DOI : 10.5958/2349-4433.2024.00047.6

J Krishi Vigyan 2024, 12(2) : 246-251

Effect of *Moringa olifera* Leaf meal on Production Performance and Egg Quality Characteristics of *Swarnadhara* Breeders

B U Umesh*, M BharatBhushan, T Thirumalesh, B G Veeranna Gowda, G M Satheesha and M M Venkatesha

Department of LFC, Veterinary College, Shivamogga, Karnataka Veterinary Animal and Fisheries Sciences University, Bidar, Karnataka, India-577204.

ABSTRACT

An experiment was carried out to investigate the effects of supplementing *Moringa oleifera* leaf meal (MOLM), as a protein replacement for soyabean meal on production performance of Swarnadhara breeders. Three different graded levels of *Moringa oleifera* leaf meal were used in formulating the diets; T1 (Control- 0% MOLM), T2 (5% MOLM), T3 (10% MOLM) and T4 (15% MOLM). One hundred and twelve *Swarnadhara* breedersof aged thirty weeks were randomly allocated to the four treatment diets containing MOLM at 0, 5, 10, and 15% levels replacing crude protein of soyabean meal. Feed intake, hen-day egg production, egg weight, Feed conversion ratio, fertility, hatchability and egg quality characteristics were measured among different dietary treatments. Among different treatments where MOLM was included in the feed replacing CP of soyabean meal, there was an improvement seen in hen day egg production in all the treatment groups when compared to control. There was no significant difference in egg weight, egg mass and egg quality characteristics like shell thickness, haugh unit and yolk index. Therefore, as per present study *Moringa olifera* leaf meal can replace soyabean meal upto 15% level and can be a promising protein source in *swarnadhara* breeders.

Key Words*:* Fertility, Hatchability, Hen day egg production, *Moringa oleifera* leaf meal, *Swarnadhara* breeder.

INTRODUCTION

The major constraints that tend to restrict growth of poultry industry are availability of ingredients and rising cost of feed. Because of the increasing cost of common protein ingredient (soybean meal, groundnut cake, and fish meal), stockholders have little access to such resources. With the present trend of rising prices of feedstuffs, alternative locally available and cheap non-conventional feedstuffs like leguminous trees are increasingly being used as a substitute of conventional resources in the formulation of poultry diets. Due to rising demand brought on by the global expansion of the cattle industry and the manufacturing of ethanol, soybean meal—a significant source of protein for poultry feeding is becoming more expensive (Ayssiwede *et al*, 2011). Replacing cereals and expensive less available agro-industrial by-products by unconventional source of raw materials, is one of the solutions to reduce cost of production even in backyard and hybrid varieties of poultry. Therefore, *Moringa olifera* leaf meal (MOLM) is of special importance and can be a solution to reduce cost of production. Swarnadhara, a hybrid chicken variety popular throughout Karnataka state was used for the study. Vitamins, flavonoids, and carotenoids included in moringa leaves not only provide vital nutrition but also enhance the colour of chicken meat and eggs and heighten the colour of the shanks and egg yolk (Melesse *et al,* 2011). Various cultivable varieties of *M. Oleifera* like Bhagya and PKM-1 are also available for better yield (Rajamanickam and Arokiamary, 2022).

M. Oleifera leaf meal can be included in the feed to promote certain qualities in pullets. Research by Teteh *et al* (2016) demonstrated that feeding moringa leaves to Isa brown laying hens increased both egg production and weight. Similar tendencies have been observed on the internal quality of eggs, especially on yolk coloration

Corresponding Author's Email - umeshbu71@gmail.com

Table 1. Proximate composition of Moringa oleifera leaf meal.

Proximate composition	**Unit** (g/100g)
Moisture	7.60
Crude Protein	24.91
Ether Extract	6.52
Ash	11.08
Minerals	**Unit** (mg/100g)
Calcium	2462
Phosphorus	252

Table 2. Ingredient composition (% as is basis) of diets used in *Swarnadhara* breeders

Ingredient	**T1 (MLM 0%)**	**T2 (MLM 5%)**	**T3 (MLM 10%)**	**T4 (MLM 15%)**
Moringa Leaf meal	0	1	2	3
Soya bean meal	20	19	18	17
Maize	55	55	56	56
DORB	8.4	8.4	7.4	7.4
Sun Flower cake (Doc)	6	6	6	6
Lime Stone Powder	2	2	2	2
Di calcium Phosphate	0.65	0.65	0.65	0.65
Stone grit	8	8	8	8
Salt	0.5	0.5	0.5	0.5
Vitamin mix	0.005	0.005	0.005	0.005
Livertonic	0.1	0.1	0.1	0.1
Trace min	0.1	0.1	0.1	0.1
Methione	0.1	0.1	0.1	0.1
Lysine	0.05	0.05	0.05	0.05
Threonine	0.1	0.1	0.1	0.1
Total	100.005	100.005	100.005	100.005
Nutrients (%)				
CP	17	17	17	17
ME(Kcal/kg)*	2613	2603	2600	2592
Calcium	3.75	3.77	3.79	3.81
Total phosphorus	0.51	0.63	0.75	0.62
Methionine*	0.4	0.4	0.4	0.4
Lysine*	0.97	0.97	0.97	0.97

* - Calculated values

[1] – One gram of Vitamin AB_2D_3K supplement contained 82500 IU of Vitamin-A, 50 mg of Vitamin-B_2, 12000 IU of Vitamin-D_3 and 10 mg of Vitamin-K.

[2] – One gram of B-Complex supplement contained 8 mg of Vitamin-B_1, 16 mg of Vitamin-B_6, 80 mcg of Vitamin B_{12}, 80 mg of Vitamin-E, 120 mg of Niacin, 8 mg of Folic acid, 80 mg of Calcium pantothenate, 120 mg of Calcium and 300 mg of Phosphate.

[3] – One gram of Trace Minerals contained 54 mg of manganese, 52 mg of zinc, 20 mg of iron, 2 mg of iodine and 1 mg of cobalt.

Table 2. Effect on moringa leaves on swarnadhara breeder hen's performance (30-58 weeks).

Parameter	T1	T2	T3	T4	SEM	P value
Feed intake (g/ day/hen)	159.69	161.86	165.34	162.98	0.79	0.699
Egg weight (g)	60.07	59.03	59.07	59.69	0.27	0.447
Hen day egg production (%)	68.69 [b]	71.06 [a]	70.95 [a]	65.11 [c]	0.62	0.033
FCR	3.91	4.01	3.91	4.01	0.12	0.111
Fertility (%)	92.46	92.07	91.41	88.34	1.27	0.047
Hatchability (%)	82.17	81.78	81.56	78.2	0.77	0.047
Egg shell thickness.	0.35	0.38	0.36	0.38	0.01	0.176
Yolk index	0.41	0.41	0.42	0.41	0.01	0.241
Haugh unit.	84.300	79.000	86.070	80.980	1.550	0.410

(Tesfaye et al, 2014). Less research has examined the possibility of moringa leaves in breeder diets, despite their nutritional value. Therefore, the aim of the current study was to assess the effect of *M. oleifera* leaf on *Swarnadhara* breeder performances and hatching egg traits.

MATERIALS AND METHODS

Mature leaves of *Moringa oleifera* plants were collected and dried under the shade up to a moisture level of ≤ 12%, then ground and stored in polythene bags in a cool and dry place until further proximate analysis and feed formulation. Additionally, a chemical analysis (macronutrients) of the leaf meal was performed (Table.1). The 28 week study was conducted on 112 *Swarnadhara* breeders (30 week old). The birds were randomly assigned to four treatments (4 replicates of 7 birds (6+1 each) containing *Moringa oleifera* leaf meal at 0, 5, 10, and 15% levels replacing soyabean meal (Table 2). During the study, percent egg production, egg weight, feed conversion ratio, fertility and hatchability during laying period (30-58 weeks) among different dietary treatments. the feed to promote certain qualities in pullets. Research by Teteh *et al* (2016) demonstrated that feeding moringa leaves to Isa brown laying hens increased both egg production and weight. Similar tendencies have been observed on the internal quality of eggs, especially on yolk coloration (Tesfaye *et al*, 2014). Less research has examined the possibility of moringa leaves in breeder diets, despite their nutritional value. Therefore, the aim of the current study was to assess the effect of *M. oleifera* leaf on *Swarnadhara* breeder performances and hatching egg traits.

RESULTS AND DISCUSSION

Effect of *Moringa oleifera* leaf meal on breeder hens

The effect *Moringa oleifera* leaf meal on swarnadhara breeder hens performances are presented in Table 2.

Egg production

The overall mean of egg production percentage and egg weight were increased for hens fed on MOLM compared with the control group. Breeder hens in T3 and T4 groups corresponded with higher egg production when compare to Control and T2 groups. This Increased egg production may be due to the role of Moringa in the digestive tract of chickens which can increase feed digestibility and is caused by the presence of phytochemical compounds in Moringa leaves. Moringa leaves are also a source of vitamin A, riboflavin, nicotinic acid, folic acid, pyridoxine, ascorbic acid, β-carotene, calcium, iron, and α-tocopherol as reported by Prasad and Ganguly (2012). According to Ayssiwede *et al* (2011), feeding birds a meal containing 24% moringa leaves reduces their intake. On the other hand, Kakengi *et al* (2007) observed an increase in feed intake in layers when 15% or 20% of dehulled sunflower seed meal was replaced by MOLM. The discrepancy in feed intake could be further explained by the lower or higher energy content of MOLM relative to the dietary components it

replaced in different studies. The current results suggested that a supplementation level of MOLM up to 15% did not have negative effect on feed intake.

Egg weight

Moringa inclusion levels did not influence egg weight at different magnitude in the present study. This supports the results of Olugbemi et al. (2010), who found that supplementation of MOL up to 10% did not affect egg weight.

Feed efficiency

The results showed that the FCR of breeder hens were not significantly improved in response to the increase of dietary MOLM supplementation. Moringa leaf extract can be useful to be used as an effective feed supplement in poultry to improve feed efficiency in poultry (Akhouri *et al* 2013) This result was in contrary with Teteh *et al.,(* 2013), who reported that the high use of Moringa leaves in feed can cause increased levels of saponin which can reduce digestion and absorption of nutrients, especially lipids.

Hatchability and fertility

The data (Table 2) showed the effect of MOL on Fertility and hatchability of fertile eggs. Fertility and hatchability of fertile eggs were numerically improved in swarnadhara breeder chickens. Similar results were seen by Moyo *et al* (2011), who found that hens fed MOLM 70% had better fertility and hatchability of viable eggs than those fed MOLM 0%. Fertility and hatchability of fertile eggs were actually improved in chickens fed MOLM70%, compared with those on MOLM0%. According to Moyo *et al* (2011), MOLM has elevated zinc and vitamin E levels, but Park *et al* (2004) reported that zinc and vitamin E could play a beneficial role in the hatchability of eggs. The result obtained in the current study was inconsistent with the finding of Etalem *et al* (2014) using M. oleifera leaf meal as an alternative feed ingredient in the layer ration which showed non-significant effect of MOLM on fertility, hatchability and embryonic mortality. Park *et al* (2004) and Moyo *et al* (2011) reported that higher concentrations of zinc and vitamin E found in *M. oleifera* leaves may improve an egg's capacity to hatch.

Egg quality parameters

It was observed that the egg weight, egg shell thickness, Yolk index and Haugh unit of the eggs laid by hens fed diets with added MOLM were similar during the experimental period (Table 2). These findings showed that feeding eggs up to 15% moringa leaf meal has no negative effects on the eggs' internal or exterior characteristics.These results were consistent with Swain *et al* (2016) who reported in Vanaraja laying hens; the egg quality characteristics *viz.* albumen (%), yolk (%), shell (%), shape index and shell thickness were similar in all the groups.

CONCLUSION

This present study provides credible information on the performance of swarnadhara breeder hens at different levels of MOLM. The results showed a better egg production where as there are no significant improvement in feed intake and feed conversion ratio of birds at 5%, 10% and 15 % of MOLM. Similarly, it was hereby concluded that the *M. oleifera* leaf meal could be included in the diet of swarnadhara breeder hens up to a level of 15% by replacing soyabean meal for better egg production, egg weight, feed intake and feed efficiency without any adverse effect on

production performance. The results of the present study showed that the *Moringa oleifera* used as a feed ingredient improves the production performance and the health status of swarnadhara breeder hens. Among different treatments where *Moringa olifera* leaf meal was included in the feed at 0,5,10 & 15 % levels replacing CP of soyabean meal, there was an improvement seen in hen day egg production and FCR in all the treatment groups when compared to control. There was no significant difference in egg weight, egg mass and egg quality characteristics like shell thickness, haugh unit and yolk index. Cost of egg production was less in all treatment groups compared to control. Therefore, *Moringa olifera* leaf meal can replace soyabean meal upto 15% level and can be a promising protein source in *swarnadhara* breeders. Moringa oleifera leaf meal can be added to Japanese quail diet up to 15% as partial replacement for soybean meal with no adverse effects on egg quality, fertility and hatchability.

REFERENCES

Akhouri S, Prasad A and Ganguly S (2013). Moringa oleifera leaf extract imposes better feed utilization in broiler chicks. *J Biol Chem Res* **30** (2)**:***447-50.*

Ayssiwede SB, Dieng A, Bello H, Chrysostome CAAM, Hane MB and Mankor A (2011). Effects of Moringa oleifera (Lam.) leaves meal incorporation in diets on growth performances, carcass characteristics and economics results of growing indigenous senegal chickens. *Pakistan J Nutr* ***10 (12):****1132-45.*

Etalem T, Getachew A, Mengistu U and Tadelle D (2014). Cassava root chips and Moringa oleifera leaf meal as alternative feed ingredients in the layer ration. *J Appl Poult Res* ***23****:614–24.*

Kakengi AMV, Kaijage JT, Sarwatt SV, Mutayoba SK, Shem MN, and Fujihara T (2007). Effect of Moringa oleifera leaf meal as a substitute for sunflower seed meal on performance of laying hens in Tanzania. *Livestock Res for Rural Dev* ***19(8):****120.*

Melesse A, Tiruneh W and Negesse T (2011). Effects of feeding Moringa stenopetala on nutrient intake and growth performance of Rhode Island Red Chicken under tropical climate. *Trop and Subtrop Agroeconomics* ***14****:485-492.*

Moyo B, Masika P J, Hugo A and Muchenje V (2011). Nutritional characterization of Moringa (*Moringa oleifera* Lam.) leaves. *African J Biotechno* ***10(60),*** *12925–12933. https ://doi.org/10.5897 /AJB10.1599.*

Olugbemi T S, Mutayoba S K and Lekule F P (2010). Evaluation of Moringa oleifera leaf meal inclusion in cassava chip-based diets fed to laying birds. *Livest Res Rural Dev* ***2(118).*** *http://www.lrrd.org/ lrrd22/6/olug22118.htm.*

Park S, Kim WK, Birkhold SG, Kubena LF, Nisbet D J and Ricke S C (2004). Using a feed-grade zinc propionate to achieve molt induction in laying hens and retain post-molt egg production and quality. *Biol Trace Element Res* ***101****:165–179.*

Prasad A and Ganguly S (2012). Promising medicinal role of Moringa oleifera: a review. *J Immunol Immunopathol.* ***14(1):****1-5.*

Rajamanickam C and Arokiamary S, 2022. Assessment of Moringa varieties for growth and yield characters. *J Krishi Vigyan, **11 (1)** : 7-10. DOI : 10.5958/2349-4433.2022.00094.0.*

Teteh A, Gbeassor M, Decuypere E and Tona K (2016). Effects of Moringa oleifera leaf on laying rate, egg quality and blood parameters. *Int J Poul Sci* **15**(7):*277-282 DOI:* 10.3923/ijps.2016.277.282.

Tesfaye E B, Animut G M, Urge, M L and Dessie T A (2014). Cassava root chips and *Moringa oleifera* leaf meal as alternative feed ingredients in the layer ration. *J Appl Poul Res **23**(4):614–624. https ://doi.org/10.3382/japr.2013-00920***.**

Swain B K, Naik P K, Chakurkar E B and Singh N P (2016). Effect of supplementation of *Moringa oleifera* leaf meal (MOLM) on the performance of Vanaraja laying hens. *Indian J Anim Sci **87 (3)**: 353–355.*

Received on 27/3/2024 Accepted on 24/4/2024