

# Performance Of Probiotics, Garlic And Neem Leaf Powder Supplements On Biochemical Parameters Of Caged Broiler

Mohamed K. A. Abujradah,

*Faculty Of Food Science, Department Of Food And Nutrition, Wadi Shati University – Libya*

Nasir Salim Elhammali

*Department Of Animal Production, Faculty Of Agriculture, Sabha University - Libya*

Nizar M. Bin Saleem

*Higher Institute Of Green Agricultural Technologies – Tarhona – Libya*

---

## Abstract

Biochemical parameters may be used as physiological indicators in birds. These values are influenced by species, age, sex, season, geographic region, nutrition, and physiological condition. They are also indicators of the health of birds housed in cage systems. The study of probiotic supplements, garlic and neem leaf powder on the biochemical parameters of caged broilers at a local livestock farm was conducted in 2023. The experiment was laid out in Completely Randomized Design (RBD). There were six treatments including control, 4 sub groups with 3 chicks in each to serve as replications with variable proportions of (basal diet + probiotic @ 10 kg per ton of feed, basal diet + garlic @ 10 kg per ton of feed, basal diet + neem leaf @ 10 kg per ton feed, basal diet + probiotic + garlic @ 10 kg per ton of feed, basal diet + probiotic + neem leaf @ 10 kg per ton of feed and basal diet + probiotic + garlic + neem leaf @ 10 kg per ton of feed), In the view of present investigation the most effective Combined supplements of basal diet + probiotic + garlic + neem leaf @ 10 kg per ton of feed, proved best in respect of growth and performance were evaluated in parameters. Polyherbal formulation not only improved growth and performance in birds. It was concluded that the positive effects of herbal plants on broilers. Their antibiotic potential, hypocholesterolemic effects, growth promoting and availability are the most beneficial parts of herbs, which have drawn the attention themselves.

**Keywords:** probiotics, garlic and neem leaf powder and biochemical

---

Date of Submission: 08-10-2024

Date of Acceptance: 18-10-2024

---

## I. Introduction

In Libya, there are plenty of public poultry production projects which are supported by the government. In addition to this private sector has also started poultry farming as a business enterprise both of these poultry farming activities help income generation and nutritional food security of the country. Broiler production in Libya is yet very low and the low productivity is mainly due to poor nutrition, management and health coverage. Further, the success of poultry industry depends on its fast growth and low mortality during first two weeks of its life, which can be managed by better hygienic and feeding conditions.

As a result, new additives of plant origin, considered to be natural that consumers would accept, have been proposed to poultry producers. Herbs, spices and various plant extracts have received increased attention as possible antibiotic growth promoter replacements. In this view, the plants identified with properties of secondary metabolites became interesting due to their antimicrobial, antioxidant effects and their stimulating effects on animal performance and digestive enzymes. At present, there are large numbers of Natural Growth Promoters (NGPs) available in the market including herbs, probiotics, prebiotics and synbiotics etc. The use of naturally occurring compounds like herbs, herbal preparations and other botanicals are preferred over chemical compounds to satisfy consumer concerns over safety and toxicity (Makkar *et al.*, 2007).

The active constituents in leaves, stem, seeds, root and barks of these medicinal plants or herbs have effect to combat different diseases and to improve the digestion and bioavailability of various nutrients, that in turn could improve the performance of the recipients. Many herbs and their bio-active constituents possess a broad antimicrobial activity (Dorman and Deans, 2000 ; Kamel, 2001). Scientific evidence exist that herbs and plant extracts stimulate the growth of beneficial bacteria and minimize pathogenic bacterial activity in the

gastrointestinal tract of poultry (Langhout, 2000 ; Wenk et al, 2000) and antioxidant properties (Faixova and Faix, 2008).

Probiotics are very beneficial to overall health, but they are especially good for the digestive system. Probiotics may help replenish the good bacteria in the gut after taking medication such as antibiotics, and they may also help lower the amount of bad bacteria, which can cause infections. Probiotics are specific chemical agents produced by microorganism containing *Lactobacillus acidophilus*, *Lactobacillus casei*, *Bifidobacterium bifidum*, *Aspergillus oryzae* and *turoloopsis* (Mohna et al., 1996). Hosna et al., (2014) investigated the effects of the dietary supplementation of Sorganic acids, prebiotics and probiotics on broiler chickens. Lowering the dietary protein level significantly decreased bird performance throughout the experiment. Additives had no significant effects on body weight, body weight gain and feed intake. At 21 day of age the dietary addition of the prebiotic and organic acids significantly increased the antibody titres against Newcastle disease compared to the control group. It noted that under the condition of the current study, the prebiotic affected performance, small intestinal morphology and immunity of broiler chickens significantly.

Feed additives are generally used to improve feed intake and to increase the growth rate in broilers (Abouelfetouh et al., 2012). For many years feed additives have been widely used to increase animals performance and recently it is used in poultry industry to improve growth, feed efficiency and layers performance (Khan et al., 2007). Kharde et al., (2014) concluded that The supplementation of garlic powder and neem leaves powder alone and their combination significantly ( $p < 0.05$ ) reduced the serum, breast and thigh meat cholesterol in broilers.

Neem tree as one of the most researched tree in the world has attracted world-wide prominence due to its vast range of medicinal properties like antibacterial, antiviral, antifungal, antiprotozoal, hepatoprotective and various other properties without showing any adverse effects (Kale et al., 2003). Neem leaves (*Azadirachta indica*) and its constituents have been demonstrated to exhibit immunomodulatory, anti-inflammatory, antihyperglycemia, antifungal, antiviral, antioxidant, properties (Subapriya and Nagini, 2005). Javad and Mehdi (2014) reported that *azadirachtaindica* at limited dose rate might be used as hepatoprotector in commercial poultry without any toxic effects and it was also concluded that proteins in the diets were more effectively utilized in the neem treated birds. From the results of previous studies it was concluded that neem leaf meal was relatively safer as compared to other forms of the herbs.

## II. Material And Methods

The experiment was carried out at a local livestock farm was conducted in 2023. The experimental technical programme with Commercial Broilers., 5 weeks of study, no. of treatments : 07, no. of birds : 84, nNo. of replications per treatment: 4 and no. of birds in each replication: 3. The data on various parameters viz, body weight of day old chicks , weekly body weight , gain in weight , weekly feed consumption and feed efficiency was given as per treatment as basal application.

### Experimental design

A total of 84 day old broiler chicks of same hatch was be procured and was be randomly divided into 7 groups as per following dietary regimens:

T<sub>1</sub>. (control) – basal diet without probiotics, garlic and neem leaf powder.

T<sub>2</sub>. basal diet + probiotic @ 10 kg per ton of feed.

T<sub>3</sub>. basal diet + garlic @ 10 kg per ton of feed.

T<sub>4</sub>. basal diet + neem leaf @ 10 kg per ton feed.

T<sub>5</sub>. basal diet + probiotic + garlic @ 10 kg per ton of feed.

T<sub>6</sub>. basal diet + probiotic + neem leaf @ 10 kg per ton of feed.

T<sub>7</sub>. basal diet + probiotic + garlic + neem leaf @ 10 kg per ton of feed.

### Ingredient and nutrient composition (%) of experimental diets (on dry matter basis)

Ingredients	Broiler starter (0 – 21 days)	Broiler finisher (22 – 35 days)
Maize	60.00	63.00
Ground nut cake	23.14	18.00
Fish meal	12.50	14.67
Premix (Vitamin)	2.50	2.50
Trace minerals	0.125	0.125
Common salt	0.30	0.30
Methionine	0.10	0.09
Lysine	0.10	0.09
D.C.P	1.20	1.20
Lincomycin	0.004	0.004
Diclazuril (CMP – 200)	0.020	0.020

	100	100
Nutrient composition		
Moisture (%)	6.29	6.22
Crude protein (%)	23.29	21.28
Total ash (%)	8.02	9.34
Cruds protein	22	19
ME (Kcal/kg)	2900	3000

### Statistical Analysis

The data obtained on various parameters was records tabulated and statistically analyzed using analysis of variance (ANOVA) technique as per Snedecar & Cocharan (1994).

### III. Results And Discussion

The mineral concentration of blood plasma and biochemical values may be affected by many factors, such as the growth rate of broiler chickens and energy requirements. The relationship between the phase of the broiler cycle and the values of selected biochemical indicators in common pheasant hens resulting from our study is presented in Table 1.

From the perusal of the data on blood cholesterol (mg/dl) of broiler in different treatments contained in Table 1, it was noted that irrespective of treatments the blood cholesterol (mg/dl) of broiler in general ranged from 103.32 – 124.32. The highest mean blood cholesterol (mg/dl) of broiler was recorded in T<sub>0</sub> (108.14), followed by T<sub>1</sub> (111.64), T<sub>2</sub> (112.55), T<sub>3</sub> (113.29), T<sub>4</sub> (114.64), T<sub>5</sub> (114.90), T<sub>6</sub> (119.67), the differences in these values between the treatments were significant. These results were non agreement with (Kharde *et al.*, 2014) that noted the supplementation of garlic powder and neem leaf powder alone and their combination significantly (P<0.05) reduced the serum, breast and thigh meat cholesterol in broilers. It was noted that irrespective of treatments the blood HDL cholesterol of broiler in general ranged from 121.84-126.86. The highest mean blood HDL cholesterol of broiler was recorded in T<sub>6</sub> (125.32), followed by T<sub>5</sub> (125.22), T<sub>4</sub> (124.82), T<sub>3</sub> (124.55), T<sub>2</sub> (124.33), T<sub>1</sub> (123.87), and T<sub>0</sub> (123.84), the differences in these values between the treatments were non significant. The blood LDL cholesterol of broiler in general ranged from 1.38 - 2.21,g. The highest mean blood LDL cholesterol of broiler was recorded in T<sub>6</sub> (33.54), followed by T<sub>5</sub> (33.24), T<sub>4</sub> (33.21), T<sub>2</sub> (33.16), T<sub>3</sub> (33.15), T<sub>1</sub> (32.21), and T<sub>0</sub> (32.02),the differences in these values between the treatments were non significant. The blood VLDL cholesterol of broiler in general ranged from 8.77-13.21. The highest mean blood VLDL cholesterol of broiler was recorded in T<sub>6</sub> (12.30), followed by T<sub>5</sub> (11.91), T<sub>4</sub> (11.72), T<sub>2</sub> (11.47), T<sub>1</sub> (11.42), T<sub>3</sub> (11.15), and T<sub>0</sub> (10.96), the differences in these values between the treatments were non significant. However the blood teriglycerids of broiler in general ranged from 1.38 - 2.21,g. The highest mean blood teriglycerids of broiler was recorded in T<sub>6</sub> (248.35), followed by T<sub>5</sub> (247.47), T<sub>3</sub> (247.16), T<sub>2</sub> (246.62), T<sub>4</sub> (246.24), T<sub>1</sub> (246.23), and T<sub>0</sub> (245.82),the differences in these values between the treatments were non significant. In case of blood glucose of broiler in general ranged from 266.47-28.60. The highest mean blood glucose of broiler was recorded in T<sub>6</sub> (273.51), followed by T<sub>5</sub> (273.24), T<sub>4</sub> (272.71), T<sub>1</sub> (272.03), T<sub>3</sub> (271.54), T<sub>2</sub> (271.19), and T<sub>0</sub> (268.85), the differences in these values between the treatments were non significant. Mansoub, (2011) reported that the effects of yogurt and probiotic on performance and serum composition of broiler chickens. As compared to the control group with the other groups observably to give improve performance in all of the experimental (P<0.05). According to the results, total cholesterol (Cholesterol), triglyceride (TG), HDL and LDL were measured in blood samples of day 42. The amount of total Cholesterol and triglyceride (TG) in the serum did showed significant differences, but HDL was not significantly different among groups. Also Kamruzzaman *et al.*, (2005) observed that the mean haemato-biochemical values of Hb , PCV, heterophil, eosinophil, basophil, triglyceride, HDL, LDL, SGPT and SGOT were differed significantly (p < 0.01) in different groups. The present findings suggest that supplementation of probiotics has significant effect on growth performance and certain hemato-biochemical parameters of broiler chickens as compared to antibiotic supplementation. And Islam *et al.*, (2004) conducted that the mean values of Hb and PCV corresponding to the different treatments were significantly (p<0.01) differ. They also demonstrated that triglycerides, HDL, LDL, SGPT and SGOT values corresponding to the different treatments were also differ significantly (p<0.01). The findings suggest that supplementation of probiotics has significant influence on certain haematobiochemical parameters of broiler chickens.

**Table 1: Biochemical parameters in broiler of different treatments**

Treatments	Blood Cholesterol (mg/dl)	Blood HDL Cholesterol (mg/dl)	Blood LDL – Cholesterol (mg/dl)	Blood VLDL – Cholesterol (mg/dl)	Blood Teriglycerids (mg/dl)	Blood Glucose (mg/dl)
T <sub>0</sub>	119.67	123.84	32.02	10.96	245.82	268.85
T <sub>1</sub>	114.9	123.87	32.21	11.42	246.23	272.03
T <sub>2</sub>	114.64	124.33	33.16	11.47	246.62	271.19

T <sub>3</sub>	113.29	124.55	33.15	11.15	247.16	271.54
T <sub>4</sub>	112.55	124.82	33.21	11.72	246.24	272.71
T <sub>5</sub>	111.64	125.22	33.24	11.91	247.47	273.24
T <sub>6</sub>	108.14	125.32	33.54	12.3	248.35	273.51

### References

- [1] Abouelfetouh, A.Y., And Moussa. N.K., (2012). Enhancement Of Antimicrobial Activity Of Four Classes Of Antibiotics Combined With Garlic. *Asian Journal Of Plant Science*, 11: 148-152.
- [2] Dorman, H. J. D. & Deans, S. G. (2000). Antimicrobial Agents From Plants: Antibacterial Activity Of Plant Volatile Oils. *Journal Of Applied Microbiology*, 88, 308-316.
- [3] Faixová, Z., & Faix, Š. (2008). Blood Chemistry Changes In Broiler Chickens Following Supplementation With *Cinnamomum Zeylanicum*. *Veterinarski Glasnik*, 62(1-2), 67-75.
- [4] Hosna H., Ahmad H. & Frahang A., (2014). Application Of Medicinal Plants In Poultry Nutrition. *Journal Of Medicinal Plants And By-Products*, 1(1): 1-12.
- [5] Islam M. W., Rahman M. M., Kabir S. M. L., & Kamruzzaman S.M., (2004). Effects Of Probiotics Supplementation On Growth Performance And Certain Haematobiochemical Parameters In Broiler Chickens. *Bangladesh Journal Of Veterinary Medicine*, 2(1): 39-43.
- [6] Javad G.B. & Mehdi S., (2014). The Effects Of Protexin Probiotic Different Levels On Growth Performance, Carcass Characteristics And Some Of Blood Parameters In Male Geese. *Bull. Env. Pharmacol. Life Sci.*, 3(5) : 199-202.
- [7] Kamel, C. (2001). Tracing Modes Of Action And Roles Of Plant Extracts In Non-Ruminants. In: Garnsworthy, P.C. And Wiseman, J., Eds., *Recent Advances In Animal Nutrition*, Nottingham University Press, Nottingham, 130-150.
- [8] Kamruzzaman S. M., Kabir S. M. L., Rahman M. M., Islam M.W. & Reza, M. A. (2005). Effect Of Probiotics And Antibiotic Supplementation On Body Weight And Hemato-Biochemical Parameters In Broiler. *Bangladesh Journal Of Veterinary Medicine*, 3(2): 100 -104.
- [9] Kale B. P., Kothekar M. A., Tayade H. P., Jaju J. B., & Mateenuddin M., (2003). Effect Of Aqueous Extract Of *Azadirachta Indica* Leaves On Hepatotoxicity Induced By Antitubercular Drugs In Rats. *Indian Journal Of Pharmacology* 35(3): 177-180.
- [10] Khan, H. S., Sardar, R., And Anjum, M.A., (2007). Effects Of Dietary Garlic On Performance And Serum And Egg Yolk Cholesterol Concentration In Laying Hens. *Asian Journal Of Poultry Science*, 1: 22-27.
- [11] Kharde K.R., Soujanya S., & Gaikwad A. H., (2014). Effect Of Garlic And Neem Leaf Powder Supplementation On Cholesterol Leaves In Serum, Breast And Thigh Muscles Broiles.
- [12] Langhout, P. (2000). *New Additives For Broiler Chickens*.
- [13] Makkar, H. P. S., Francis, G. And Becker, K. (2007). Bioactivity Of Phytochemicals In Some Lesser-Known Plants And Their Effects And Potential Applications In Livestock And Aquaculture Production Systems. *Animal*, 1 (9): 1371-1391.
- [14] Mansoub N. H. (2011). Comparison Of Effects Of Using Yogurt And Probiotic On Performance And Serum Composition Of Broiler Chickens. *Advances In Environmental Biology*, 5(7): 2012-2015.
- [15] Mohan B., Kadirevel R, Natarajan A, Bhaskaran M. (1996). Effect Of Probiotic Supplementation On Growth, Nitrogen Utilization And Serum Cholesterol In Broilers. *British Poultry Science*, 37: 395-401.
- [16] Subapriya R. And Nagini S. (2005). Medicinal Properties Of Neem Leaves. *Current Medicinal Chem. Rev.* 5(2), P.149-156.
- [17] Wenk, C., Fernández, J. A., & Dupuis, M. (Eds.). (2023). *Quality Of Meat And Fat In Pigs As Affected By Genetics And Nutrition: Proceedings Of The Joint Session Of The Eaap Commissions On Pig Production, Animal Genetics And Animal Nutrition (Vol. 100)*. Brill.