

Performance of broilers fed ashwagandha (*Withania somnifera*) incorporated diets during summer season for alleviating heat stress

P. Vasanthakumar*, B. Pangayarselvi, P. Sasikumar, D. Chandrasekaran, K.A. Doraisamy and M.R. Purushothaman

Department of Animal Nutrition, Veterinary College and Research Institute,
(TANUVAS) Namakkal – 637 002, India.

Received: 18-12-2013

Accepted: 11-03-2014

DOI:10.5958/0976-0555.2015.00082.5

ABSTRACT

An experiment was conducted to assess the effect of ashwagandha on alleviating heat stress using 90 numbers of day old broiler chicks dividing into 3 treatment groups containing 3 replicates in each group during summer season. The dietary treatments included T₁ (Control) without any herbal supplementation, T₂ - 1.0 % ashwagandha root powder and T₃ - 0.15 % ashwagandha root extract. At the end of 42 days of age, the body weight, feed intake, antioxidant level and immune status were significantly (p<0.05) better in ashwagandha root powder and extract supplemented groups when compared to the control group. Based on the above said results, ashwagandha root powder and extract are found to be beneficial to alleviate heat stress in broilers during summer season.

Key words: Ashwagandha, Broiler performance, Heat stress.

INTRODUCTION

The use of medicinal plants as feed additives is gaining popularity worldwide. Ashwagandha (*Withania somnifera*) is one of the well known medicinal plants which is widely used in herbal medicine for the management of stress, arthritis, inflammation, conjunctivitis and tuberculosis. It contains many active principles such as withanolides, somnitalglucose, inorganic salt, withanone, di-hydroxy kaempferol-3 and rutosides (Murthy *et al.*, 2009 and Pal *et al.*, 2012). These active principles have been reported to possess immunomodulatory, general tonic, hepato-protective, anti-stress, growth promoter and antioxidant properties (Ansari *et al.*, 2008; Singh *et al.*, 2010; Kushwaha *et al.* 2012; Varma *et al.*, 2012) beside antibacterial and anti-fungal properties (Punetha *et al.*, 2010). Akotkar *et al.* (2007) recorded significant (P<0.05) improvement in performance of broilers fed ashwagandha root powder for a period of six weeks. Similarly, Khobragade (2003) reported that body weight gain of broiler birds was more in ashwagandha supplemented group. Hence the present study was carried out to assess the heat stress alleviating effect of ashwagandha root powder and commercial grade ashwagandha root extract in commercial broilers.

MATERIALS AND METHODS

A broiler trial was conducted for 42 days during summer season (April – May, 2012) to study the performance of broilers fed ashwagandha supplemented diets.

Experimental design: Ninety number of one day old broiler chicks were divided into three treatment groups containing 3 replicates in each group. The dietary treatments included T₁. Control without any herbal supplementation, T₂ - 1.0 % ashwagandha root powder (crude form) and T₃ - 0.15 % ashwagandha root extract (purified form) supplemented diets. All the birds were maintained in deep litter pens and the management practices adopted were similar except the experimental diets. The birds were vaccinated against ND and IBD at the age of 7th and 14th day, respectively. The broiler prestarter rations were fed from 1-14 days followed by starter ration from 15 – 28 days and finally broiler finisher rations from 28 – 42 days of age.

Parameters studied: Feed consumption and body weight of birds were recorded. Feed conversion efficiency (FCR) was calculated. At the end of the experimental period of 42 days, two birds from each replicate were slaughtered and parameters such as hot carcass weight, liver weight and intestinal length were recorded. The levels of ascorbic acid and glutathione peroxidase activity in serum samples were measured (Sivakumar *et al.*, 2012). ELISA technique was used to measure the antibody titre against Ranikhet disease.

Statistical analysis: All the data were subjected to analysis of variance test. Means of different groups were compared using Duncan's multiple range tests using SPSS software (version 15.0).

*Corresponding author's e-mail: p.vasanthakumar@tanuvas.org.in and drpvkumar@yahoo.com.

TABLE 1: Feed intake, body weight, feed conversion efficiency, feed cost, carcass characteristics, serum glutathione peroxidase, ascorbic acid and blood RD titre levels in broilers fed ashwagandha powder (1%) and ashwagandha extract (0.15%) supplemented diets

| Treatment | Control | Ashwagandha powder (1.0%) | Ashwagandha extract (0.15%) |
|------------------------------------|----------------------------|-----------------------------|-----------------------------|
| Feed intake (g) | 3954.22±83.24 ^a | 4580.64±194.86 ^c | 4423.52±76.23 ^b |
| Body weight (g) | 1947.83±41.39 ^a | 2214.78±57.4 ^b | 2297.11±49.80 ^c |
| FCR | 2.03±0.06 ^b | 2.07±0.03 ^c | 1.93±0.08 ^a |
| Feed cost (Rs) | 57.34±0.78 ^a | 58.48±0.62 ^b | 61.33±1.07 ^c |
| Hot carcass weight (g) | 1537.50±33.26 ^a | 1842.33±55.32 ^b | 1795.50±50.79 ^b |
| Dressing percentage | 78.44±1.60 | 78.59±0.63 | 77.50±0.90 |
| Liver weight(as % body weight) | 2.69±0.27 | 2.42±0.12 | 2.50±0.14 |
| Intestinal length (cm) | 183.75±6.77 | 213.50±5.27 | 221.33±11.03 |
| Ascorbic acid (mg/ml) | 0.94±0.3 ^a | 1.62±0.2 ^c | 1.40±0.6 ^b |
| Glutathione peroxidase (µg/ml) | 32.84±4.65 ^a | 57.11±5.30 ^c | 41.91±2.17 ^b |
| RD titre value (log ₂) | 6.6 ^a | 7.3 ^c | 7.0 ^b |

RESULTS AND DISCUSSION

The performance of broilers fed ashwagandha root powder or root extract based diets in terms of feed intake, body weight and feed conversion efficiency, slaughter parameters, RD titre values, serum ascorbic acid and glutathione peroxidase values are presented in Table 1. The body weight (g) of T₃ group fed ashwagandha root extract at the level of 0.15 % was significantly (p<0.05) more (2297.11±49.8) when compared to the control (1947.83±41.39) and ashwagandha powder (2214.78±57.41) fed groups. The feed intake (g) was significantly (p<0.05) more in ashwagandha root powder T₂ (4580.64±94.86) and root extract T₃ (4423.52±76.23) supplemented groups as compared to the T₁ (3954.22±83.24) group. The observations made in this study corroborate the findings of Singh *et al.* (2010) and Ansari *et al.* (2008) who also reported increased feed intake in ashwagandha fed groups leading to increased body weight. Though the feed conversion efficiency did not differ significantly, the FCR was numerically better in T₃ group fed ashwagandha extract at 0.15 % of the diet. This is in accordance with earlier reports of Khobragade (2003), Akotkar *et al.* (2007) and Bhardwaj and Gangwar (2011). Kumari Daisy (2006) also observed improved feed conversion ratio and increased average body weight in broilers fed ashwagandha supplemented diets. The liver weight did not differ significantly among the treatment groups. Samarth *et al.* (2002) and Pedulwar *et al.* (2007) concluded that dietary supplementation of ashwagandha root powder increased the dressing percentage and meat yield of broiler birds. The hot carcass weight was significantly more in ashwagandha supplemented groups compared to unsupplemented group in this study which corroborates the observations of above workers. The intestinal length was relatively more in ashwagandha fed groups which may be due to better gut health.

The glutathione peroxidase, present in the cytosol and mitochondrial matrix, catalyses the degradation of various peroxides by oxidizing glutathione. The antioxidant status was better in ashwagandha fed groups compared to the unsupplemented T₁ group. Holovska *et al.* (2003) and Bharavi *et al.* (2010) observed increase in plasma antioxidant enzyme levels due to the supplementation of antioxidants in the diet of broilers. The immune status of the birds as assessed by RD titre values (log₂) was found to be better in T₂ (7.3) and T₃ (7.0) groups as compared to control group (6.6). Akotkar *et al.* (2007) reported that HI titre and skin thickness were more in 1.0% ashwagandha supplemented group. Both humoral and cell mediated immune responses of the broiler birds were improved due to ashwagandha supplementation (Kumari *et al.*, 2011). The results of the present study are similar to the observations of earlier workers. The immunomodulatory activity of ashwagandha may be due to the presence of the active principle glycowithanolides (Jadhav *et al.*, 2008).

CONCLUSIONS

From this study, supplementation of ashwagandha (*Withania somnifera*) root powder and root extract at an inclusion level of 1.0 % and 0.15%, respectively was found to improve the body weight, feed intake, serum antioxidant levels, immune status and general health of the commercial broiler birds. Based on the results, it can be concluded that ashwagandha root powder and extract reduce the heat stress in broilers during summer season.

ACKNOWLEDGEMENT

The authors are thankful to the Director, Central Research Institute for Dryland Agriculture (ICAR), Hyderabad, India and the Deputy Director General (NRM), Indian Council of Agricultural Research, New Delhi, India for the financial assistance under NICRA. The authors are grateful to the Dean, VC & RI, Namakkal and the Director of Research, TANUVAS, Chennai for providing necessary facilities to carry out this work.

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