



International Journal of Veterinary Sciences and Animal Husbandry



ISSN: 2456-2912

NAAS Rating (2026): 4.61

VET 2025; SP-11(7): 41-45

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www.veterinarypaper.com

Received: 16-05-2026

Accepted: 19-06-2026

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Effect of licorice on production performance, gastrointestinal health and immunity of broiler chickens: A review

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DOI: <https://www.doi.org/10.22271/veterinary.2026.v11.i7Sa.3627>

Abstract

Licorice (*Glycyrrhiza glabra*) is a medicinal herb with considerable potential as a phytogetic feed additive in poultry due to its antioxidant, antimicrobial, anti-inflammatory, immunomodulatory, and hypocholesterolemic properties. Its bioactive compounds, including glycyrrhizin, flavonoids, saponins, and phenolics, enhance antioxidant defenses, improve immune function, reduce oxidative stress, and lower serum cholesterol levels. This review summarizes the effects of licorice supplementation on growth performance, carcass traits, immune response, antioxidant status, and stress indicators in poultry. While responses in body weight gain and feed intake are inconsistent, most studies report improved feed conversion efficiency, enhanced antioxidant capacity, better immune competence, reduced serum cholesterol, and increased tolerance to physiological stress without adversely affecting carcass characteristics. Variations in results are primarily attributed to differences in dosage, extract type, bird species, and management conditions. Overall, licorice shows promise as a natural alternative to antibiotic growth promoters, although further research is needed to standardize its application and optimize dietary inclusion levels.

Keywords: Broilers, licorice, production, serum biochemical, immunity, histomorphometry

1. Introduction

Licorice (*Glycyrrhiza glabra*) is one of the oldest medicinal herbs and has gained increasing attention as a phytogetic feed additive in poultry production due to its diverse biological activities. It belongs to the family Fabaceae and is native to Central and South-Western Asia and the Mediterranean region. The dried root contains numerous bioactive compounds including triterpene saponins, flavonoids, glycyrrhizin, glycyrrhetic acid, phytosterols, coumarins, amino acids, tannins, volatile oils and phenolic compounds. Glycyrrhizin, the principal active constituent, accounts for approximately 10% of the dry root weight and possesses a sweetness nearly 50 times greater than sucrose. Other important constituents such as liquiritin, isoliquiritin, glabridin and various flavonoids contribute to the antioxidant, antimicrobial, anti-inflammatory and immunomodulatory properties of licorice (Shibata, 2000; Simmler *et al.*, 2013; Pastorino *et al.*, 2018; Rizzato *et al.*, 2017) [39, 41, 31, 35].

1.1 Antioxidant properties

The high phenolic and flavonoid content of licorice confers strong antioxidant activity through free radical scavenging, metal ion chelation, inhibition of lipid peroxidation and enhancement of endogenous antioxidant defense systems (Visavadiya *et al.*, 2009). Glabridin has been identified as one of the most potent antioxidants, effectively inhibiting low-density lipoprotein oxidation and reducing cholesteryl linoleate hydroperoxide formation (Vaya *et al.*, 1997; Carmeli and Fogelman, 2009). Moreover, glycyrrhizic acid suppresses cyclooxygenase activity and prostaglandin E₂ synthesis, thereby reducing inflammatory responses. Glycyrrhetic acid also exhibits glucocorticoid-like activity, enhancing stress tolerance and modulating inflammatory pathways (Shibata, 2000; Damle, 2014) [46, 43, 7, 39, 5].

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1.2 Immunomodulatory properties

Licorice has also demonstrated considerable immunomodulatory potential. Glycyrrhetic acid stimulates the production of cytokines, antibodies, T-lymphocytes and interferon- γ , thereby strengthening both innate and adaptive immunity (Kataria *et al.*, 2013; Dhama *et al.*, 2015; Dhama *et al.*, 2018). It has also been shown to activate toll-like receptor 4 signaling, which plays an essential role in pathogen recognition and immune activation (Peng *et al.*, 2011). In poultry, supplementation with licorice has been associated with increased spleen and bursa weights, suggesting enhanced immune competence and disease resistance (Kalantar *et al.*, 2017) [24, 9, 10, 32, 23].

1.3 Hypo-cholesterolemic properties

Another important biological property of licorice is its hypo-cholesterolemic effect. Phytosterols present in licorice interfere with intestinal cholesterol absorption by competing with cholesterol for micelle incorporation, while dietary fiber and saponins enhance bile acid excretion and hepatic cholesterol clearance (Ostlund, 2004; Venkatesan *et al.*, 2003). Consequently, supplementation with licorice has been reported to reduce serum total cholesterol and LDL cholesterol concentrations (Visavadiya and Narasimhacharya, 2006; Alagawany *et al.*, 2019) [29, 44, 45, 2].

1.4 Antimicrobial properties

The antimicrobial activity of licorice has been attributed primarily to its flavonoids, saponins and alkaloids. These phytochemicals inhibit the growth of several pathogenic bacteria, including *Escherichia coli*, *Staphylococcus aureus*, *Pseudomonas aeruginosa* and *Bacillus subtilis*, by suppressing bacterial gene expression and toxin production (Gupta *et al.*, 2008; Nitalikar *et al.*, 2010; Sharma *et al.*, 2013; Wang *et al.*, 2015). Such antimicrobial effects may contribute to improved gastrointestinal health and nutrient utilization in poultry [16, 28, 38, 47].

Beneficial Effects

Effect on Growth Performance

The influence of licorice supplementation on growth performance has been inconsistent across studies. Several investigations reported no significant effects on body weight gain in broiler chickens receiving dietary or water supplementation of licorice extract (Sedghi *et al.*, 2010; Moradi *et al.*, 2014; Naser *et al.*, 2017). In contrast, other studies demonstrated significant improvements in body weight gain when licorice was supplemented at appropriate levels. Jalandhar *et al.* (2019) observed enhanced body weight in Vanaraja chickens supplemented with 0.5-1.0% licorice, while Ibrahim *et al.* (2020) reported improved growth in broilers fed 1 g/kg licorice extract. Similar improvements were observed in Japanese quails (Hosny *et al.*, 2020; Reda *et al.*, 2021) and in broilers reared under high stocking density where licorice alleviated stress-induced growth depression (Rashidi *et al.*, 2019). Furthermore, synergistic effects have been reported when licorice was combined with thyme, enzymes or probiotics (Kalantar *et al.*, 2014; Geravand *et al.*, 2021).

Feed intake responses have also varied considerably. Most studies found no significant influence of licorice supplementation on feed consumption (Sedghi *et al.*, 2010; Jagadeeswaran *et al.*, 2012; Moradi *et al.*, 2014; Naser *et al.*, 2017), whereas others reported either increased feed intake (Salary *et al.*, 2014; Jalandhar *et al.*, 2019; Geravand *et al.*,

2021) or reduced consumption at higher inclusion levels (Dogan *et al.*, 2018; Hosny *et al.*, 2020). These discrepancies are likely attributable to differences in dosage, method of administration, bird species, environmental conditions and experimental duration.

Feed conversion ratio (FCR) has generally shown favorable responses to licorice supplementation, particularly at optimal inclusion levels. Improved FCR has been reported in broilers, quails and laying hens (Nasra *et al.*, 2010; Hosny *et al.*, 2020; Reda *et al.*, 2021) while combinations of licorice with thyme and enzymes further enhanced feed efficiency (Kalantar *et al.*, 2014). However, several authors observed no significant changes in FCR (Naser *et al.*, 2017; Dogan *et al.*, 2018; Zeweil *et al.*, 2019) indicating that responses are dose dependent [37, 25, 26, 21, 18, 17, 34, 33, 22, 14, 37, 20, 25, 26, 36, 21, 14, 11, 17, 27, 17, 34, 22, 26, 11, 48].

2.2 Effect on Carcass Characteristics

Most studies suggest that licorice supplementation has little influence on carcass yield or organ weights. Naser *et al.* (2017), Hosny *et al.* (2020), Reda *et al.* (2021) and Rashidi *et al.* (2019) reported no significant changes in dressing percentage, breast yield or internal organ weights following licorice supplementation. Nevertheless, Sedghi *et al.* (2010) observed reduced abdominal fat deposition in broilers receiving licorice extract, while Nasra *et al.* (2010) reported increased spleen and heart weights, suggesting potential improvements in immune organ development [17, 34, 33, 37, 27].

2.3 Effect on Immune Response

The immunostimulatory properties of licorice have been widely recognized. Supplementation has been associated with increased spleen weight (Nasra *et al.*, 2010) and enhanced humoral immunity, as evidenced by higher haemagglutination inhibition antibody titers against Newcastle disease virus in broilers receiving standardized licorice extract (Jagadeeswaran and Selvasubramanian, 2014). However, some studies observed no significant effects on antibody titers or lymphoid organ weights (Moradi *et al.*, 2014; Beski *et al.*, 2019) indicating that immune responses may vary according to dosage, extract type and management conditions [27, 19, 25, 6].

2.4 Effect on Serum Cholesterol

Numerous studies support the cholesterol-lowering effect of licorice supplementation. Al-Daraji (2012a) demonstrated reduced plasma cholesterol concentrations in broilers fed aflatoxin-contaminated diets supplemented with licorice extract. Likewise, Naser *et al.* (2017) reported decreased serum total cholesterol and LDL cholesterol concentrations in broilers receiving licorice extract through drinking water. Similar reductions were observed in Japanese quails (Dosoky *et al.*, 2021), although some studies reported non-significant changes despite numerically lower cholesterol levels (Aghdam Shahryar *et al.*, 2018; Hosny *et al.*, 2020) [4, 26, 12, 1, 17].

2.5 Effect on Antioxidant Status

Licorice supplementation consistently enhances antioxidant defense mechanisms in poultry. Dietary inclusion significantly increases total antioxidant capacity while reducing total oxidant status and oxidative stress indices (Dogan *et al.*, 2018; Sibel *et al.*, 2018). Furthermore, licorice extract lowers serum malondialdehyde concentrations, indicating reduced lipid peroxidation (Dosoky *et al.*, 2021). These antioxidant properties are primarily attributed to

flavonoids and phenolic compounds that neutralize reactive oxygen species and improve cellular antioxidant systems [11, 40, 12].

2.6 Effect on Heterophil-to-Lymphocyte Ratio

The heterophil-to-lymphocyte (H/L) ratio is widely recognized as an indicator of physiological stress in poultry. Several studies demonstrated that licorice supplementation significantly reduces the H/L ratio, particularly under stress conditions such as aflatoxin exposure, indicating improved stress tolerance and immune competence (Al-Daraji, 2012a; Al-Daraji, 2012b). However, other researchers found no significant changes in leukocyte profiles following licorice supplementation (Sedghi *et al.*, 2010; Moradi *et al.*, 2014; Aghdam Shahryar *et al.*, 2018; Dosoky *et al.*, 2021; Geravand *et al.*, 2021). Similar reductions in H/L ratio have also been reported with other phytogetic feed additives including asparagus root powder, lemongrass, thyme, garlic combinations and herbal essential oils, suggesting that phytogetic additives may effectively alleviate physiological stress in poultry [4, 5, 37, 25, 1, 12, 14].

2.7 Effect on Intestinal Histomorphometry

Ullah *et al.* (2024) reported that dietary liquorice supplementation @ 2ml/L significantly enhanced intestinal morphology ($P<0.05$) in broilers, by increasing villus height, villus width, and villus height-to-crypt depth ratio, together with reduced crypt depth, suggesting improved gut health and nutrient absorption. Similar results were reported by Gowthaman *et al.* (2024), stating that supplementation of liquorice root powder at 0.3% level in the broiler diet significantly increased ($P<0.05$) the jejunal villus height, villus width and villus height to crypt depth ratio. Also, Pappula *et al.* (2026) reported that supplementation of licorice in the broiler diet improved the gut morphology (villus height, villus width, crypt depth and villus height to crypt depth ratio). Intestinal histomorphometry of broilers had appositve effect by the supplementation of 0.1% licorice root powder when given in combination with asparagus root powder and lemongrass oil (Dr *et al.*, 2023) [42, 15, 30].

Conclusion

Overall, the available literature indicates that licorice root powder and its extracts possess substantial antioxidant, anti-inflammatory, antimicrobial, immunomodulatory and hypocholesterolemic properties that make them promising phytogetic feed additives in poultry nutrition. Although responses in growth performance are variable among studies, most evidence suggests that appropriate inclusion levels improve feed efficiency, antioxidant status, immune response, serum lipid profile and stress resistance without adversely affecting carcass characteristics. Variations among experimental findings are likely related to differences in dosage, extraction method, bird species, environmental conditions and duration of supplementation. Future studies focusing on standardized preparations, optimal inclusion levels and underlying molecular mechanisms, particularly in straight-run broiler chickens, are required to fully establish the practical benefits of licorice root powder in commercial poultry production.

- **Conflict of Interest:** Not available
- **Financial Support:** Not available

References

1. Aghdam Shahryar M, Ahmadzadeh A, Nobakht A. Effects of different levels of *Glycyrrhiza glabra* medicinal plant powder on performance, egg quality and some serum biochemical parameters in laying hens. Iranian Journal of Applied Animal Science. 2018;8:119-124.
2. Alagawany M, Elnesr SS, Farag MR. Use of liquorice (*Glycyrrhiza glabra*) in poultry nutrition: Global impacts on performance, carcass and meat quality. World's Poultry Science Journal. 2019;75:293-304.
3. Alagawany M, Elnesr SS, Farag MR, Abd El-Hack ME, Khafaga AF, Taha AE, et al. Use of licorice (*Glycyrrhiza glabra*) herb as a feed additive in poultry: Current knowledge and prospects. Animals. 2019;9:536.
4. Al-Daraji HJ. Effect of liquorice extract supplemented diet on aflatoxin degradation and blood parameters in broiler chickens. International Journal of Pharmaceutical and Phytopharmacological Research. 2012;2:87-91.
5. Al-Daraji HJ. The use of licorice extract to alleviate the adverse effects of heat stress on physiological performance of broiler chickens. International Journal of Pharmaceutical and Phytopharmacological Research. 2012;2:79-82.
6. Beski S, Shekhu N, Sadeq Barzan A, Al-Khdri A, Ramadhan Najib, Al-Bayati S. Effects of the addition of aqueous liquorice (*Glycyrrhiza glabra*) extract to drinking water on production performance, carcass cuts and intestinal histomorphology of broiler chickens. Iraqi Journal of Agricultural Sciences. 2019;50:842-849.
7. Carmeli E, Fogelman Y. Antioxidant effect of polyphenolic glabridin on LDL oxidation. Toxicology and Industrial Health. 2009;25:321-324.
8. Damle M. *Glycyrrhiza glabra* (Liquorice): A potent medicinal herb. International Journal of Herbal Medicine. 2014;2:132-136.
9. Dhama K, Latheef SK, Samad HA, Karthik K, Tiwari R, Khan RU, et al. Multiple beneficial applications and modes of action of herbs in poultry health and production: A review. International Journal of Pharmacology. 2015;11:152-176.
10. Dhama K, Karthik K, Khandia R, Munjal A, Tiwari R, Rana R, et al. Medicinal and therapeutic potential of herbs and plant metabolites/extracts countering viral pathogens: Current knowledge and future prospects. Current Drug Metabolism. 2018;19:236-263.
11. Dogan SC, Baylan M, Erdogan Z, Kucukgul A, Bulancak A. The effects of *Glycyrrhiza glabra* root on performance, some serum parameters and antioxidant capacity of laying hens. Brazilian Journal of Poultry Science. 2018;20:699-706.
12. Dosoky WM, Zeweil HS, Ahmed MH, Zahran SM, Ali AM, Abdelsalam NR, et al. The influences of tylosin and licorice dietary supplementation on productive performance, serum parameters, egg yolk lipid profile, antioxidant and immunity status of laying Japanese quail under heat stress conditions. Journal of Thermal Biology. 2021;99:103015.
13. Radhika P, Chinni Preetam V, Vijaya Lakshmi K, Nagalakshmi D, Raju MVLN. Effect of dietary supplementation of phytogetic feed additives (licorice root powder, asparagus root powder and lemongrass oil) in combination on the intestinal histomorphometry of commercial broiler chicken. Pharma Innovation Journal. 2023;12(8S):353-356.

14. Geravand M, Sharifi SD, Yaghobfar A, Mohammadi A, Hosseini SA, Ghazanfari S. Growth performance, ascites sensitivity and ileal microbiota as affected by licorice essential oil in broiler chicken diets. *Livestock Science*. 2021;251:104670.
15. Gowthaman V, Sharma D, Deo C, Tiwari AK, Biswas A. Production performance, serum lipid profile and gut health in Indian native Kadaknath chickens fed diet incorporated with liquorice root powder. *Heliyon*. 2024;10(22):e40183.
16. Gupta VK, Fatima A, Faridi U, Negi AS, Shanker K, Kumar JK, et al. Antimicrobial potential of *Glycyrrhiza glabra* roots. *Journal of Ethnopharmacology*. 2008;116:377-380.
17. Hosny M, Abdelnabi M, Essa N, Ali A. Effect of licorice extract on growth performance, meat yield and plasma analysis of Japanese quail (*Coturnix coturnix japonica*). *Archives of Agriculture Sciences Journal*. 2020;3:55-66.
18. Ibrahim D, Sewid AH, Arisha AH, Abd El-Fattah AH, Abdelaziz AM, Al-Jabr OA, et al. Influence of *Glycyrrhiza glabra* extract on growth, gene expression of gut integrity and *Campylobacter jejuni* colonization in broiler chickens. *Frontiers in Veterinary Science*. 2020;7:612063.
19. Jagadeeswaran A, Selvasubramanian S. Effect of supplementation of licorice root (*Glycyrrhiza glabra* L.) extracts on immune status in commercial broilers. *International Journal of Veterinary Science & Technology*. 2014;3:88-92.
20. Jagadeeswaran A, Selvasubramanian S, Chandrasekaran D. Supplementation of licorice (*Glycyrrhiza glabra* L.) for commercial broilers. *Indian Veterinary Journal*. 2012;89:68-69.
21. Jаланtha P, Veeramani P, Vasanthi B, Ruba Nanthini A. Supplementation of licorice for improving the productivity and livability in Vanaraja birds. *Indian Veterinary Journal*. 2019;96:84-85.
22. Kalantar M, Rezaei M, Salari J, Matin HH. *Thymus vulgaris* L., *Glycyrrhiza glabra* or Combo® enzyme in corn- versus barley-based broiler diets. *Journal of Coastal Life Medicine*. 2014;2:993-997.
23. Kalantar M, Hosseini SM, Yang L, Raza SHA, Gui L, Rezaie M, et al. Performance, immune and carcass characteristics of broiler chickens as affected by thyme and licorice or enzyme supplemented diets. *Open Journal of Animal Sciences*. 2017;7:105-119.
24. Kataria R, Hemraj SG, Gupta A, Jalhan S, Jindal A. Pharmacological activities of *Glycyrrhiza glabra*: A review. *Asian Journal of Pharmaceutical and Clinical Research*. 2013;6:5-7.
25. Moradi N, Ghazi S, Amjadian T, Khamisabadi H, Habibian M. Performance and some immunological parameter responses of broiler chickens to licorice (*Glycyrrhiza glabra*) extract administration in drinking water. *Annual Research and Review in Biology*. 2014;4:675-683.
26. Naser M, Shahab G, Mahmood H. Drinking water supplementation of licorice (*Glycyrrhiza glabra* L.) root extract as an alternative to in-feed antibiotic growth promoter in broiler chickens. *GSC Biological and Pharmaceutical Sciences*. 2017;1:20-28.
27. Nasra BA, Yahya ZE, Abd El-Ghany FA. Effect of dietary supplementation with phytoestrogen sources before sexual maturity on productive performance of Mandarrah hens. *Egyptian Poultry Science*. 2010;30:829-846.
28. Nitalikar MM, Munde KC, Dhore BV, Shikalgar SN. Studies on antibacterial activities of *Glycyrrhiza glabra* root extract. *International Journal of PharmTech Research*. 2010;2:899-901.
29. Ostlund RE Jr. Phytosterols and cholesterol metabolism. *Current Opinion in Lipidology*. 2004;15:37-41.
30. Pappula R, Velpula C, Kondaveti V, Devanaboyina N, Narasimha R. Effect of phytobiotics (licorice, asparagus and lemongrass) on the intestinal histomorphometry of broiler chicken. *Indian Journal of Animal Health*. 2026;65:152-157.
31. Pastorino G, Cornara L, Soares S, Rodrigues F, Oliveira MBPP. Liquorice (*Glycyrrhiza glabra*): A phytochemical and pharmacological review. *Phytotherapy Research*. 2018;32:2323-2339.
32. Peng LN, Li L, Qiu YF. Glycyrrhetic acid extracted from *Glycyrrhiza uralensis* Fisch. induces the expression of Toll-like receptor 4 in Ana-1 murine macrophages. *Journal of Asian Natural Products Research*. 2011;13:942-950.
33. Rashidi N, Ghorbani MR, Tatar A, Salari S. Response of broiler chickens reared at high density to dietary supplementation with licorice extract and probiotic. *Journal of Animal Physiology and Animal Nutrition*. 2019;103:100-107.
34. Reda FM, El-Saadony MT, El-Rayes TK, Farahat M, Attia G, Alagawany M. Dietary effect of licorice (*Glycyrrhiza glabra*) on quail performance, carcass traits, blood metabolites and intestinal microbiota. *Poultry Science*. 2021;100:101266.
35. Rizzato G, Scalabrin E, Radaelli M, Capodaglio G, Piccolo O. A new exploration of licorice metabolome. *Food Chemistry*. 2017;221:959-968.
36. Salary J, Kalantar M, Ala MS, Ranjbar K, Matin HR. Drinking water supplementation of licorice and aloe vera extracts in broiler chickens. *Scientific Journal of Animal Science*. 2014;3:41-48.
37. Sedghi M, Golian A, Kermanshahi H, Ahmadi H. Effect of dietary supplementation of licorice extract and a prebiotic on performance and blood metabolites of broilers. *South African Journal of Animal Science*. 2010;40:371-380.
38. Sharma V, Agrawal RC, Pandey S. Phytochemical screening and determination of antibacterial and antioxidant potential of *Glycyrrhiza glabra* root extracts. *Journal of Environmental Research and Development*. 2013;7:1552-1558.
39. Shibata S. A drug over the millennia: Pharmacognosy, chemistry, and pharmacology of licorice. *Journal of Pharmaceutical Society of Japan*. 2000;120:849-862.
40. Sibel C, Zeynep E, Ahmet S, Mikail B, Altug K. The effects of licorice root powder (*Glycyrrhiza glabra*) on performance, serum parameters, egg yolk cholesterol and antioxidant capacity of laying Japanese quail. *Turkish Journal of Agriculture-Food Science and Technology*. 2018;6:1290-1296.
41. Simmler C, Pauli GF, Chen SN. Phytochemistry and biological properties of glabridin. *Fitoterapia*. 2013;90:160-184.
42. Ullah A, Khan S, Shuaib M, ul Hassan S, Sufyan A, Lionel K, et al. Effect of liquorice (*Glycyrrhiza glabra*) on growth performance, gut morphometry, and

- economics of broiler production. Pakistan Journal of Zoology. 2024;56:2039-2046.
43. Vaya J, Belinky PA, Aviram M. Antioxidant constituents from licorice roots: Isolation, structure elucidation and antioxidative capacity toward LDL oxidation. Free Radical Biology and Medicine. 1997;23:302-313.
44. Venkatesan N, Devaraj SN, Devaraj H. Increased binding of LDL and VLDL to apo B/E receptors of hepatic plasma membrane of rats treated with Fibernat. European Journal of Nutrition. 2003;42:262-271.
45. Visavadiya NP, Narasimhacharya AVR. Hypocholesterolaemic and antioxidant effects of *Glycyrrhiza glabra* (Linn.) in rats. Molecular Nutrition & Food Research. 2006;50:1080-1086.
46. Visavadiya NP, Soni B, Dalwadi N. Evaluation of antioxidant and antiatherogenic properties of *Glycyrrhiza glabra* root using *in vitro* models. International Journal of Food Sciences and Nutrition. 2009;60:135-149.
47. Wang L, Yang R, Yuan B, Liu Y, Liu C. The antiviral and antimicrobial activities of licorice, a widely used Chinese herb. Acta Pharmaceutica Sinica B. 2015;5:310-315.
48. Zeweil HS, Dosoky WM, Zahran SM, Ahmed MH, Mohamed AA. Effect of licorice as an alternative to antibiotics on productive performance, egg quality, yolk lipid profile and blood lipid profile of laying Japanese quail. Journal of the Advances in Agricultural Researches. 2019;24:164-177.

How to Cite This Article

Radhika P, Mahesh Babu M. Effect of licorice on production performance, gastrointestinal health and immunity of broiler chickens: A review. International Journal of Veterinary Sciences and Animal Husbandry. 2026;SP-11(7): 41-45.

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