Biological Times

Volume No. 5 | Issue No. 4 | Pages 6-7

Influence of Dietary Selenium on Performance on Broiler Chickens

Safdar Hassan, Ahmad Raza, Muhammad Sharif and Abdul Basit*

Institute of Animal and Dairy Sciences, Lecturer, University of Agriculture Faisalabad

*Corresponding Author: **abdulbasit.07786@gamil.com**

ABSTRACT

An important trace mineral, selenium (Se) is vital for poultry's immune system, antioxidant defense, and general physiological function. The impact of dietary selenium supplementation on broiler chicken development performance is assessed in this study. A total of broiler chicks were divided into treatment groups at random and given basal diets supplemented with varied amounts and sources of selenium, such as organic (selenium yeast) and inorganic (sodium selenite). Throughout the trial, growth performance metrics such body weight gain, feed intake, and feed conversion ratio (FCR) were recorded. In comparison to the control group, the results show that selenium supplementation, especially in organic form, greatly enhanced body weight gain and feed efficiency. Increased glutathione peroxidase activity in birds with optimum selenium levels demonstrated improved antioxidant state and decreased oxidative stress. Furthermore, broiler health and immunological response were enhanced by selenium supplementation.

Keywords: Growth performance, Selenium, Broilers, Chicken

To cite this article: Hassan S, A Raza, M Sharif & A Basit. Influence of Dietary Selenium on Performance on Broiler Chickens. Biological Times. 2026. April 5(4): 6-7.

Introduction

From 22 to 42 days of age, broilers fed the Se-supplemented diets had higher (P<0.05) ADG and ADFI, and from 1 to 21 and 22 to 42 days of age, they had lower (P<0.05) F/G and mortality from 22 to 42 days of age in comparison to the control broilers; however, from 1 to 21 days of age, there were no differences (P>0.05) in ADG, ADFI, or mortality between the broilers fed the control diet and those fed Se-supplemented diets. ADG, ADFI, F/G, and mortality were not affected (P>0.05) by the Se source, Se level, or their combination during either trial period. According to [1] compared with the control group, all Se-supplemented groups had no effect (p > 0.05) on the ADG, ADFI, FCR and mortality of broilers from 1 to 21 d of age. The Se source, added Se level and their interaction had also no effects (p > 0.05) on the above indices (Sumei *et al*., 2025). The effects of dietary treatments on growth performance. For the entire period (1-42 days), there was no significant effect on growth performance parameters (BWG, FI, and FCR). The Se content in the breast and thigh muscles of broiler chickens fed GNS and inorganic Se for 42 days (Mohsen *et al*., 2022). According to Mohammad et al., (2022) the current findings demonstrate that 0.3 mg GNS/kg food supplementation significantly increased Se content in breast and thigh muscles when compared to SS.

According to [2] the impact on growth performance of adding 0, 0.2, 0.3, and 0.4 mg/kg of Nano-Se to broiler diets. The findings showed that whereas Nano-Se supplements raised broiler BW linearly at 12 days of age, they enhanced broiler BW linearly and quadratic ally at 24th and 35th days of age. Similarly, throughout the course of the entire time, the BWG of broilers grew dramatically as Nano-Se levels increased. Additionally, adding more Nano-Se to broiler diets during the starter (1-12 days), finisher (24-35 days), and entire (1-35 days) phases considerably increased the FCR.

Meat Quality:

Meat color, pH, shear force, and drip loss of breast and thigh muscles did not differ (P>0.05) between the broilers fed the Se-supplemented diets and individuals given the control diet (Xing *et al.,* 2021). The pH value and shear force of the thigh muscle were impacted by the Se source (P<0.05), and the shear force of the thigh muscle was impacted by the Se level (P<0.05). However, The L*, a*, and b* values, pH values, shear force, and drip loss of the breast and thigh muscles were unaffected by the Se source, Se level, or their combination (P>0.05) [3]. Chicks fed the diet supplemented with Se yeast showed reduced (P<0.05) thigh muscle shear force and a greater (P<0.05) pH value when compared to those fed the diet supplied with sodium selenite. Thigh muscle shear force was lower (P<0.05) in chicks fed meals supplemented with 0.40 mg Se kg-1 than in those provided diets supplemented with 0.20 mg Se kg-1 [4].

The impact of Nano-Se on the physiochemical quality of broiler meat. In the leg, increasing the amount of Nano-Se supplementation led to a linear and quadratic significant decrease in cooking loss and a linear significant increase in water holding capacity; in the breast, a discernible linear significant increase in water holding capacity and a linear decrease in cooking loss were also noted. Additionally, there were no discernible variations in pH between the leg or breast treatments [5].

Effect on IBD and ND

Selenium is essential for preserving intestinal integrity, lowering oxidative stress, and regulating the makeup of the gut Microbiota all of which are strongly linked to IBD-like enteric inflammation, according to recent research on chickens. In broilers under stress or pathogen challenge, dietary supplementation with organic or nano-selenium greatly enhanced intestinal barrier function, crypt depth ratio, and villus height [6]. Selenium reduces intestinal permeability and inflammation by increasing the expression of tight junction proteins (occludin, claudin-1) and antioxidant enzymes (GPx, SOD) [7]. Additionally, lipopolysaccharide (LPS)-induced intestinal damage and inflammatory cytokine production (IL-1β, TNF-α) were reported to be reduced by selenium supplementation, suggesting its protective effect against oxidative and inflammatory damage comparable to IBD processes [8]. These results imply that selenium promotes immunological control, intestinal health, and effective food absorption in chickens.

By boosting antioxidant capacity and reducing neurodegenerative-like stress brought on by heat or pollutants, selenium also supports neurological health in chickens. According to studies, taking selenium supplements lowers malondialdehyde levels and boosts brain glutathione peroxidase activity, which lessens oxidative damage to neural tissues [9].

When compared to inorganic forms, organic and nano-selenium forms shown better bioavailability and neuroprotective benefits. Through the activation of selenoproteins and antioxidant signaling pathways, selenium has been demonstrated to prevent neuronal death, enhance behavioral responses under heat stress, and control neurotransmitter balance. These findings suggest that sustaining brain function, lowering oxidative stress, and enhancing poultry welfare and performance all depend on proper selenium diet.

Nutrient Digestibility

Recent research has shown that supplementing poultry with selenium (Se), particularly in organic or nano forms, greatly increases feed efficiency and nutrient digestibility. Proteins, lipids, and minerals are better absorbed when intestinal integrity is preserved and digestive enzyme activity is increased by selenium. Broilers given organic selenium appeared to digest crude protein and ether extract more readily than those given inorganic sodium selenite. Similarly, via improving gut shape (higher villus height and villus height-to-crypt depth ratio) and intestinal antioxidant status, selenium yeast supplementation enhanced nutrition utilization and energy retention [10]. The effect of Nano-Se levels on broiler hens' nutritional digestibility. When compared to the control group, the dietary Nano-Se had a substantial impact on the apparent digestibility coefficient of EE in hens. Up to 0.4 mg/kg of Nano-Se, the apparent digestibility coefficient of EE increased significantly in a linear fashion. All other digestibility coefficients, such as DM, CP, and CF, were non-significant in the meanwhile.

Supplementing with nano-selenium has been shown to be very successful in enhancing nutrient digestion under stressful situations. Boosting intestinal enzyme activity (amylase, protease, and lipase) and lowering oxidative stress, nano-selenium improved the digestibility of dry matter and crude protein in broilers. Additionally, improved fermentation patterns and nutrient absorption efficiency have been associated with selenium-mediated modification of gut microbiota. According to these findings, selenium not only promotes gut health and enzyme function but also maximizes nutrient consumption, which enhances chicken growth performance and feed conversion efficiency.

Histopathology

Selenium supplementation protects important organs from oxidative and inflammatory damage, including the liver, gut, and brain, according to histopathological investigations in poultry. The production of seleno proteins, such as thioredox in reeducates and glutathione peroxidase, is one way that selenium helps to preserve cellular integrity and stop tissue deterioration. Dietary nano-selenium dramatically decreased hepatic necrosis, lipid peroxidation, and inflammatory infiltration in broilers subjected to oxidative or thermal stress, resulting in almost normal liver histoarchitecture. In a similar vein, [10] found that birds provided organic selenium supplements had intact intestinal villi and less epithelial cell sloughing than those fed inorganic versions, suggesting enhanced intestinal tissue resilience.

Furthermore, increased intestinal morphology, higher villus height, shallower crypts, and higher goblet cell density has been associated with selenium supplementation, indicating better absorptive and protective ability. By lowering apoptotic cell numbers and preserving normal Purkinje cell structure, nano-selenium also stopped neuronal degeneration in the brain tissues of birds under oxidative stress. Overall, histopathological analyses from several studies support the protective function of selenium against oxidative tissue damage, inflammation, and cellular apoptosis, showing that both organic and nano forms of selenium aid in maintaining the structural integrity of poultry organs under stressful circumstances.

References

[1] Fatma S. O. Elkhateeb, Abdallah A. Ghazalah, Jayant Lohakare Ahmed A. A. Abdel-Wareth. 2024. Scientific Reports volume 14, Article number: 18557.

[2] Gao, J., Liu, Y., Y. Huang and J. Zhao. 2020. Effects of different selenium sources on growth performance, antioxidant capacity, and selenoprotein gene expression in broilers. Poultry Science, 99(11):6694-6702.

[3] He, X., F. Yin, J. Xu and Y. Guo. 2021. Effects of dietary selenium yeast supplementation on intestinal health and immune function in broilers. British Poultry Science, 62(4):564-571.

[4] Huang, Y., J. Zhang and Z. Chen. 2023. Nano-selenium alleviates lipopolysaccharide-induced intestinal oxidative injury and inflammation in broilers. Antioxidants, 12(3):589.

[5] Liu, W., M. Zhou and L. Wang. 2023. Dietary selenium supplementation improves antioxidant status and neuroprotective responses in laying hens under heat stress. Animals, 13(9), 1478.

[6] Liu, W., M. Zhou, and L. Wang. 2023. Dietary selenium supplementation improves antioxidant status and prevents neuronal degeneration in laying hens under oxidative stress. Animals, 13(9) :1478.

[7] Mohammad, K. B., M. Afsharmanesh, Mehran Espahbodi and Esmat. 2022. Effects of dietary nano-selenium supplementation on broiler chicken performance, meat selenium content, intestinal microflora, intestinal morphology, and immune response. Journal of Trace Elements in Medicine and Biology, 126897.

[8] Wang, C.L., X.G. zhong, W. Li-sai, L.S.-fen, Z.L. yang, L.U. Lin, L. Xu-gang and LIAO X.d. 2021. Effects of selenium source and level on growth performance, antioxidative ability and meat quality of broilers. Journal of Integrative Agriculture, 20(1):227-235.

[9] Zhang, X., Y. Wang, and J. Xu, (2022). Nano-selenium improves intestinal morphology, barrier function, and antioxidant capacity in broilers. Poultry Science, 101(5):101867.

[10] Zhou, M., Chen, X., & Li, Y. 2022. The protective role of selenium on brain oxidative stress and apoptosis in broilers exposed to heat stress. Frontiers in Veterinary Science, 9:945218.