



The Place of Moringa in Poultry Production: A review

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Abstract: *Moringa* has so many health benefits. The health benefit of *moringa* does not stop on the leaf alone. The roots, bark, gum, fruit, flower, seed and oil all exert some health benefits. The health benefit of *moringa* is due to the presence of phytochemical and nutrients it contains. This was found to be effective in improving the nutritional status of poultry and improving their immune system in combating disease such as coccidiosis, Newcastle and Gumboro. Thus, *moringa* is beneficial in improving the performance of broiler and laying chickens.

Key words: *Moringa*, Health, Phytochemical, Broiler, Layer

Introduction

In recent years, the use of plant leaves in poultry production is getting much attraction of researchers. This is due to the phytochemical composition of the leaf which aid in improving the health status of the animals thereby serving as growth promoter. Fasuyi and Olorunfemi (2008) used *Telfairia occidentalis* in laying birds in which the hen day production and egg yolk colour were significantly higher than the control. So many researchers used *Moringa oleifera* leaf in feeding poultry with superb results were reported in improving performance and haematological characteristics (Gadzirayi *et al.*, 2012; Makanjuola *et al.*, 2014; Alabi *et al.*, 2017; Akinola and Ovotu, 2018). *Moringa oleifera* Lam, *Moringaceae*. It's a tree that is originated from India, South of Himalayan mountains. The leaves and fruits of *M. oleifera* are used as food (Umaye *et al.*, 2014)

Phytochemicals in *Moringa oleifera* Leaf

Frying does not increase flavonoid content but increases the phenolic content of *moringa* leaf significantly with equal increase in 2,2-diphenyl-1-picrylhydrazyl radical scavaging and iron-chelating ability (Subudhi and Bhoi, 2014). Pakade *et al.* (2012) found higher total phenolics and total flavonoids content in *moringa* than cabbage, Spinach, peas, cauliflower and broccili. *Moringa* leaves are the most used part been it high in vitamins, poly phenols, flavonoid, alkaloid, glucosinolic acid, isothiocyanic acid, tannin and saponin (Subudhi and Bhoi, 2014; Ustundag and Ozdogan 2016; Vergara-Jimenez *et al.*, 2017).

Table 1 Nutrients Composition of *Moringa oleifera* Leaf Meal (MOLM)

Nutrients	Range	Authors
Moisture	5.75-10.10%	1,2,4,5,6 and 9
Crude protein	17.00-32.46%	1,2,3,4,5,6,7,8 and 9
Crude fibre	6.5-22.5%	1,3,4,5,6,7,8 and 9
Ether extract	1.70 – 15.00%	1,3,4,5,6,7,8 and 9
Ash	7.41 -14.27%	1, 4,5,6,7,8 and 9
Nitrogen Free Extract	32.47 – 63.11%	1,3, 5,6,7 and 8
Phosphorus	0.31 – 0.42%	2,5 and 8
Calcium	1.90 – 6.98%	2,4,5,8,11 and 12
Potassium	0.9 – 2.4%	4,5 and 11
Magnesium	0.38-2.63	5 and 11
Sodium	1.80-1.93	5 and 11
Iron	0.41 – 150.5mg/kg	5, 10 and 12
Zinc	0.6-5.89mg/kg	4 and 5
Manganese	0.1-0.8mg/kg	5 and 12
Vitamin A	19mg/100g	12
Vitamin B1	2.04-2.59mg/100g	12
Vitamin B2	20.5-21.5mg/100g	12
Vitamin B3	7.6-8.25mg/100g	12
Vitamin B12	2.625mg/100g	12
Vitamin C	15.8-17.25mg/100g	12
Vitamin E	10.8	12

(1) Odeyinka *et al.* (2006), (2) Sebola *et al.* (2017), (3) Gadzirayi *et al.* (2012), (4) Tijani *et al.* (2016a), (5) Ogbe and Affiku (2013), (6) Alabi *et al.* 2017, (7) Zanu *et al.* (2012), (8) Abou Sekken (2015), (9) Liaqat *et al.* (2016), (10) Tesfaye *et al.* (2014), (11) Aslam *et al.* (2005) and Ustandag and Ozdogan (2016)

Alabi *et al.* (2017) reported MOLM had 0.12µg/ml total flavonoid, 10.00µg/ml total phenol, 0.28mg/ml alkaloid, 1.18µg/ml tannin and 245.5µg/ml saponins. The water extract of moringa leaves have 0.12µg/mg total flavonoid, 1078µg/ml total phenol, 0.21mg/ml alkaloid, 5.33µg/ml tannin and 22.55µg/ml saponins. Ogbe and Affiku (2013) phytochemical and anti-nutrient analysis showed that tannin 21.20%, phytatic acid 2.58%, trypsin inhibitor 3.01%, saponin 1.64%, Oxalate 0.47% and Cyanic acid 0.10%. Abousekken (2015) found that *Moringa oleifera* leaf meal contained total phenol 3.68%, total flavonoid 0.65%, tannin 1.99% and polysaccharide 21.86%.

Nutritional Benefits of Feeding *Moringa oleifera* Leaf Meal

There was higher final body weight, average feed intake and feed conversion efficiency when MOLM was used as replacement for mineral and vitamin premix at 5% and 7.5% inclusion level (Igogu, 2014). Gadzirayi *et al.* (2012)

reported no significant difference between treatment 1 (0% moringa) and treatment 2 (25% moringa) in both feed consumption and live weight of broiler. Treatment 3 (50% moringa), 4 (75% moringa) and treatment 5 (100% moringa) were significantly lower consumption of feed and broiler chicken live weight.

Significantly higher body weight at the end of the experiment, daily body weight, feed consumption and water consumption were observed in group with antibiotic (positive control), while feed conversion ratio was significantly higher in treatment 2 (0 mL aqueous *Moringa oleifera* leaf extract) and treatment 4 (90mL aqueous *Moringa oleifera* leaf extract) (Alabi *et al.*, 2017). MOLM to broilers at 200g, 400g and 600g per 1kg, but without differing significantly except in FCR where treatment 3 was lower significantly compared to remaining treatments (Makanjuola *et al.*, 2014). Abbas (2013) found a significant decrease in final live weight and feed efficiency when moringa was added to cassava based broiler diet.

Effects Moringa Leaf Meal Based Diet on Haematological Parameters of Poultry

There was significantly higher haemoglobin, PCV, mean corpuscular haemoglobin, and mean corpuscular volume in the control diet when *Moringa oleifera* leaf meal was fed to layers (Akinola and Ovotu, 2018). PCV and WBC significantly higher in control diet than other treatments when MOLM was included at 5%, 10%, 15% and 20% (Tijani *et al.*, 2016b). The report of Zanu *et al.* (2012) showed no significant difference in blood parameters except for MCH that was significantly higher in control diet. EL Tazi and Tibin (2014) reported significantly higher PCV, RBC, and total serum protein at 5% inclusion than other experimental diets when moringa was included in broiler diets at 0, 3, 5, and 7% inclusion levels in broiler diet. There were no tangible differences in blood parameters measured but only in haemoglobin concentration (Anthony and Ashawe, 2014).

Effect of Moringa oleifera on Poultry Diseases

Moringa oleifera was found to be effective against coccidiosis and aflatoxin (Umay, 2014). The body immunity in broiler chickens that fight newcastle and infectious bursa diseases were significantly higher in treatment diets than the control (Liaqat, 2016; Mousa *et al.* 2017). Moringa has high antioxidant ability than other leafy vegetables. They concluded that the antioxidant ability of moringa is higher than these vegetables (Pakade *et al.*, 2012). Wright *et al.* (2017) reported that the polar solvents extracted moringa has significantly higher antioxidant properties than other solvents used.

Egg Quality Characteristics of Layers Fed Moringa oleifera Leaf Meal

There was significantly higher egg length, weight of egg shell, height of albumen, albumen weight, yolk weight, yolk height, yolk index and yolk colour in treatment 4 (50% cassava root chips and moringa) than the control (Tesfaye *et al.*, 2014). Egg quality parameters were significantly better in White Leghorn breed than Fayoumi breed while the yolk weight was reported to be significant in Fayoumi breed (16.13g) than white leghorn breed (15.28g) (AbdulRehman *et al.*, 2016).

Weight of egg and feed consumption showed difference significantly among groups with treatment diet compared to the control. Deeper yolk colour was observed in treatment 2 when MOLM at 0, 5, 10 and 15%. The albumen height and Haugh unit increase with increasing level of moringa (Lu *et al.*, 2016). Moringa leaf meal had significant impact on yolk colour without adverse effect on egg production. Moringa leaves powder does not have negative impact on the shape of egg measured and the thickness of the shell. When the albumen height increases and the yolk index reduce is indicating low cholesterol in the egg, this adds value to the egg in the face of consumer. Moringa leaves meal significantly affect egg weight at 5% inclusion in the feed (Abd EL-Hack *et al.*, 2018). Addition of MOLM in the diet of laying hens does not affect monthly egg laying percentage. The egg quality characteristics such as the shell thickness and yolk colour intensity were not different with the control (Paguia *et al.*, 2014).

Serum and Egg Biochemistry of Birds Fed Moringa oleifera Leaf Meals

Moringa oleifera has a hypocholesteremic effect which is used in poultry feed to reduce cholesterol content of egg (Abd EL-Hack *et al.*, 2018). Serum cholesterol, yolk cholesterol and serum protein were significantly higher in treatment 4 (cassava root chips and *Moringa oleifera* leaf meal) than the control (Tesfaye *et al.*, 2014). Rehman *et al.* (2018) reported that serum glucose decreases with an increase level of *Moringa oleifera* leaf meal. The control group had higher total serum cholesterol compared to the remaining groups after using MOLM to replace Canola in broiler diet. Tijani *et al.* (2016b) reported a significantly higher albumin protein, Aspartate aminotransferase and Alanine aminotransferase in control than other experimental diets. Uric acid and creatine were significantly lower in control than other experimental diets. Mousa *et al.* (2017) reported higher protein, albumin, and globulin with significantly

lower cholesterol and triglycerides in treatment diets than the control when *Moringa oleifera* and *Chicory intybus* were included in broiler diets.

The cholesterol was significantly lower for the diet with 10% MOLM inclusion (Anthony and Ashawe, 2014). Akinola and Ovotu (2018) reported significantly high cholesterol and high low density lipoprotein in the serum of control diet than treatments diets. Olugbemi *et al.* (2010) found that the serum cholesterol levels at 0.5 and 10% MOLP decreased cholesterol level up to 22%, while yolk cholesterol decreased by 12.1%. A significantly higher High density lipoprotein in egg when moringa was included at 0.5% (T₂) and 1% (T₃) (Akinola and Ovotu, 2018). *Moringa oleifera* leaf extract groups achieved significantly higher values total lipid, total cholesterol, high density lipoprotein and low density lipoprotein in comparison with the control group (Abousekken, 2015).

CONCLUSION

Moringa oleifera has high content of phytochemicals, minerals, vitamins and protein. The high composition of these nutrients in *Moringa oleifera*, attract the attention of researchers for its inclusion into the diet of poultry. This enhance the growth performance in poultry and improvement in body immunity thereby preventing the occurrence of certain diseases in poultry, hence moringa can be used as growth promoter in poultry production.

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