

Effect of Dosing Broiler Breeder Roosters with Different Levels of Moringa (*Moringa oleifera*) Leaf Powder on Some Reproductive Hormones

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ABSTRACT: The study was conducted at the poultry farm of the animal production Department - College of Agriculture - Al-Qasim Green University. This experiment was lasted for 42 days to study the effect of dosing different levels of moringa leaf powder on the reproductive hormones and weight gain of the broiler breeders. The moringa leaf powder was given to the roosters in the form of capsules at the rate of one capsule/day for each rooster. 12 broiler breeder roosters (Ross 308) aged 70 weeks were used in this trial, randomly divided in to 4 treatments with 3 replicates and one rooster for each replicate. The first treatment was the control treatment (without additives), while in the 2nd, 3rd, and 4th treatments 0.5, 1, and 1.5 gm of moringa leaf powder were used respectively. The results of this study showed a high significant superiority ($P < 0.01$) in the hormonal characteristics; whereas, the fourth treatment had the best performance in the percentage of LH, FSH, testosterone, and live body weight among other treatments.

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INTRODUCTION

The decline in fertility in broiler breeder flocks is considered an economic loss in poultry production because the number of fertilized eggs is what determines the profitability of breeder flocks (Remero – Sanchez et al 2008).

The quality of semen negatively affected by the age (when they getting older) of the broiler breeders' male as well as reduces the activity of antioxidant enzymes in sperm, thus increasing the production of reactive oxygen species (ROS) leads to cell death and reduced semen quality (Ahsan et al., 2014). Testosterone, as a sex-related hormone, decreases as broiler breeder roosters aged. Testosterone enters various stages of sperm production as the most important hormone affecting reproduction, because testosterone maintains the blood-testis barrier and germ cell division (Smith and Walker, 2014). In addition, Aging affects the reproductive performance of roosters, a decline in reproductive performance has been observed in old roosters that begins after 54 weeks of age. This leads to a decrease in the production of hatched eggs which leads to economic losses in the poultry industry (Lagares et al., 2017). It was observed by (Ahmad et al. 2023) that adding the hot aqueous extract of moringa leaf led to an increase in the sex hormones (testosterone and LH) in the broiler breeder of hatching eggs. The addition of medicinal plants as antioxidants improved the characteristics of semen from broiler breeders (Emad et al. 2022). It was also shown by (Emad et al. 2017) that an improvement in the Armatase enzyme led to an increase in testosterone, LH, and FSH in broiler breeders. Moringa leaf are one of the plants used in medical fields (Vinodini et al., 2014). Its leaf is edible and have great nutritional value and therapeutic ability because they contain vitamins A and C and minerals, especially calcium and potassium, and they contain many antioxidants, amino acids and carotenoids (Nihad et al. 2016). Moringa leaf are also used as natural antioxidants because they contain a high percentage of polyphenols (Sreelatha and Padma 2009). Moreover, adding moringa leaf to the poultry male diet improved the semen pH, which led to an improvement in sperm movement (Keamogetswe et al. 2022). Therefore, the aim of this research is to evaluate the effect of dosing broiler brooder roosters with different levels of moringa leaf powder on some reproductive traits of broiler breeder.

MATERIALS AND METHODS

This study was conducted at the poultry farm of the Animal Production Department - College of Agriculture - Al-Qasim Green University for a period of 42 days to find out the effect of dosing broiler brooder roosters with different levels of moringa leaf powder on some reproductive characteristics of broiler breeder. 12 roosters (Ross 308) with an average weight of 5,800 g and 70 weeks of age were used in this experiment.

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Roosters were raised in one of the poultry farm barns, this barn (hall) was prepared and divided into enclosures, the dimensions of each enclosure were (1.5 x 1) m², and each enclosure was divided into three sections according to the ground rearing system. The lighting program was (14 hours/day) throughout the duration of the experiment, with 10 hours of darkness provided daily. The roosters were randomly distributed in to 4 treatments with 3 replicates and one rooster for each replicate. The Moringa leaf powder was given to the roosters in the form of capsules, which were dosed to the roosters at a rate of one capsule/day for each rooster. The first treatment was the control treatment (without additives), while The second, third, and fourth treatments were used 0.5, 1, and 1.5 gm of moringa leaf powder respectively.

The roosters were fed with diet containing 16.53% crude protein and metabolizable energy of 2788.44 kcal/kg. It was prepared at Al-Baraka feed mill – Babylon province, where the diet provided at 146 grams of feed/bird/day. The feed and capsules were provided at fixed times throughout the duration of the experiment. Table 1 shows the diet formulation and nutrient composition of experimental diets (as-fed basis).

Table 1. Diet formulation and nutrient composition of experimental diets (as-fed basis).

Ingredients	Amount (g/kg)
Corn	37
Wheat	14
Barley	16.2
Soybean meal, 44% CP	20
Wheat bran	6.8
Vitamin-mineral premix ¹	2
Limestone powder	3
Vegetable oil	1
Calculated analyses ²	
ME kcal/kg	2788.44
CP %	16.53
CF %	3.45
Calcium %	1.26
Available phosphorus %	0.74
Methionine + Cysteine %	0.69
Lysine %	0.85

¹Maxcare premix of Belgian origin. Each 1 kg contains: crude protein 7.9%, lysine 2.4%, methionine 7.7%, methionine + cysteine 7.7%, calcium 23.1%, phosphorus 3.3%, sodium 5.5%, metabolizable energy (ME) 2903 kcal/kg, vitamin A 400,000 IU, Vitamin D3 300,000 IU, Vitamin E 800 IU, Vitamin K 80 ppm, Vitamin B1 40 ppm, Vitamin B2 160 ppm, Calcium Pantothenate 320 ppm, Niacin 600 ppm, Biotin 1600 ppm, vitamin B12 1000 ppm, folic acid 40 ppm, vitamin B6 160 ppm, iron 2800 ppm, copper 600 ppm, zinc 2400 ppm, magnesium 4000 ppm, iodine 80 ppm, selenium 8 ppm.

²Chemical analysis calculated according to NRC (1994).

A completely randomized design (CRD) was used in this study. Significant differences between means were compared using the Duncan multinomial test (Duncan, 1955) .

RESULTS AND DISCUSSION

Dosing different levels of moringa leaf powder found significant effect on reproductive hormones and body weight. Table 2 showed that there are significant differences between the experimental treatments in sexual hormones and body weight. Treatment 4 (1.5mg) was found to be significantly higher (<0.01 P) than T1, T2, and T3 in the FSH percentage. However, no significant different was found between treatments T1, T2, and T3 in the FSH percentage. T4 was significantly higher than other treatments, while T3 was found to be significantly lower than T4 but higher than T2 and T1 in the LH value. Table 2 showed that LH and testosterone values were linearly increased as the level of moringa leaf powder increased, but the significant superiority observed only between T4 and other treatments and also between T3 and T2 and T1 respectively. Live body weight in T3 and T4 was significantly higher than T1 and T2 respectively, while no significant different was found between (T1 and T2) and between T3 and T4.

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Table 2: Effect of different treatments of moringa leaf powder in Hormones level and body weight

Treatments ¹	Means ± SE			
	FSH (IU/L)	LH (IU/L)	Testosterone (ng/ml)	Body weight (gm)
T1	1.200 ±0.06 b	1.033 ±0.03 c	1.320 ±0.01 c	4520.33 ±129.96 b
T2	1.333 ±0.09 b	1.233 ±0.08 c	1.350 ±0.01 c	4597.33 ±157.34 b
T3	1.433 ±0.08 b	1.533 ±0.12 b	1.673 ±0.02 b	5521.67 ±126.38 a
T4	1.800 ±0.07 a	2.416 ±0.03 a	3.176 ±0.12 a	5716.00 ±180.14 a
<i>P-Value</i> ²	**	**	**	**

Means with the different letters in the same column are significantly different

¹T1= control, T2= 0.5mg, T3= 1mg, T4= 1.5mg.

²P-Value ** (P≤0.01)

The significant improvement in the moringa leaf powder treatments, specifically the improvement in live body weight was due to the compounds present in the moringa leaf (Mutiaru et al., 2013).

As for the significant improvement (P≤0.01) in moringa leaf treatments for sex hormones (testosterone, LH, FSH), this may be due to the moringa leaf² possession of many active substances such as flavonoids and saponins, which have an important role in fertility, especially testosterone production, and by increasing steroid protein expression. Which is important for the entry of cholesterol into the mitochondria, which leads to an increase in testosterone in the testicular cells and thus a significant increase in the hormones LH and FSH will be shown (Martin and Touaibia, 2020). In addition, this improvement may be due to the sterol substance present among the active compounds of the moringa plant, which is considered the basic substance for building the testosterone hormone, which in turn works to stimulate the gonads and thus produces a greater amount of ovarian follicles (Teteh et al., 2016) which at the end improves sperm biosynthesis (Rahim et al., 2013). (Ahmad et al. 2023) explained that adding the hot aqueous extract of Moringa leaf improved the sexual hormones including testosterone, LH, and FSH. The reason is due to the presence of antioxidants that improved these characteristics. And because of that moringa may improve the reproductive performance of broiler breeder roosters.

CONCLUSION

It is concluded from the results of the study that Moringa leaf powder improved the level of reproductive hormones in roosters (LH, FSH and testosterone), and the fourth treatment (1.5 g) was the best treatment in terms of improving the level of reproductive hormones.

REFERENCES

- Ahmad, S.J.,Emad,A.A.2023. The Influence of Feedin a Moringa Oleifera Leaf Aqueous Extract on the Biochemical Attributes of the Lohmann Brown Rooster Breed Breeder.IOP.International Conference of Modern Technologies in Agricultural Sciences,10 : 1 – 4.
- Ahsan ,U.,Kamran, Z;Raza, I;Ahmad, S;Babar, W; Riaz; M . H ; and .Iqbal, Z.2014 . Role of selenium in male reproduction – A review . Animal reproduction science , 146 (1-2) , 55 – 62.
- Duncan, D.B., 1955. Multiple Rang and Multiple F-test. Biometrics.11:4-42.
- Emad,A.A., Sabreen,S.A.(2022). Effect of Adding Different Levels of Aqueous Extract of Lemongrass Leaves on Reproductive Characteristics, Testis Weight and Testicular Tissues of Male Broiler Mothers ROSS308. IOP.International Conference of Modern Technologies in Agricultural Sciences,10 : 1 – 8.
- Emad,A.A.,Mahdi,Z.,Armin.T.,Mojtaba.Z.,Mahdi,A.,Mojtaba,N.,Hamid.D.(2017).
- Haitham, M.H N.A.L., Ali., H.H. Al-Jebory. 2024. Evaluation of the Nutritional Effectiveness of Nano-Alcoholic Extract of Moringa oleifera Leaves added to Drinking Water on the Productive Traits of Broilers. International Journal of Life Science and Agriculture Research. 3 (2) . DOI: <https://doi.org/10.55677/ijlsar/V03I2Y2024-01>.
- Keamogetswe T.; Nthabiseng A.; Sebola,H.K. ;Mokoboki ,K. Q .; Mosetle,F.M. Mnnye M.2022. Inclusion of Moringa oleifera leaf meal in the diet of locally bred chickens :effects on growth performance , semen and hatchability traits ,Journal of applied animal research , 50 :1,239 – 245 .
- Lagares , M.;Ecco , R.; Marlins, N.; Lara,L.; Rocha ,J.; Vilela, D; Barbosa, V.; Mantovani , P .; Braga, J.; Preis , I.; I.; Gheller, V.; Cardeal, P. and Baiao, N. 2017 , Detecting reproductive system abnormalities of broiler breeder roosters at different ages . Reprod Dom Anim, 52:67 – 75 .
- Letrozole, an aromatase inhibitor, reduces post-peak age-related regression of rooster reproductive performance. Animal Reproduction Science,183:110 – 117.

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10. Martin, L. J., and Touaibia, M. 2020. Improvement of testicular steroidogenesis using flavonoids and isoflavonoids for prevention of late-onset male hypogonadism. *Antioxidants*, 9(3), 237.
11. Mutiara, T., Titi, E. S., & Estiasih, W. (2013). Effect lactagogue moringa leaf (Moringa oleifera Lam) powder in rats. *Journal of basic and applied scientific Research*, 3(4), 430-434.
12. Nihad A. A Alnidawi ; Hanaa, F. M. Ali ; Sherein, Ahmed. and M. Farid. 2016. *Moringa Oleifer* Leaves in Broiler Diets: Effect on Chicken Performance and Health. *Food Science and Quality Management*, 58:40-48 .
13. NRC, 1994. Nutrient Requirements of Poultry, 9th rev. ed. National Academy Press, Washington, DC.
14. Rahim, S. M., Taha, E. M., Mubark, Z. M., Aziz, S. S., Simon, K. D., and Mazlan, A. G. 2013. Protective effect of Cymbopogon citratus on hydrogen peroxide- induced oxidative stress in the reproductive system of male rats. *Systems biology in reproductive medicine*, 59(6), 329-336.
15. Remero – Sanchez Z, Plumstead P, Leksrisompong N, Brannan K, Brake J., 2008, feeding broiler breeder males. 4. Deficient feed allocation reduces fertility and broiler progeny body weight . *poultry Science* ; 87:805 – 11 .
16. Smith LB, Walker WH; 2014 .The regulation of spermatogenesis by androgens . *Seminars in Cell & Developmental Biology* .; 30:2 – 13.
17. Sreelatha S. and P. R. Padma (2009). Antioxidant Activity and Total Phenolic Content of Moringa oleifera Leaves in Two Stages of Maturity *Plant Foods Hum Nutr* 64:303–311.
18. Tete, A., Gbeassor, M., Decuypere, E., & Tona, K. (2016). Effects of Moringa oleifera leaf on laying rate, egg quality and blood parameters. *International Journal of Poultry Science*, 15(7), 277-282.
19. Vinodini, N.A.; Pratik, K. C .; Anwar ,AS.; Suman, V .B .and Sheila , R .P . 2014. Evaluation of live functions with moringaoleifera leaf extract in cadmium induced adult wistar albino rats . *int . J. plant and environ . Sci.* vol . 4 no . 3 : 103 – 106.