



Research Article

EFFECT OF DIETARY SUPPLEMENTATION OF ASHWAGANDHA (*WITHANIA SOMNIFERA*) AND KALMEGH (*ANDROGRAPHIS PANICULATA*) ON GROWTH PERFORMANCE AND IMMUNE STATUS IN BROILERS

DHENGE S.A.^{*1}, SHIRBHATE R.¹, WANKAR A.¹ AND KHANDAIT V.²

¹Department of Veterinary Physiology, Nagpur Veterinary College, Maharashtra Animal and Fishery Sciences University, Nagpur, 400 006, Maharashtra, India

²Department of Veterinary Extension and Animal Husbandry, Nagpur Veterinary College, Maharashtra Animal and Fishery Sciences University, Nagpur, 400 006, India

*Corresponding Author: Email - drdhenge2009@gmail.com

Received: December 02, 2018; Revised: December 26, 2018; Accepted: December 27, 2018; Published: December 30, 2018

Abstract: Day old 120 broiler birds were equally divided in 4 groups and treated with 5 gm Ashwagandha (*Withania somnifera*) root powder (T₁) and 2 gm Kalmegh (*Andrographis paniculata*) whole plant powder (T₂), 5 gm Ashwagandha root powder and 2 gm Kalmegh whole plant powder (T₃) per kg feed and control (T₀) supplied only plain feed. Growth parameters as mean live body weight, gain in body weight, feed consumption and feed efficiency were estimated weekly during 1st - 6th weeks and skin thickness, Serum Glutamic Pyruvate Transaminase (SGPT) and Serum Glutamic Oxaloacetate Transaminase (SGOT) levels were measured during 3rd - 6th weeks to judge immune response in broilers to Ashwagandha and Kalmegh. Results revealed as, T₁ and T₃ significantly (P<0.05) increased live body weight, gain in body weight and feed efficiency with slight increase in feed consumption, while T₂ group significantly (P<0.05) increased live body weight, feed efficiency with slightly increased gain in body weight and feed consumption as compared with T₀. T₁, T₂ and T₃ significantly (P<0.05) increased broiler birds skin thickness and significantly (P<0.01) reduced SGPT and SGOT levels as compared to T₀. In conclusion, the herbs Ashwagandha and Kalmegh promotes growth in broiler birds along with enhance immunity and liver functions.

Keywords: Ashwagandha, Kalmegh, Broilers, Growth, Immunity

Citation: Dhenge S.A., et al., (2018) Effect of Dietary Supplementation of Ashwagandha (*Withania somnifera*) and Kalmegh (*Andrographis paniculata*) on Growth Performance and Immune Status in Broilers. International Journal of Agriculture Sciences, ISSN: 0975-3710 & E-ISSN: 0975-9107, Volume 10, Issue 24, pp.- 7634-7636.

Copyright: Copyright©2018 Dhenge S.A., et al., This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution and reproduction in any medium, provided the original author and source are credited.

Introduction

India with its rich traditional heritage is well known for ayurvedic medicine system due to its therapeutic potential and it has been now practiced in human as well as animal health care. Among these, Ashwagandha (*Withania somnifera*) [1], Kalmegh (*Andrographis paniculata*) [2], Shatavari (*Asparagus racemosus*) [3], Tulsi (*Ocimum sanctum*) [4] etc. have been traditionally used in India as medicine in human. The herb Ashwagandha belongs to a family solanaceae and withanolides are active principles in whole plant and it has immunomodulatory, antioxidant, hepatoprotective as well as antibacterial effects [5]. Kalmegh (*Andrographis paniculata*) is ancient medicinal herb contains diterpenoids as active constituents and being used as hepatoprotective [6], antibacterial and immunomodulatory agent [2]. In ethnoveterinary practice, various medicinal plants were used to control diseases [5], increased body weight [7] and enhancing immunity [8] in broilers. Herbs or medicinal plants are safer alternative to synthetic growth promoters and antibiotics in broilers, as herbs are cheap, easily available and reduces risk to toxicity and health hazards. Therefore, in present study, it was evaluated the dietary effect of Ashwagandha (*Withania somnifera*) root powder and Kalmegh (*Andrographis paniculata*) whole plant powder on growth performance, immuno-enhancing as well as hepatoprotective properties in broilers.

Materials and Methods

The present study was carried out in Lower Poultry Farm and Department of Veterinary Physiology, Nagpur Veterinary College, Nagpur (Maharashtra) and experimental design was approved with Institutional Animal Ethics Committee. Ashwagandha (*Withania somnifera*) root powder, Kalmegh (*Andrographis paniculata*) whole plant powder, broiler feed etc. were purchased from local market.

Experimental design

Total 120, day old broiler chicks (50-55 gm body weight) were equally divided in T₀, T₁, T₂ and T₃ groups on day 0 and T₀ (control) supplied only basal diet, T₁ and T₂ were supplemented with 5 gm Ashwagandha root powder and 2 gm Kalmegh whole plant powder, respectively and T₃ was supplied with 5 gm Ashwagandha and 2 gm Kalmegh combinely per kg broiler diet. Broiler birds were reared up to 6th weeks age and experimental data was recorded during each week.

Management of birds

All broiler chicks were vaccinated against Infectious Bursal Disease (IBD) and Ranikhet Disease (RD) as per vaccination schedule and broilers birds were reared on deep litter system in well ventilated house. All groups were provided feed as per experimental design and ad-libitum fresh drinking water and all biosafety measures were strictly followed during experiment.

Experimental parameters

Growth performance

Growth parameters such as mean live body weight, gain in body weight, feed consumption and feed efficiency were studied to evaluate Ashwagandha and Kalmegh dietary supplementation effect on growth performance in broilers.

Immune response

Cell mediated immune response to Ashwagandha and Kalmegh in broilers was judge by using Contact Sensitivity Test (CST) and 1% 2- 4 dinitrochlorobenzene (DNCB) was used as sensitizing agent in acetone [9].

Table-1 Effect of Ashwagandha and Kalmegh on growth performance in broilers, ($P < 0.05$)

SN	Growth parameters (6 th weeks mean)	Treatment groups			
		T ₀	T ₁	T ₂	T ₃
1	Live body weight (gm)	757.11±241.11	842.98±278.62	823.79±274.94	830.65±279.07
2	Gain in weight (gm)	278.65±44.20	330.93±48.03	319.65±50.83	328.45±53.63
3	Feed consumption(gm)	640.60±127.58	662.21±136.65	676.05±144.50	672.49±142.95
4	Feed efficiency	0.44±0.03	0.50±0.03	0.48±0.02	0.49±0.03

Table-2 Effect of Ashwagandha and Kalmegh on immunity and liver functions in broilers, (* $P < 0.05$ and ** $P < 0.01$)

SN	Particulars (Mean)	Treatment groups			
		T ₀	T ₁	T ₂	T ₃
1	Skin thickness (mm)	2.73±0.62*	3.25±0.75*	3.35±0.75*	3.22±0.67*
2	SGPT (IU/L)	14.15±1.93**	13.12±1.64**	12.13±1.84**	13.04±1.66**
3	SGOT (IU/L)	35.30±0.55**	34.08±0.46**	33.69±0.44**	33.98±0.38**

Liver functions

Blood samples were collected from jugular vein of six broiler birds from each group during 3rd to 6th weeks as weekly and serum was separated to study hepatoprotective properties of Ashwagandha and Kalmegh by estimating Serum Glutamic Pyruvate Transaminase (SGPT) and Serum Glutamic Oxaloacetate Transaminase (SGOT) levels.

Statistical analysis

The recorded data during experimental study was analyzed by Randomized Block Design [10] and presented as Mean ± Standard Error.

Results

Growth performance

Live body weight and feed efficiency in T₁, T₂ and T₃ groups were significantly ($P < 0.05$) increased as compared to T₀ group while, gain in body weight in T₁ and T₃ groups was significantly ($P < 0.05$) and in T₂ group slightly increased as compared to T₀ group alongwith moderately increased feed consumption in T₁, T₂ and T₃ groups than T₀ group [Table-1].

Immune response

The mean skin thickness of broilers was significantly ($P < 0.05$) increased in T₁, T₂ and T₃ groups as compared to T₀ group [Table-2] and increase skin thickness in response to sensitizing agents shows increase cell mediated immune response due to delayed type hypersensitivity (DTH) reaction which shows enhance immunity.

Liver functions

SGPT and SGOT levels in T₁, T₂ and T₃ were significantly ($P < 0.01$) decreased as compared to T₀ group with lowest in T₂ group [Table-2] and decrease SGPT and SGOT levels indicates improve liver functions in broilers.

Discussion

In present study, the 5 gm Ashwagandha (*Withania somnifera*) root powder and 2 gm Kalmegh (*Andrographis paniculata*) whole plant powder per kg feed showed significant ($P < 0.05$) improvement in broilers growth up to 6th weeks and as like present study, Ashwagandha [7, 11] and Kalmegh [12] increased growth in broilers. In addition, previous reports show *Andrographis paniculata* leaves powder decreased mortality rate in broilers [13] and significantly ($P < 0.05$) increased live body weight, gain in body weight and feed efficiency [14] and these results are coincided with present study findings. However, *Andrographis paniculata* and *Psidium guajava* leaves powder (0.2-0.4% in feed) separately and combinely did not significantly ($P > 0.05$) altered body weight, gain in body weight, feed intake, feed conversion ratio and mortality % as compared to control and antibiotic supplied group of broilers [15] which are not accordance with present study findings. In comparison to control group, feed consumption of birds was also slightly increased as like previous findings in broilers supplied with Ashwagandha [7] and Kalmegh [16]. In addition, Ashwagandha and Kalmegh combinely significantly ($P < 0.05$) increased growth of broiler birds as compared to control and Kalmegh group and these findings are similar with previous findings [17] who reported higher live body weight and weekly gain in body weight in broilers

supplemented with polyherbal preparation containing mainly Ashwagandha, Kalmegh and other herbs. Broiler bird's immunity was significantly ($P < 0.05$) increased due to Ashwagandha and Kalmegh supplementation in feed as judged by CST and these herbs also significantly ($P < 0.01$) increased liver functions as indicated by SGOT and SGPT tests. Increased in immunity and liver functions in birds is mainly due to immunomodulatory [18] and hepatoprotective [6] properties of Ashwagandha and Kalmegh, respectively and these findings are in agreement with the earlier reports in broilers supplied with Ashwagandha [6] and Kalmegh [8] and also in Japanese quails supplied with 1% Ashwagandha root powder [9]. However, Kalmegh significantly ($P < 0.01$) increased liver functions in broilers as compared to control group and Ashwagandha supplied group showing Kalmegh is potent hepatoprotective agent in broilers which was similarly justified in broilers [8]. There are certain evidences as medicinal plants or herbs increase resistance against biotic and abiotic stressors which are physiological or chemical in origin and indicating antioxidant and adaptogens properties of Ashwagandha and Kalmegh due their active principles.

Conclusion

Present study concludes that, 5 gm Ashwagandha (*Withania somnifera*) and 2 gm Kalmegh (*Andrographis paniculata*) powder per kg feed separately and combinely improved growth and immune status in broilers but, Kalmegh is potent hepatoprotective agent and these can be supplied in feed to improve general health and production of broilers.

Application of research: To replace synthetic and antibiotic origin growth promoters in residual free broiler production.

Acknowledgement / Funding: Authors are thankful to Maharashtra Animal and Fishery Sciences University, Nagpur, 400 006, Maharashtra, India

***Research Guide or Chairperson of research: Dr R.N. Shirbhate**

University: Maharashtra Animal and Fishery Sciences University, Nagpur, 400 006, Maharashtra, India

Research project name or number: MVSc Thesis

Authors contribution: All authors equally contributed.

Authors statement: All authors read, reviewed, agree and approved final manuscript.

Conflict of interest: None declared.

Ethical approval: This article does not contain any studies with human participants or animals performed by any of the authors.

Ethical Committee Approval Number: Nil

References

- [1] Singh B., Saxena A. K., Chandan B. K., Gupta D. K., Bhutani K. K. and Anand K. K. (2001) *Phytotherapy Research*, 15, 311-318.
- [2] Joselin J. and Jeeva S. (2014) *Medicinal Aromatic Plants*, 3, 169.

- [3] Kamat J. P., Bolor K. K., Devasagayam T. P. and Venkatachalam S.R. (2000) *Journal of Ethnopharmacology*, 71(3), 425-435.
- [4] Cohen M. M. (2014) *Journal of Ayurveda & Integrative*, 5(4), 251-259.
- [5] Divya K., Mishra S. K. and Lather D. (2015) *Haryana Veterinarian*, 54 (1), 1-6.
- [6] Hossain S., Zannat U., Abubakar S., and Hafizur R. (2014) *The Scientific World Journal*, Article ID 274905.
- [7] Mane A. G., Kulkarni A. N., Korake R. L. and Bhutkar S.S. (2012) *Research Journal of Animal Husbandry & Dairy Science*, 3(2), 94-96.
- [8] Mathivanan R., Edwin S.C., Vishwanathan K., Chandrasekaran D. and Nanjappan K. (2007) *Indian Veterinary Journal*, 85(3),277-279.
- [9] Bhardwaj R. K. Bhardwaj A. and Gangwar S. K. (2012) *International Journal of Science and Nature*, 3(2), 476-478.
- [10] Snedecor G.W. and Cochran W. E. (1967) *Statistical methods*, 6th edition, Oxford and IBH publishing Co., New Delhi, India.
- [11] Pedulwar S. N., Chaudhari A. J., Zanzad A. A., Ramteke B. N. and Deshmukh G. B. (2007) *Veterinary World*, 6(2),37-38.
- [12] Sapkota D., Islam R. and Medhi A. K. (2005) *Indian Veterinary Journal*, 82(5),529-532.
- [13] Tipakorn N. (2002) *Doctoral Dissertation, submitted to Institute of Animal Physiology and Nutrition, George-August University, Göttingen.*
- [14] Mathivanan R., Edwin S. C. Amutha R. and Viswanathan K. (2006) *International Journal of Poultry Science*, 5(12),1144-1150.
- [15] Watanasit S.Y., Siriwanthanukul and Itharal A. (2005) *Songklanakarinn Journal of Science and Technology*, 27 (Suppl.2),587-596.
- [16] Bhaskar D., Sharma R. K., Chauhan S.S., Singh H. and Kumar A. (2003) *Indian Journal of Poultry Science*, 38(2),110-114.
- [17] Roy T. J., Das S. K., Mandal T. K. and Chaudhary A.K. (2003) *Phytomedica*, 4,73-86.
- [18] Lokhande P. T., Kulkarni G. B., Ravikanth K., Maini S. and Rekhe D. S. (2009) *Veterinary World*, 2(11), 432- 434.