



RESEARCH ARTICLE.....

# Effect of dietary supplementation of Ashwagandha (*Withania somnifera*) and Selenium on growth performance and carcass quality of broilers

MANOJ KUMAR SINGH, V.P. SINGH, D.S. SAHU AND JINU MANOJ

**ABSTRACT.....** Poultry meat is an excellent source of high quality protein, vitamins and minerals and is not subjected to cultural and religious restrictions. Incorporation of herbal plants and vitamins in the feed of broilers are more acceptable to health conscious consumers. Selenium, an essential micronutrient, has various biological roles in poultry and it is needed for normal growth and maintenance in them. The current study was designed to study the combined effect of Ashwagandha and Selenium on growth performance and carcass traits of broilers. Day old chicks (n=60) were selected and divided in to six groups, with 3 replicates of each group, 20 chicks in each replicate. Ashwagandha and Selenium were supplemented in broiler chicken feed at different levels for different group. The growth performance of broilers were assessed in terms of weekly body weight gain and feed conversion ratio. The carcass quality was analyzed based on dressing percentage, drumstick weight, giblet weight, cooking yield and pH of fresh chicken meat. The data obtained in the present study were analyzed statistically by using Complete Randomized Design one way Anova procedure of SPSS version 20. Average body weight gain of broilers groups treated simultaneously with both the Ashwagandha and Selenium showed significant (P<0.05) difference when compared to other groups. The highest body weight gain was found during the third week of the trial and for the treatment group T<sub>5</sub>. The carcass traits were also found better in Ashwagandha and Selenium treated groups due to the synergistic effect of these dietary inclusions. The current study recommends an inclusion of Ashwagandha and Selenium in the broiler diet at level of 2.5 per cent and 0.20 mg/kg, respectively for the improvement of growth performance and carcass traits in broiler chicken.

**KEY WORDS.....** Ashwagandha, Broiler, Carcass, Growth, Selenium

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## INTRODUCTION.....

Poultry production in the country has gained

tremendous momentum during the last four decades. Worldwide consumption of poultry meat is growing up in

developed as well as in developing countries. Poultry meat has significant role in Indian diet and India is the fourth largest producer of poultry meat in world (Singh *et al.*, 2016). Poultry meat is an excellent source of high quality protein, vitamins and minerals and is not subjected to cultural and religious restrictions (Kale *et al.*, 2014). Due to side effects of the residues in animal products and the resistance developed by bacteria in the poultry farms, antibiotics as feed additives have been banned in many countries. The feed industry has now turned its attention to search for new growth promoter alternatives to antibiotics. Potential alternatives to antibiotics may be found among plant products which have been used for centuries as food and medicines. Use of herbal plants as feed ingredient for broilers is more acceptable due to its growth promoting quality and reducing the antimicrobial resistance among broilers and is preferred by health conscious consumers (Singh *et al.*, 2016).

Medicinal plants as natural feed additive are recently used in poultry diet to enhance the performance and carcass traits of chicken (Jahanzeb *et al.*, 2013; Ansari *et al.*, 2013 and Samarth *et al.*, 2003). *Withania somnifera* also known as Ashwagandha or Indian ginseng, is a medicinal plant belonging to the family *Solanaceae* and used as feed additive to enhance the growth rate (Srivastava *et al.*, 2012 and Singh *et al.*, 2008). Selenium, an essential micronutrient, which has various biological roles, is needed for normal growth and maintenance in poultry (Choct *et al.*, 2004). The level of this micronutrient in soil is decreasing worldwide because of the intensive agricultural practices (Peric *et al.*, 2009). The researches using Ashwagandha and selenium for better performance of broilers are less or lacking. Therefore, the current study was undertaken to analyse the combined effect of Ashwagandha and Selenium on growth performance and carcass traits of broiler chickens.

**RESEARCH METHODS.....**

**Experiment design and feeding :**

The experiment was conducted at Poultry Research and Training Centre, SVPUAT, Meerut, Uttar Pradesh (India). Day old vaccinated broiler chicks (n=360) were purchased from commercial hatchery located in Haryana. These chicks were weighed individually and randomly divided into six treatment groups (T<sub>0</sub>- T<sub>5</sub>), with three replicates of 20 chicks in each group. All the broiler chicks were fed as per BIS standards feeding schedule. Various concentrations of Selenium and Ashwagandha (*Withania somnifera*) root powder were added into broiler rations (Table A) and fresh water was provided ad-libitum. The trial was conducted for 6 weeks in pens under standard managemental conditions.

**Sampling and samples analysis:**

The body weight and feed intake were recorded weekly. The feed consumption was calculated by subtracting the amount of feed residue from the amount of feed offered in a week and was expressed in term of average feed consumption (gram) by a bird per week. Body weight gains of all groups of broiler chicks were observed at weekly interval to get the growth performance. Feed conversion ratio (FCR) was calculated from the body weight and feed consumption data.

At the end of experiment (42 d), 6 birds per dietary treatment group (2 per replicate) were selected randomly, live weight of the birds were recorded and allowed to fast for overnight, however, drinking water was provided. These birds were slaughtered by Halal method. After 4 min of bleeding, each bird was dipped in hot water bath for 2 min and feathers were removed manually. After removal of the head, carcasses were manually eviscerated to determine carcass traits. Dressing percentage, drumstick weight, giblet weight, pH of fresh chicken meat and cooking yield were recorded.

Group	Basal ration	Selenium (mg/kg.)	Ashwagandha (mg/kg.)
T <sub>0</sub>	Basal ration	-	-
T <sub>1</sub>	Basal ration	-	250
T <sub>2</sub>	Basal ration	0.15	-
T <sub>3</sub>	Basal ration	0.20	-
T <sub>4</sub>	Basal ration	0.15	250
T <sub>5</sub>	Basal ration	0.20	250

**Statistical analysis :**

The data for all measured variables were analyzed as a Complete Randomized Design using one way Anova procedure of SPSS version 20 (SPSS for windows, V 20.0; SPSS Inc., Chicago, IL, USA). The significant difference between and within groups for the different variables was determined using Duncan Multiple Range Test of Significance.

**RESEARCH FINDINGS AND ANALYSIS.....**

Growth performance of broilers supplemented with different levels of Ashwagandha and selenium in feed is reported in Table 1. The mean initial body weights of day old broiler chicks were nearly similar among groups. Average final body weight was significant ( $P<0.05$ ) among treatment groups and observed highest in  $T_5$  group as compared to other groups. Present finding was similar

to results of other researchers who reported increase in body weight with supplementation of Ashwagandha or selenium as growth promoter in poultry (Choct *et al.*, 2004; Shisodiya *et al.*, 2008; Peric *et al.*, 2009; Srivastava *et al.*, 2012; Mane *et al.*, 2012 and Kale *et al.*, 2014). Average body weight gain of broilers was significantly ( $P<0.05$ ) different among treatment groups (Table 2). The highest body weight gain was found during the third week of the trial and for the treatment group  $T_5$ . This indicated that the broiler fed diet supplemented with different levels of Ashwagandha and selenium grew faster as compared to birds in control group without supplement.

In present experiment, feed conversion ratio observed significantly ( $P<0.05$ ) lower in treatment groups, that was recorded lowest in  $T_5$  group of broilers, indicating better utilization of feed. This beneficial effect

**Table 1 : Growth performance of broiler chicks supplemented with Ashwagandha and different levels of vitamin E**

Parameter (g)	Treatment groups					
	T <sub>0</sub>	T <sub>1</sub>	T <sub>2</sub>	T <sub>3</sub>	T <sub>4</sub>	T <sub>5</sub>
Initial weight	38.37 <sup>a</sup> ±0.75	38.14 <sup>a</sup> ±0.49	38.60 <sup>a</sup> ±0.28	38.23 <sup>a</sup> ±0.30	39.91 <sup>a</sup> ±0.28	39.95 <sup>a</sup> ±0.29
Final weight	2002.83 <sup>a</sup> ±15.74	2128.83 <sup>b</sup> ±18.93	2218.17 <sup>c</sup> ±29.08	2089.83 <sup>b</sup> ±23.54	2245.50 <sup>d</sup> ±25.93	2286.67 <sup>e</sup> ±20.46
Feed intake	466.82 <sup>a</sup> ±152.56	466.02 <sup>a</sup> ±145.16	557.70 <sup>a</sup> ±144.06	509.37 <sup>a</sup> ±150	561.85 <sup>a</sup> ±149.72	564.69 <sup>a</sup> ±151.87
FCR	2.00 <sup>b</sup> ±0.22	1.80 <sup>ab</sup> ±0.18	1.75 <sup>ab</sup> ±0.18	1.90 <sup>ab</sup> ±0.20	1.71 <sup>a</sup> ±0.20	1.66 <sup>a</sup> ±0.20

Mean ± SE with different superscript in small letter in a row differ significantly ( $P<0.05$ )

**Table 2: Average body weight gain (grams/bird/week) of broiler chicks diets supplemented with Ashwagandha and different levels of Selenium**

Age (Weeks)	Treatment groups					
	T <sub>0</sub>	T <sub>1</sub>	T <sub>2</sub>	T <sub>3</sub>	T <sub>4</sub>	T <sub>5</sub>
1	127.70 <sup>a</sup> ±0.72	135.18 <sup>bc</sup> ±1.21	138.89 <sup>cd</sup> ±0.76	130.70 <sup>ab</sup> ±0.81	141.78 <sup>d</sup> ±0.39	150.24 <sup>e</sup> ±0.78
2	238.55 <sup>a</sup> ±1.77	247.78 <sup>b</sup> ±3.91	257.80 <sup>c</sup> ±4.04	244.68 <sup>b</sup> ±3.33	262.15 <sup>c</sup> ±2.96	268.05 <sup>d</sup> ±5.21
3	336.83 <sup>a</sup> ±2.27	349.58 <sup>b</sup> ±4.21	353.59 <sup>b</sup> ±12.38	339.16 <sup>a</sup> ±6.51	366.24 <sup>c</sup> ±4.98	378.92 <sup>d</sup> ±5.68
4	582.33 <sup>a</sup> ±3.96	592.76 <sup>b</sup> ±7.69	605.99 <sup>c</sup> ±4.61	587.75 <sup>ab</sup> ±6.79	616.59 <sup>d</sup> ±2.56	631.91 <sup>e</sup> ±5.43
5	391.80 <sup>a</sup> ±5.70	414.80 <sup>b</sup> ±4.66	422.35 <sup>c</sup> ±4.30	396.83 <sup>a</sup> ±6.04	436.18 <sup>d</sup> ±7.73	450.68 <sup>e</sup> ±6.28
6	320.85 <sup>a</sup> ±9.15	345.43 <sup>c</sup> ±7.66	358.73 <sup>d</sup> ±5.74	334.30 <sup>b</sup> ±9.47	362.60 <sup>d</sup> ±6.15	378.50 <sup>e</sup> ±6.05
Mean ± SEM	290.92 <sup>a</sup> ±67.48	303.38 <sup>b</sup> ±69.32	310.85 <sup>c</sup> ±70.74	295.95 <sup>a</sup> ±68.14	317.92 <sup>c</sup> ±72.20	328.32 <sup>d</sup> ±74.12

Mean ± SE with different superscript in small letter in a row differ significantly ( $P<0.05$ )

**Table 3: Carcass parameters of broiler chicks diets supplemented with Ashwagandha and different levels of Selenium**

Parameters	Treatment groups					
	T <sub>0</sub>	T <sub>1</sub>	T <sub>2</sub>	T <sub>3</sub>	T <sub>4</sub>	T <sub>5</sub>
Dressing %	70.58 <sup>ab</sup> ±0.34	72.43 <sup>bb</sup> ±0.27	72.88 <sup>cb</sup> ±0.24	72.67 <sup>cb</sup> ±0.06	73.47 <sup>db</sup> ±0.13	73.68 <sup>db</sup> ±0.02
Cooking yield %	58.32 <sup>ab</sup> ±0.44	61.78 <sup>bb</sup> ±0.05	62.34 <sup>cb</sup> ±0.13	61.96 <sup>bb</sup> ±0.14	62.57 <sup>ca</sup> ±0.09	63.74 <sup>db</sup> ±0.02
Giblet %	4.86 <sup>ab</sup> ±0.09	5.13 <sup>bc</sup> ±0.09	5.11 <sup>ba</sup> ±0.02	5.12 <sup>bb</sup> ±0.03	5.19 <sup>cb</sup> ±0.09	5.33 <sup>da</sup> ±0.00
Drumstick weight %	31.83 <sup>ab</sup> ±0.01	33.58 <sup>bb</sup> ±0.15	33.63 <sup>bb</sup> ±0.06	33.61 <sup>bb</sup> ±0.05	33.58 <sup>bb</sup> ±0.04	33.53 <sup>bb</sup> ±0.03
pH	5.69±0.01 <sup>a</sup>	5.68±0.02 <sup>a</sup>	5.73±0.13 <sup>a</sup>	5.68±0.04 <sup>a</sup>	5.65±0.06 <sup>a</sup>	5.67±0.05 <sup>a</sup>

Mean ± SE with different superscript in small letter in a row and capital letter in column differ significantly ( $P<0.05$ )

of treatment with Ashwagandha and selenium on FCR was in agreement with earlier researchers, who reported that the improvement in body weight and FCR might be due to active constituents of selenium and Ashwagandha (Akotkar *et al.*, 2007 and Kale *et al.*, 2014).

Meat quality evaluation is important in improving food animal production. Evaluation of carcass quality is the measure of meat palatability and acceptability to the consumers. The mean values for dressing percentage, cooking yield, giblet weight, drumstick weight and pH at 6<sup>th</sup> week of age of broilers under different dietary treatments are presented in Table 3. In the current study, no significant difference was found in dressing percentage, pH and cooking yield between treatments groups. The mean giblet weight showed significant (P<0.05) difference between treatments groups. However, the highest giblet weight was observed for treatment group T<sub>5</sub>, followed by T<sub>4</sub>. The mean drumstick yield also showed significant (P<0.05) difference between treatments and control groups. The highest

drumstick yield was observed for treatment groups T<sub>4</sub> and T<sub>5</sub>, indicating beneficial effects of feeding Ashwagandha and selenium simultaneously. The dietary supplementation of Ashwagandha/Selenium has been found as reason for improved various carcass traits by earlier researchers also (Tayeb and Qader, 2012; Kale *et al.*, 2014 and Tawfeek *et al.*, 2014).

It may be concluded from present investigation that the inclusion of Ashwagandha and Selenium in the broiler diet at level of 2.5 per cent and 0.20 mg/kg, respectively was more beneficial to improve growth performance and carcass traits in broiler chicken.

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