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Aswagantha (*Withania somnifera*) churnam supplementation in feed on production parameters, serum lipid and liver enzyme profile of desi fowl

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Abstract
This study was conducted to record the effect of Aswagantha (*Withania somnifera*) churnam supplementation in feed on production parameters, serum lipid and liver enzyme profile of desi fowl. The experiment was conducted for a period of 4 months in 150 desi fowl (Namakkal Chicken I). The chicks were divided into three treatment groups containing 2 replicates in each group except control group. The dietary treatments included Group 1 (Control) without any herbal supplementation, Group 2 - 1.0% and Group 3 with 0.5% ashwagandha churnam. Results showed that supplementation of 0.5 percent aswagantha churnum in the feed increased body weight gain, feed conversion ratio and majority of the lipid biochemical profile and higher concentration of aswagantha churnum (1 percent) increased the burden on liver function. So supplementing 0.5 percent aswagantha churnam is beneficial for the increasing body weight and to reduce the blood cholesterol and triglycerides in desi fowl.

Keywords: *Withania somnifera*, desi birds, production parameters, serum lipid and liver enzyme profile

Introduction
Ashwagandha (Withania somnifera) is a traditional medicine with immense health benefits (Mahima *et al*., 2012) [5]. The steroidal lactones (withanolides) present in the roots has a great impact on the health acting as a immunomodulator, combating infectious agents, having the properties of anti-cancer, antiepileptic, memory enhancer, mood elevator, diuretic, rejuvenator, stress reliever, cardio-respiratory endurance enhancer, anti-ageing, anti-oxidant, hypoglycemic, hypocholesterolemic and in common an effective adaptogen (Adallu and Radhika, 2000; Hemalatha *et al*., 2006; Naidu *et al.*, 2006) [1, 3, 6] Cholesterol and other lipid content in the body is of great concern in the present society. It is being a practice that taking low lipid containing food would reduce the risk of cardiac and other ailments in elderly people. Thus, majority of the people are trying to avoid non vegetarian diet as it contains high cholesterol content. Aswagantha (*Withania somnifera*) is considered to be of having hypocholesteremic and hypolipidemic activity. Aswagantha is a natural herb meaning "smell of Horse". Supplementation of aswagantha in the feed might be of helpful as it acts as immunomodulatory, antibacterial, antioxidant and anti stress agent. Hence the present study was undertaken to study the effect of aswagantha on the Namakal Chicken 1 and to record the production, lipid and liver enzyme profile.

Materials and Methods
Experimental design: One hundred and fifty day old desi fowl (Namakkal Chicken I) were divided into three treatment groups containing 2 replicates in each group except control group. The birds were randomly allocated to 2 dietary treatments. The experiment was conducted for a period of 4 months. The dietary treatments included Group 1 (Control) without any herbal supplementation, Group 2 - 1.0% and Group 3 with 0.5% ashwagantha churnam (The Indian Medical Practioners Co-Operative Pharmacy and Stores Ltd, Chennai Cat. No. A029) was fed along with the basal diet. All the birds were maintained in deep litter sheds and the management practices adopted were similar except the experimental diets. The birds were vaccinated against New Castle Disease and Infectious Bursal Disease at the age of 7th and 14th day, respectively and a booster dose of LaSota was given on the 28th day. The birds were fed with Desi chicken grumble from 1-45 days followed by Desi finisher ration till the end of the study.

Parameters studied: Feed consumption and body weight ofbirds were recorded at the 4th,8th,12th and at 16th week. Feed conversion efficiency (FCR) wascalculated. Similarly the lipid profile measured were serum triglycerides, serum Cholesterol, serum HDL and LDL, Serum VLDL cholesterol at 16th week. Assessment of liver function was made by estimating the serum SGOT, SGPT, serum alkaline phosphatase, Serum glutamyl transferase and serum bilirubin.

Results and Discussion

Birds supplemented with Aswagantha churnum in the the basal feed showed increase in body weight during the study period when compared with control group. There was no difference in weight gain upto 30 days in the birds fed with Aswagantha churnam at the rate of 0.5% and 1% of feed when compared to the control. However, at 60 days of age and after,the birds supplemented with aswagantha in feed showed increase in body weight.Even though statistical significance was not observed, it was clear (as per Table I) that body weight gain had improved after supplementing aswagantha in feed. On the contrary other studies have shown that aswagantha feed supplementation had increased body weight significantly in broilers (Narayanaswamy *et al*., 2004; Shisodiya *et al*., 2008; Kale *et al*., 2016 and Singh *et al*., 2011) [7, 8, 4, 9] and in Japanese quails (Bharadwaj *et al*., 2012). Probably this could due to the usage of upgraded desi fowls in this study. On the other hand our study showed a significant difference in feed conversion ratio between control and the treatment groups from 60 days onwards. This observation was in accordance with the other studies in broilers (Narayanaswamy *et al*., 2004; Shisodiya *et al*., 2008; Kale *et al*., 2016 and Singh *et al*., 2011) [7, 8, 4, 9] and in Japanese quails (Bharadwaj *et al*., 2012). Since supplementation of Aswagantha churnam at the level of 1 percent (Group 2) and 0.5 percent (Group 3) showed no significant difference in feed conversion ratio between them it could be said that 0.5 percent Aswagantha churnam would be sufficient to achieve the desirable weight gain and feed conversion ratio in desi fowls. The increase in weight gain after 30 days period may be attributed to the change in the feed from desi chicken grumble to desi chicken finisher. Our study showed that there was increased weight gain and significant feed conversion ratio from 60 days onwards.

Serum lipid profile tests carried out in this study revealed that there was reduction in the values (Table I) of all the parameters. Cholesterol levels were 245 ± 12.31 mg/dl, 79.67±2.90 mg/dl and 129.17±2.66 mg/dl of control, group 2 and group 3 treatments with aswagantha respectively. Similarly triglyceride levels (Table I) also decreased from 1157.5 ± 17.21 mg/dl in control to 770.16 ± 6.3 mg/dl in group 2 and 526.67 ± 3.99 mg/dl in group 3. HDL, LDL and VLDL cholesterol also significantly decreased in treated groups when compared to untreated control. LDL and VLDL cholesterol levels were very much decreased at 0.5 percent aswagantha supplementation. But HDL cholesterol was increased in 0.5 percent than 1 percent aswagantha supplementations. Kale *et al*. (2016) [4] stated that Aswangantha supplementation at the rates of 0.25 percent and at 0.5 percent levels were capable of reducing the lipid profiles in their study especially triglycerides. However, the present study is contradicting with the report of Kale *et al*. (2016) [4] and in accordance with the reports of Visavadiya and Narachimhacharya (2006). This lipid profile levels indicate that aswagantha supplementation drastically reduced the serum lipid content and hence it could be postulated that the overall reduction in lipid content of the products produced (Meat or eggs) from these birds.

Serum glutamic oxaloacetic transaminase (SGOT) and serum glutamate pyruvate transaminase (SGPT) levels were significantly increased in group 2 of 1 percent aswagantha treated birds than control and group 3. Hence higher concentration of aswagantha may cause damages in liver cells, because these two enzymes namely SGOT and SGPT are considered to be increased when there is aliver damage. Alkaline phosphatase (ALP)level is low in group 2 (1131.5 ± 17.39 IU/L) as compared with the control (1345.67 ± 15.52 IU/L) and group 3 (1617.67± 20.98 IU/L). It is evident that 1 percent supplementation of aswagantha churnam reduced the level of ALP. However higher level of ALP at 0.5 percent supplementation of aswagantha churnam in feed could be inferred that there is increased level of protein utilization or metabolism. Since only when the high ALP level and high gamma glutamyl transferase (GGT) levels could indicate liver or gall bladder disorder. However, in this present study GGT levels are low in group 3 (35.83 ± 1.40 U/L) than the control and group 2, hence these birds were suffering with liver disorder but there were no bone related issues recorded in this study. So, the high level of ALP could only be attributed to metabolism. Further studies should be done on the nutrient content in meat and eggs of desi chicks fed with aswagantha and its impact on human health.

In the present study, it could be concluded that supplementation of 0.5 percent aswagantha churnum in the feed increased body weight gain, feed conversion ratio and majority of the lipid biochemical profile and higher concentration of aswagantha churnum (1 percent) increases the burden on liver function. So supplementing 0.5 percent aswagantha churnam is beneficial for the increasing body weight and to reduce the blood cholesterol and triglycerides in desi fowl.

Table I. Production and Serum lipid and liver function profile of Namakkal chicken 1 for the control and aswagantha treatment groups

Parameters			Values		
			Control Group 1	Aswagantha Treatment	
				Group 2 (1%)	Group 3 (0.5%)
1	Body weight				
		30 days	530 ± 51.5	592 ± 34.8	589 ± 8.7
		60 days	867 ± 88.5	1078 ± 61.2	1139 ± 50.8
		90 days	1214 ± 82.8	1332 ± 79.9	1271 ± 46.7
		120 days	1288 ± 86.6	1539 ± 24.9	1490 ± 64.6
2	Feed Conversion Ratio				
	a.	30 days	0.7 ± 0.11	0.76 ± 0.08	0.76 ± 0.02
	b.	60 days	0.76^{a} ± 0.13	1.62^{b} ± 0.14	1.34^{b} ± 0.11
	c.	90 days	0.63^{a} ± 0.09	1.23^{b} ± 0.14	1.12^{b} ± 0.06
	d.	120 days	0.42^{a} ± 0.05	0.98^{b} ± 0.03	0.95^{b} ± 0.07
3	Cholesterol (mg/dl)		245^{c}± 12.31	79.67^{a}± 2.90	129.17^{b}± 2.66

4	Triglycerides(mg/dl)	$1157.50^{c}\pm 17.21$	$770.16^{b}\pm 6.3$	$526.67^{a}\pm 3.99$
5	HDL cholesterol(mg/dl)	$87.07^{c}\pm 1.53$	$34.33^{a}\pm 1.23$	$67^{b}\pm 1.98$
6	LDL cholesterol(mg/dl)	$14.97^{b}\pm 0.72$	$4.43^{a}\pm 0.20$	$5.12^{a}\pm 0.14$
7	VLDL cholesterol(mg/dl)	$238.17^{c}\pm 3.84$	$155.68^{b}\pm 2.38$	$106.17^{a}\pm 1.3$
8	Total cholesterol/ HDL ratio	$2.81^{a}\pm 0.13$	$2.33^{a,b}\pm 0.05$	$1.94^{b,c}\pm 0.08$
9	SGOT (Units/L)	$127.5^{a}\pm 2.83$	$146.17^{b}\pm 2.12$	$124.33^{a}\pm 1.82$
10	SGPT (Units/L)	$75.33^{a}\pm 2.19$	$92.5^{c}\pm 1.54$	$64.17^{b}\pm 1.58$
11	Alkaline phosphatase (IU/L)	$1345.67^{a}\pm 15.52$	$1131.5^{b}\pm 17.39$	$1617.67^{c}\pm 20.98$
12	Gamma Glutamyltransferase (Units/L)	$79.83^{a}\pm 3.16$	$67.67^{a}\pm 1.87$	$35.83^{b}\pm 1.40$

*Different superscripts differ significantly at ($P \leq 0.05$)

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