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Efficacy of *Moringa olifera* Leaf Aqueous Extract Supplementation on Growth Performance of Native 'Ankleshwar' Poultry Birds

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ABSTRACT: In this investigation the efficacy of different levels of *Moringa olifera* leaf aqueous extract (MOLAE) was examined on two hundred birds of four-weeks-old 'Ankleshwar' chicks at growing stage. The birds were randomly allocated into four different treatments and each treatment contained 50 chicks. The feed treatments groups were as; T-0 (control), T-1 (60 ml of MOLAE), T-2 (90 ml of MOLAE) and T-3 (120 ml of MOLAE), respectively. Results of this investigation revealed that the significant (P<0.001) highest body weight was observed with supplementation of 90 ml L^{-1} (1426.22g ± 18.12) as compared to control (1283.82 g ± 24.54) as well as 60 ml L^{-1} (1311.08^{a} g ± 18.50) and 120 ml L^{-1} (1332.38^{a} g ± 14.77). There was a non significant difference in total feed intake when birds supplemented with 60 ml L^{-1}, 90 ml L^{-1} and 120 ml L^{-1} compared to control group. Feed conversion ratio (FCR) was significantly (P<0.05) improved with 90 ml L^{-1} MOLAE compared to 60 ml L^{-1}, 120 ml L^{-1} and control group. Mortality percentage was not significantly influenced by feeding with different levels of MOLAE and was 4.0 %, 1.0 %, 1.50 % and 3.0 % in control group, 60 ml L^{-1}, 90 ml L^{-1} and 120 ml L^{-1}, respectively. In summary, *Moringa olifera* leaf aqueous extract may be given at 90 ml L^{-1} in the drinking water to native birds as it did not show any harmful effects on production performance.

Keywords: Ankleshwar bird, growth performance, *Moringa olifera*, natural feed.

INTRODUCTION

Since immemorial time, poultry farming is considered as an integral part of livestock rearing as crucial place in India due to most of its population are living in rural parts and has huge potential as it provides an opportunity to uplift the economic growth for the rural farmers and woman's to have supplementary income generation for their family by using low investment cost (Lavania and Verma 2022; Kumar *et al*., 2020). Due to the adaptability in the adverse climate of the country, the native birds are highly preferred in the rural areas as poultry production promises improved production of meat and eggs.

Despite the fact that poultry industry in India has created exceptional progress throughout last three decades, nonetheless raising expense and inaccessibility of the feed ingredients are significant hindrance for target production. Feed is that costliest of all inputs and concerning 70% of manufacturing cost is accounted for feed alone (Soren and Kumar 2020). Concerning the health of the consumers, the use of herbal plants and their derivatives can be used as an effective alternative of chemically based feed supplements. *Moringa oleifera*, native to India grown in tropical and subtropical parts of world. Moringa is a cost-effective and easily available and rich source of minerals, vitamins, amino acids, energy, crude protein, polyphenols and low levels of tannins, trypsin and amylase inhibitors, (Saranya *et al*., 2023; Leone *et al*., 2015; Moyo *et al*., 2012; Makkar and Becker 1997) and with high antioxidant, anti-inflammatory, anti-mutagenic and anti-cancer properties (Verma *et al*., 2013). These naturally plant-based growth promoters have potential in enhancing the production and believed to be safe due to no residual toxicity (Jayanti *et al*., 2017). In previous reports, the supplementation with moringa leaf extract improved the overall performance of the birds without showing any detrimental effect on their health (Verma *et al*., 2022). Likewise, supplementation with moringa leaves showed the potential to enhance the level of immune response and to improve intestinal health of broiler chicken (Yang *et al*., 2006). However, as per best of our knowledge no previous such reports are available on the effect of moringa leaf extract supplementation with water of '*Ankleshwar*' Indian breed of poultry in growing stage from 4th week to up to 20th week therefore justifies to be investigated. In view of high nutritional aspects and cost effectiveness properties and ease of availability and natural based feed supplement as *Moringa oleifera* leaves was selected in this investigation to find out a suitable level among different levels of moringa leaves aqueous extract to feed the poultry birds. This experiment was designed with the view to reduce cost of feed and increasing the poultry weight for increasing the income of farmers by supplementation of *Moringa oleifera* leaves extract in the poultry feed.

MATERIAL AND METHODS

Experimental Site: The current investigation was carried out to evaluate the effect of different levels of *Moringa oleifera* leaf aqueous extract supplementation on growth performance of poultry breed 'Ankleshwar' chicks at Poultry unit of the Department of Animal Production, College of Agriculture, Sumerpur, Pali, Rajasthan for a period of 16 weeks (4-20 weeks) for growth and health performance.

Birds and Housing: Prior to beginning of this investigation trial, the experimental shed, its premises and the equipment were thoroughly cleaned and disinfected. Saw dust was provided as a bedding material for the birds. A total of two hundred four-weeks-old 'Ankleshwar' poultry chicks (mixed sexes) were procured from a Poultry Farm maintained at College of Agriculture, Bhilwara, Rajasthan. The chicks were randomly divided into four different treatment groups and each treatment included fifty chicks. The chicks were reared on deep litter system for the period of sixteen weeks.

Dietary Treatments: To feed the chicks in this investigation the readymade feed was used. Crude protein content 16.0 percent and metabolic energy 2.8 M cal/kg. The chemical analysis of the Moringa leaf was carried out as per AOAC (2012). The feed treatments groups were; as control (T-0), 60 ml of moringa leaf aqueous extract (T-1), 90 ml of moringa leaf aqueous extract (T-2) and 120 ml of moringa leaf aqueous extract (T-3), respectively.

Preparation of Moringa leaf extract: *Moringa oleifera* leaves were harvested from college farm between January to February and leaves were removed from the stems, sorted, cleaned with tap water, and air dried under shade for 5 days. The dried Moringa leaves were crushed and ground to get Moringa leaf powder. Total 60 g Moringa leaf powder was soaked in one litre of tap water for 24 hrs, and then filtered using a muslin cloth to separate the debris from the filtrate and the collected extract was diluted using fresh water (v/v) to make solutions *viz.*, 60, 90 and 120 ml/1000 ml water respectively. This procedure was carried out daily and the filtrate served to the experimental birds.

Data collection

Feed intake (g): The daily intake feed was calculated by the difference between total feed offered subtracted by feed left over. The fortnightly record of average feed consumed was obtained for each treatment by dividing the total quantity of feed consumed by the total number of chickens in each treatment.

Body weight gain (g): The gain in the body weight was calculated by subtracting the previous fortnight's body weight from the current fortnight body weight. The initial weights of the birds were taken at the commencement of the study. The record obtained was used to calculate the average body weight gain.

***Feed conversion ratio*:** The feed conversion ratio (FCR) was determined from the average feed consumed divided by average weight gained by the birds in each treatment.

Statistical analysis: Data collected were subjected to one way analysis of variance (ANOVA) based on the Completely Randomized Design model, using Statistical Analysis System (SAS, 2012). Where differences occurred at 5 % ($p<0.5$) they were separated using Duncan's Multiple Range Test.

RESULTS AND DISCUSSION

A. Proximate composition of Moringa olifera leaves

The proximate composition of *Moringa olifera* leaf was used in this experiment (Table 1). *Moringa oleifera* leaves Dry matter (88.26%), Moisture (11.74%), Crude protein (23.16 %), Organic matter (90.11 %) Crude fibre (9.15%), ether extract (5.10%), Nitrogen free extract (52.70%) and Ash content (9.89%). Our results are in close agreement with Esiegwu (2019) who found the dry matter (93.05 %), moisture (6.95 %), ether extract (6.45 %), crude protein (23.42 %), crude fibre (16.21 %), ash content (10.03 %) and nitrogen free extract (36.94 %) respectively. Meel *et al.* (2018) who observed that *Moringa olifera* leaf had organic matter (90.24 %), crude protein (23.31 %), ether extract (4.70 %), crude fibre (9.26 %), nitrogen free extract (52.97 %) and ash content (9.76 %) respectively. In another investigation, lower value of dry matter (77.40 %), higher protein value (26.30 %) and total ash (14.10 %) was also observed and almost at par values of crude fibre (8.8%), ether extract (5.70 %), respectively (Damor *et al*., 2017). The variations in the nutritive values of *Moringa oleifera* might be due to the season of harvest, soil fertility level, proportion of leaf and stem, postharvest treatments and existing agro-climatic conditions where trees were grown (Divya *et al*., 2014).

B. Impact of Moringa olifera leaf extract on body weight performance of 'Ankleshwer' poultry birds

The results showed that the final body weight and weight gain was significantly (*P<0.01*) higher when supplemented with *Moringa olifera* leaf aqueous extract (MOLAE) to 'Ankleshwer' poultry birds (Table 2). Among different used concentrations, 90 ml L^{-1} exhibited significantly highest body weight (1426.22g±18.12) as compared to control (1283.82g ± 24.54) and other treatment groups. The MOLAE (90 ml L^{-1}) recorded the highest body weight gain may be due to higher protein content in the diet (Safa and Taji 2014; Meel and Sharma 2021). In our investigation the MOLAE when supplemented with 120 ml L^{-1} showed a lower body weight due to the negative effect of the anti-nutritional factors present in *Moringa olifera* leaf meal on the birds and higher intake of tannin, phytate and oxalate leading to nutrient in balance and poor metabolism (Sara *et al*., 2020; Tijani *et al.,* 2016; Iheukwumere *et al*., 2008). Present findings are comparable with the results reported by Esiegwu (2019) who observed a higher body weight gain on 60-day old broilers when supplemented with *Moringa olifera* leaf water (MOLW) 150 g 20 L^{-1} water as compared with 250 g 20 L^{-1} MOLW and control. Sara *et al*. (2020) also investigated that cob broiler birds when fed with control, 3 %, 5 % and 7 % *Moringa olifera* leaf meal (MOLM) and found that among all the concentrations 3 % MOLM recorded the highest body as compared to all other concentrations.

C. Impact of Moringa olifera leaf extract on Feed Intake performance of 'Ankleshwer' poultry birds

There was a non significant decrease in total feed intake when birds supplemented with 60 ml L^{-1}, 90 ml L^{-1}, 120 ml L^{-1} compared to control groups (Table 2). The control group (T-0) recorded the higher total feed intake as compared to 120 ml L^{-1} MOLAE, 60 ml L^{-1} MOLAE and 90 ml L^{-1} MOLAE, respectively. The reduction in feed intake with inclusion of MOLAE might be improved digestion and metabolism activities of *Moringa oleifera* (Alabi *et al*., (2017). Furthermore, leaves of *Moraga oleifera* are rich in carotenoids, vitamins, minerals, amino acids, alkaloids, and flavonoids (Siddhuraju and Becker 2003). These results are in accordance with the findings of Sara *et al*. (2020) who observed total feed intake on Cobb broiler and observed no significance differences between the experimental groups fed on the basal diets containing 0 % (4037 g/bird), 1% (3987 g/bird), 3% (3990 g/bird), 5% (4100 g/bird) and 7% (4120 g/bird) MOLM. This finding is similar to those of Ashong and Brown (2011), who reported that the control group had higher feed intake compared to the treatment groups when *Moringa oleifera* leaf meals were fed to White Leghorn type of chickens. There was a marked reduction in the feed consumption of birds fed on 7% MOLM diet. This reduction might be due to reduced palatability of the diet (Kakengi *et al*., 2003). In contrast to present findings Safa and Taji (2014) observed significant difference in the feed intake of the birds among the treatments. The feed intake increased significantly (P<0.05) with the increasing level of MOLM.

D. Impact of Moringa olifera leaf extract on Feed conversion ratio of 'Ankleshwer' poultry birds

Feed conversion ratio (FCR) was significantly (*P<0.05*) improved with 90 ml L^{-1} MOLAE (T-2) compared to 60 ml L^{-1}, 120 ml L^{-1} and control groups (Table 2). The improvement in FCR was recorded in the sequence as 120 ml L^{-1} MOLAE >60 ml L^{-1} MOLAE > 90 ml L^{-1} MOLAE > control, respectively. This might be due to the presence of bioceutical agents in *Moringa oleifera* plant as previously reported by Lannaon (2007) and bacterial and immune-stimulant activities of *Moringa oleifera* plant (Ghazalah and Ali 2008). Meel and Sharma (2021) also reported that the diet supplemented with 1.5% *Moringa olifera* leaf meal showed better feed conversion ratio in broiler chicks (Vencobb-400) for the experimental period of 42 days. Likewise, Sara *et al*., (2020) who reported that broilers when fed on a diet containing 3% MOLM achieved better feed conversion (1.59; P < 0.001) compared with other experimental groups in broiler chicks 'Cobb' for up to 42 days. Alabi *et al*. (2017) also found that FCR was significantly improved with an inclusion of 90 ml L^{-1} and 120 ml L^{-1} (1.46 and 1.50 respectively) as compared to control (1.58) in Hubbard broiler chicks for up to six weeks. Likewise, in another investigation, Esiegwu (2019) who found the higher FCR when supplemented with moringa leaf powder @ 150 g 20 L^{-1} water.

E. Mortality of 'Ankleshwer' poultry birds

Mortality percentage was not significantly influenced by different levels of MOLAE (Table 2). Mortality was 4.0 %, 1.0 %, 1.50 % and 3.0 % in T-0, T-1, T-2 and T-3, respectively which is negligible in poultry production. However, there was no significant effect on the health of experimental birds when supplemented with *Moringa olifera* leaf aqueous extract. Previously, in a similar investigation Safa and Taji (2014) had also observed non significant results for the mortality rate in Ross broilers for the period of seven weeks.

Table 1: Proximate composition of *Moringa oleifera* leaf.

Parameters	Composition (%)
Dry matter	88.26
Moisture	11.74
Organic Matter	90.11
Crude protein	23.16
Crude fibre	09.15
Ether extract	05.10
Nitrogen free extract	52.70
Ash	09.89

Table 2: Effect of different levels of *Moringa olifera* leaf aqueous extract (MOLAE) on growth performance of 'Ankleshwar' poultry birds.

Parameters	T-0	T-1	T-2	T-3	Significance
Initial Body Weight (g)	278.74±9.86	270.18±10.83	276.84±10.83	279.52±11.50	NS
Final Body Weight (g)	1283.82^{a}±24.54	1311.08^{a}±18.50	1426.22^{b}±20.12	1332.38^{a}±14.77	*
Total Body Weight Gain (g)	1005.08^{a}±22.76	1040.90^{a}±19.47	1149.38^{b}±21.89	1052.86^{a}±16.46	*
Total feed intake (g)	6799.49±149.35	6695.66±137.51	6611.52±136.57	6716.78±148.40	NS
Average daily feed intake (g)	56.66±9.96	55.80±9.17	55.10±9.10	55.97±9.89	NS
Feed Conversion Ratio	6.95^{a}±1.39	6.70^{a}±1.31	6.12^{b}±1.42	6.93^{a}±1.67	*
Mortality %	4.00	1.00	1.50	3.00	NS

CONCLUSIONS

Rural poultry production system, particularly semi range-based technology, can be a viable tool for poverty alleviation among landless and small land holder masses. From this investigation it can be concluded that dietary incorporation of *Moringa oleifera* leaf aqueous extract 90 ml L^{-1} is a vital source of nutrients and alternative sustainable feed ingredient for 'Ankleshwar' native birds.

FUTURE SCOPE

This investigation delivers key information for the application of naturally herbal based feed supplementation on the health and growth performance of poultry bird cv. 'Ankleshwar'. Furthermore research exploration will encourage the farmers to use the herbal based feed supplements ahead of chemically based feed supplements. Owing to the cost effectiveness and benefits on growth performance, human-health and environment the application of naturally based feed supplements can be further explored.

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Conflict of Interest. None.

REFERENCES

Alabi, O. J., Malik, A. D., Ngambi, J. W., Obaje, P. and Ojo, B. K. (2017). Effect of aqueous *Moringa oleifera* (Lam) leaf extracts on growth performance and carcass characteristics of Hubbard broiler chicken. *Brazilian Journal of Poultry Science, 19*(2), 273-280.

AOAC (2012). *Association of Official Analytical Chemist.* Official Method of Analysis of AOAC International, 19th Edn. Washington D.C., U.S.A.

Ashong, J. O. and Brown, D. L. (2011). Safety and efficacy of *Moringa oleifera* powder for growing poultry. *Journal of Animal Science, 89*(1), 84- (M220).

Damor, S. V., Pawar, M. M., Ankuya, K. J., Gami, Y. M., Srivastava, A. K. Chauhan, H. D. and Chaudhary, K. R. (2017). Effect of feeding different levels of moringa (*Moringa Oleifera*) leaves on growth performance of Mehsana goat kids. *Trends in Biosciences, 10*(18), 3190-3193.

Divya, A. B. Mandal, A., Biswas, Yadav, A. S. and Biswas, A. K. (2014). Effect of dietary *Moringa oleifera* leaves powder on growth performance, blood chemistry, meat quality and gut microflora of broiler chicks. *Animal Nutrition and Feed Technology, 14,* 349-357.

Esiegwu, A. C. (2019). The supplementary effect of *Moringa oleifera* leaf water on performance and blood indices of finisher broilers. *Direct Research Journal of Veterinary Medicinal and Animal Science, 4*(4), 27-32.

Ghazalah, A. A, and Ali, A. M. (2008). Rosemary leaves as a dietary supplement for growth in broiler chickens. *International Journal of Poultry Science, 7*(3), 234-239.

Iheukwumere, F. C., Ndubuisi, E. C., Mazi, E. A. and Onyekwere, M. U. (2008). Performance, nutrient utilization and carcass characteristics of broilers fed cassava leaf meal diet. *Pakistan Journal of Nutrition, 7*(1), 13-16.

Jayanti, L. A., Manwar, S. J., Khose, K. K. and Wade, M. R. (2017). Effect of supplementation of *moringa oleifera* leaf powder on growth performance of broilers. *Journal of Poultry Science and Technology, 5*(03), 28-34.

Kakengi, A. M. V., Shen, M. N., Sarwart, S. V. and Fujihara, T. (2003). Can *Moringa oleifera* be used as protein supplement to ruminant diet ? *Asian-Australian Journal of Animal Science*, *18*(1), 42-47.

Kumar, A. R., Yugandhar, M. and Vinod, R. (2020). Rajasri birds-A source of better livelihood for rural farmers in Guntur district. *Journal of Krishi Vigyan, 9*(2), 189-183.

Lannaon, W. J. (2007). Herbal plants as source of antibiotics for broilers. *Agriculture Magazine, 11*(2), 55.

Lavania, P. and Verma, M. P. (2022). Production and economic performance of pratapdhan chickens for backyard farming in Sirohi district of Rajasthan. *The Haryana Veterinarian, 61*(1), 14-17.

Leone, A., Spada, A., Battezzati, A., Schiraldi, A., Aristil, J. and Bertoli, S. (2015). Cultivation, genetic, ethnopharmacology, phytochemistry and pharmacology of *Moringa oleifera* leaves: An overview. *International Journal Molecule Science, 16,* 12791–12835.

Makkar, H. P. S. and Becker, K. (1997). Nutrients and anti-quality factors in different morphological parts of the *Moringa oleifera* tree. *The Journal of Agricultural Science, 128,* 311–322.

Meel, M. S. and Sharma, T. (2021). Effect of feeding *Moringa oleifera* leaf meal as feed additive on the performance and carcass characteristics of broiler chicks. *International Journal of Current Microbiology Applied Science, 10* (1), 40-46.

Meel, P., Gurjar, M. L., Nagda, R. K., Sharma, M. C., Gautam L. and Manju (2018). Growth performance of sirohi goat kids fed different levels of *Moringa oleifera* leaves. *Journal of Entomology and Zoology Studies, 6*(4), 786-791.

Moyo, B., Oyedemi, S., Masika, P. J. and Muchenje, V. (2012). Polyphenolic content and antioxidant properties of *Moringa oleifera* leaf extracts and enzymatic activity of liver from goats supplemented with *Moringa oleifera* leaves/sunflower seed cake. *Meat Science*, *91*, 441-447.

Safa, M. A. and EI Taji (2014). Effect of feeding different levels of *Moringa oleifera* leaf meal on the performance and carcass quality of broiler chicks. *International Journal of Science and Research, 3*(5), 147-151.

Sara, A., Mickdam, E., Ibrahim, A. and Sayed, A. (2020). The effect of dried Moringa oleifera leaves on growth performance, carcass characteristics and blood parameters of broiler chicken. *SVU-International Journal of Veterinary Sciences, 3*(1), 87-99.

Saranya, V., Perasiriyan, V., Narayanan R., Mangala Gowri A., and Sujatha G. (2023). *Moringa oleifera*: A review on nutritive properties of leaves and its application on dairy products. *Biological Forum – An International Journal, 15*(6), 461-466.

SAS - Statistical Analysis System (2012). SAS user guide: release 9.2. Cary: SAS Institute.

Siddhuraju, P. and Becker, K. (2003). Antioxidant properties of various solvent extracts of total phenolic constituents from three different agroclimatic origins of drumstick tree (*Moringa oleifera* Lam.) leaves. *Journal of Agricultural and Food Chemistry, 51*(8), 2144–2155.

Soren, P. and Kumar, P. (2020). Efficacy of *Azolla Pinnata* as an adjunct to increase poultry weight, egg production and egg weight. *Journal of entomology and zoology studies*, *SP-8*(2), 42-45.

Tijani, L. A., Akanji, A. M., Agbalaya, K. and Onigemo, M. O. (2016). Haematological and serum biochemical profiles of broiler chickens fed diets containing *Moringa leaf* meals. *Journal of Tropical Agriculture, food, Environment and Extension, 14* (3), 7-11.

Verma, A. K., Pramanik, P., Gautam, S., Kumar, R., Verma, M. K. and Panday, G. (2022). Effect of *Moringa olifera* leaf extracts on growth performance and haemato-biochemical indices of broiler chichens *The Haryana Veterinarian, 61*(1), 90-94.

Verma, S., Singh, A. and Mishra, A. (2013). Gallic acid: molecular rival of cancer. *Environmental Toxicology Pharmacology, 35*, 473-485.

Yang, R., Chang, L., Hsu, J., Weng, B. B. C., Palada, M. C., Chadha, M. L. and Levawsseur, V. (2006). Nutritional and functional properties of moringa leaves from germplasm, to plant, to food, to health. *American Chemical Society*, 1-17.

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