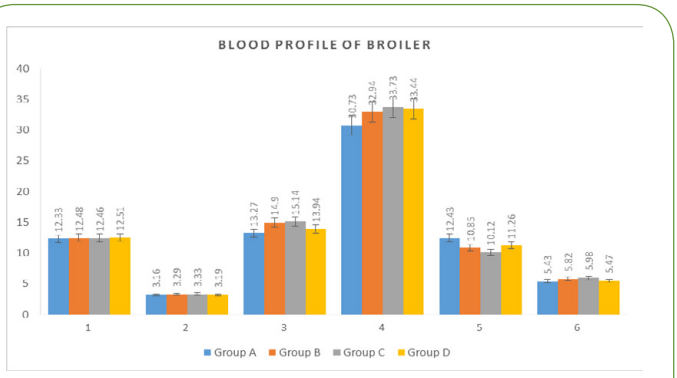

Figure 4 Blood profile of broiler), *White blood cells count, (2). Red blood cells count, (3). Blood hemoglobin, (4). Packed cell volume count, (5). Blood Glucose Count, and (6). Total proteins count.*

White blood cells count (x10^3 /µL)

All-pair-wise test shows that in two different groups (B and C) in which the means were non-significantly different from one another while significant different from control group A and group D, respectively. In (**Figure 4**), shows that white blood cells average were counted in group A (control) and treated groups (12.33, 12.48, 12.46 and 12.51 x10^3 /µL), respectively.

The comparable WBC of birds suggests that the animals were healthy because decrease in number of WBC below the normal range is an indication of allergic conditions, anaphylactic shock and certain parasitism or presence of foreign body in circulating system [25]. The general non significance of the WBC across treatments indicates that the experimental diets neither impaired nor enhanced the birds' ability to wade off infection [14].

Red blood cells count (x106 /µL)

The result in (Figure 4), indicate that average red blood cells were count in different groups A, B, C, and group D (3.16, 3.29, 3.33 and 3.19 x 10^6 /µL), respectively. In group C the Maximum red blood cells was counted (3.33 x 10^6 /µL), as compared to group B (3.29 x 10^6 /µL) and group D (3.19 x 10^6 /µL). In group A (control) the average was counted (3.16 x 10^6 /µL). Statistically there were no significant pairwise differences among the means of different groups, respectively. In group C the results shows the higher red blood cells counted than treated and control group A respectively. The values obtained for RBC of birds fed MOLM diets were higher than the range of 3.07 to 7.50 x 10^6/mm^3 reported but within 5–8 x 10^6/mm^3 reported .The higher RBC recorded for birds fed MOLM diets indicates a higher protein quality of these diets and that MOLM increased the blood quality. [26-28] reported that increased RBC values were associated with high quality dietary protein and with disease free animals. Red Blood Cells (RBC) are responsible for the transportation of oxygen and carbon dioxide in the blood as well as manufacture of hemoglobin hence higher values indicate a greater potential for this function and a better state of health [14].

Blood hemoglobin (g/dl)

In (**Figure 4**) the results showed that normal blood hemoglobin (g/dl) was noted in group A (control) and in treated groups (13.27, 14.90, 15.14 and 13.94 g/dl), respectively. In treated group C the maximum hemoglobin was counted (15.14 g/dl). In control group A average hemoglobin was counted (13.27 g/dl). Statistically analysis that there were in two groups control group A and group D, where the means were not significantly different from one another while significant from groups B and D, respectively. In group C the results was shows that highest hemoglobin counted than other treated and control groups, respectively.

Packed cell volume count (%)

In (**Figure 4**) the result are showed the average packed cells volume in control and treated groups were counted (30.73, 32.94, 33.73 and 33.44%) respectively, Maximum packed cell volume was in group C (33.73%), Minimum packed cell volume counted level (30.73%) was counted in control group (A), where the broiler chicks did not supplied Moringa oleifera with phyase enzyme. Statistically analysis there were in three groups (B, C and D) the means were not significantly different from one another, while significant from group A (control), respectively. The PCV values obtained in this study though it differed significantly among the group was within normal range [29]. The values obtained for all the treatment groups indicate nutritional adequacy of all diets and presence of a toxic factor, since values did not indicate malor under nutrition [30]. PCV is an index of toxicity reduction in the blood usually and suggest presence of a toxic factor which has adverse effect on blood formation [31].

Blood Glucose Count (mmol/L)

In (**Figure 3**) the result showed that the average of blood glucose counted in A (control) and treatment groups (12.43, 10.85, 10.12, and 11.26 mmol/L), respectively. In group A (control) the maximum blood glucose level was counted (12.43 mmol/L), Minimum blood glucose count was noted (10.12 mmol/L) in treated group C, respectively. There were two groups (B and C) in which the means were not significantly different from one another while significant from group A and D, respectively.

Total proteins count (mg/dl)

In (**Figure 4**) the result showed that the average of total proteins count in treated groups and control (A) group was (5.43, 5.82, 5.88 and 5.47 mg/dl), respectively. In treated group C the maximum total proteins count was noted, as related to others groups. Minimum total protein count level (5.43) was reported in control (A) group, where the chicks were not provided Moringa oleifera with phyase enzyme. Statistical analysis showed that, there were non- significantly different from one another, respectively.

Conclusion

From these result, it is concluded that starter broilers could tolerate up to 2.5% MOLM and 0.075 g/kg Phytase enzyme Moringa oleifera leaf meal inclusion in their diets without adverse effects on their growth performance and blood characteristics.

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