Publisher homepage: www.universepg.com, ISSN: 2663-6913 (Online) & 2663-6905 (Print)

https://doi.org/10.34104/ajpab.023.01630172

American Journal of Pure and Applied Biosciences

Journal homepage: www.universepg.com/journal/ajpab

Effectiveness of Basak (*Adhatoda vasica*) Leaf Extract on Growth Performance and Heamato-Biochemical Profile of Sonali Chicken

Sabbir Hossen Sabuz[1]*, Jouti Roy[1], Ummay Salma[1], Md. Nurul Amin[1], Md. Ahsan Habib[1], Md. Arafat Jaman[2], and Jibendra Kumar Jha[1]

[1]Dept. of Animal Science & Nutrition, Faculty of Veterinary & Animal Science; Hajee Mohammad Danesh Science and Technology University, Dinajpur, Bangladesh; and [2]Dept. of Medicine Surgery & Obstetrics, Faculty of Veterinary & Animal Science; Hajee Mohammad Danesh Science and Technology University, Dinajpur, Bangladesh.

*Correspondence: sabbirdvm7368@gmail.com (Dr. Sabbir Hossen Sabuz, Assistant Professor, Dept. of General Animal Science & Nutrition, Faculty of Veterinary & Animal Science; Hajee Mohammad Danesh Science and Technology University (HSTU), Dinajpur, Bangladesh).

ABSTRACT

This research was done to find out how supplementing with basak (*Adhatoda vasica*) leaf extract affected Sonali chickens' growth performance and carcass qualities. 180 chickens in all were divided into four dietary experimentation groups at random, with each group taking up three replications. Dietary groups included control (T_0), basak at 2 ml/L of water (T_1), basak at 4 ml/L of water (T_2), and basak at 6 ml/L of water (T_3), respectively. A total of 63 days into the experiment, two birds from each replication were randomly chosen and slaughtered to measure the carcass characteristics. The collected data were analysed using ANOVA with SPSS version 25. Weekly live weight and feed consumption data were also gathered throughout the trial. Across the experimental groups, there was no discernible difference in initial body weight ($P>0.05$). The greatest value was recorded at T_2 (908.10±3.03g) in comparison to the other three experimental groups, and the final live weight was substantially different among the experimental groups ($P>0.05$). The difference in total body weight gain across the experimental groups was statistically significant ($P>0.05$), with the T_2 group recording the greatest result (873.48±0.720 g) when compared to the other three groups. Total feed intake varied significantly between the treatment groups. The T_1 group had the best feed conversion ratio (1.827±0.03), and there were significant differences in feed conversion ratio across the experimental groups ($P>0.05$). The experimental groups significantly differed from one another in terms of daily live weight gain ($P>0.05$). There were significant differences in the weights of the carcass, breast, drumstick, thigh, and wings across the various treatment groups ($P>0.05$). The lipid profile was significantly different ($P>0.05$) among the dietary treatment groups. Net profit was found to significantly ($P>0.05$) differ across the experimental groups, with the T_2 group achieving the greatest value (66.52 tk) and the T_0 group having the least price (44.58 tk). Therefore, basak leaf extract may be supplemented with basal feeds to enhance the carcass yield, growth performance, and net profit of sonali chicken.

Keywords: Basak (*Adhatoda vasica*), Replications, Growth performances, Carcass characteristics and Significant.

INTRODUCTION:

Poultry can significantly contribute to the agricultural sector's efforts to reduce the poverty, malnutrition, and unemployment because it is the only crop that can yield a speedy return. Due to antibiotic residues, the use of different antibiotics in poultry raising in Bangladesh poses one of the greatest concerns to poultry meat consumers. The European Union has banned the use of antibiotics in animal feed due to the possibility of the antibiotic residues in milk and meat and their adverse effects on humans (Khanna and Bhatia, 2003). This is the cause of the decline in popularity of the broilers. This situation has increased curiosity about alternative energy sources for supplying poultry with nourishment. To facilitate quick growth, the Sonali chicken is supplemented with a variety of synthetic medications and growth stimulants, but their use has resulted in several negative side-effects on the health of birds as well as long-lasting properties, etc. (Bhujbal *et al.,* 2009). Finding an alternative is necessary to reduce the growth loss. Inorganic acids, probiotics, prebiotics, botanicals, enzymes, and other non-therapeutic options are available (Banerjee, 1998). Herbs and their constituents have been known to have varied degrees of antibacterial action since the dawn of time (Juven *et al.,* 1994; Shahen *et al*., 2019).

Natural ingredients from medicinal and herbal plants have been used for centuries as feed additives for farm animals and have been demonstrated to have antibacterial, immunity-boosting, and stress-relieving effects. The chemistry of the substances, their concentration in the diet, the volume of feed consumed, and the health status of the animals all have a significant role in the aforementioned impacts. Additionally, it has been demonstrated that a number of the plant extracts and phytochemicals lessen the harmful effects of aflatoxins in a number of animal model systems. One of the readily accessible plant species, *Adhatoda vasica* (L.), is commonly used as a component in Ayurvedic medicine to treat bronchitis, asthma, and cough. Animal experiments revealed that the leaves of *A. vasica* had a strong hepatoprotective effect against the various chemicals that caused toxicity. In vitro degradation of aflatoxins by an aqueous extract from *A. vasica* leaves was demonstrated by Vijayanandraj *et al.* (2014), & an alkaloid was found to be the bioactive component in the *A. vasica* leaves. According to Brinda *et al.* (2013), preceding Wistar rats with a spray-dried formulation of *A. vasica* leaf extract (500 mg kg-1 body weight every day for seven days) prevented the hepatic dysfunction brought on by later administration of AFB1. By a variety of the methods, such plants may reduce the body weight, feed intake, feed conversion ratio, and digestibility of chickens. Before the development of conventional medicine, medicinal herbs were used for a number of centuries (Demir *et al.,* 2005). Recently, natural antibacterial plant extracts have been discovered and proposed for use in food (Hsieh *et al.,* 2001). These plants' the phytochemical constituents, which have defined physiological effects on the human body, are what give them their medicinal significance. One of the most significant herbs, basak (*Adhatoda vasica*), has gained recognition on a global scale due to its extensive array of medicinal characteristics. The noncytotoxic antiviral activity of the aqueous and methanolic extracts is used. The strong antiviral properties of extracts make them useful for the viral prophylaxis (Chavan and Chowdhary, 2014).

Additionally, the extracts have been shown to exhibit antifungal and hepatoprotective properties (Pandit *et al.,* 2004; Ramachandran & Sankaranarayanan, 2013). In addition to being used as an insect repellent, it can also be used as an insecticide (Haifa and Ali, 2016; Saxena *et al.,* 1986). The powder of basak is highly recommended by the Al-Shaibani *et al.* (2008) for the management of gastrointestinal nematodes in sheep. Determining the impact of basak (*Adhatoda vasica*) leaf extract on the lipid profile, hematological, and production efficiency of Sonali chicken is the purpose of the current study.

Objectives of the study

1) To investigate how basak leaf extracts affects the performance and carcass characteristics of sonali chickens.
2) To ascertain the impact of basak leaf extract on the lipid profile of sonali chicken.
3) To determine optimal basak leaf extract dosage for improving sonali chicken performance.

MATERIALS AND METHODS:

Experimental site and duration

The experiment was conducted to ascertain the effects of supplementing with basak leaf juice on the performance and meat yield traits of Sonali chicks (classic). The duration of the experiment was from June 20 to August 25, 2022, at the poultry farm of Hajee Mohammad Danesh Science and Technology University (HSTU), Dinajpur.

Experimental birds

180-day-old Sonali chicks (Classic) had been purchased for the experiment through local suppliers from the Kazi Farm hatchery.

Layout of the experiment

The chicks were randomly assigned to one of 4 nutritional treatment groups (T_0, T_1, T_2, and T_3) each of which consisted of three replications with 15 birds each. The following are the treatments: T_0 = Control, T_1 = Control + 2 ml basak leaf extract/litre water, T_2 = Control + 4 ml basak leaf extract/litre in the drinking water, T3 = Control + 6 ml basak leaf extract/litre water.

Collection & preparation of Star gooseberry & feed

The HSTU Botanical Garden provided the basak leaf for collection. These were cleaned with clean water after collection to remove any dirt. Thick, smooth, big, spotless leaves was gathered, and correct extraction methods were used. The fruit of the basak leaf was then ground into extract using a grinder machine.

Managemental Practices

Housing, litter, and feed (CP Feed Co. Ltd.) Sonali pre-starter: 1-7 days; Sonali starter: 8-21 days; Sonali grower: 22-63 days; water, lighting, sanitization, and vaccination were all necessities provided. Adequate precautions were the implemented throughout the study period.

Fig. 1: Basak Leaf.

Calculation

1) Total gain in weight = final weight- initial weight
2) Dressing percentage = (dressed weight ÷ body weight) x 100
3) Total feed consumption = total feed offered – total left-over
4) Feed efficiency = total feed consumed / total gain in weight
5) Mortality rate (%) = no. of dead chickens / total no. of birds as a group × 100

Hematological Analysis

At the end of 5 weeks, a vacutainer tube (BD vacutainer SST Gel-5 ml) was placed via the wing vein puncture tubes to collect blood samples at random from 6 birds in each group (2 birds/replication). The blood was then allowed to coagulate for one hour at room temperature (25°C). After centrifuging the blood sample for 15 minutes at 2000 rpm, the serum was extracted. Separated, unhaemolyzed serum samples were stored in clean, dry Eppendorf tubes in the deep freezer at -20°C until needed. The serum cholesterol concentration was the determined using an industrial analytical kit manufactured by German cholesterol agent manufacturer Randof. The assay was performed on a Merck as recommended in the manufacturer's brochure. The assay was performed using a Merck Microlab 300 biochemistry analyzer in accordance with the manufacturer's instructions.

Fig. 2: Basak Leaf Extract.

Statistical analysis

Using the SPSS version 25 software and the one-way ANOVA technique, data on feed consumption, growth performance, carcass features, and hemato-biochemical data were evaluated using the Complete Randomised Design (CRD) principles. Every result was presented as the mean SEM, with significance assessed at P<0.05. The Duncan test was used to compare the treatment groups' means.

RESULTS AND DISCUSSION:

This study was carried out to assess how well organic basak affected the production performance of Sonali chickens in terms of the weekly body weight gain, final live weight gain, feed intake, feed efficiency, and carcass characteristics. During the experiment, there was no death of bird.

Live weight

The average body weight of the birds did not substantially differ between the treatment groups at the beginning of the trial. At 7, 14, and 21 days of age, the live weight of the birds did not significantly (P > 0.05) differ between the treatment groups. In the treatment groups, the live weight was substantially different at ages 28, 35, 42, 49, and 56 (P< 0.05). Additionally, there were significant differences in final live weight (63 days of age) across the dietary groups (P< 0.05). The birds' basak-supplemented feed revealed that group T_2 (908.10±3.03) had the highest body weight and group T_0 (792.74±0.029), the lowest body weight. Among the birds, T_1 had (893.81±1.49), while T_3 had (854.03±8.75) (**Table 1**).

Table 1: Effect of the dietary supplementation of Basak on live weight (g) in different treatment groups of the Sonali birds.

Live weight (g)/ bird (days)	Treatment Group				Level of significance
	T_0	T_1	T_2	T_3	
Initial Body Weight	24.70±0.40	24.66±0.17	24.16±0.08	24.83±0.60	NS
7th	71.03±0.32	71.18±0.54	71.33±0.26	70.73±0.23	NS
14th	123.30±0.20	127.56±0.48	128.70±0.43	130.83±0.65	NS
21st	184.10±0.66	191.63±0.86	193.93±0.29	195.30±0.05	NS
28th	279.76±0.16^a	296.93±0.18^b	298.86±0.42^c	304.70±0.26^d	*
35th	370.63±0.28^a	394.66±0.32^c	402.40±0.20^d	386.00±0.35^b	*
42th	459.03±0.014^a	506.66±0.56^c	533.66±2.14^d	492.76±0.24^b	*
49th	591.0±0.417^a	632.16±0.44^c	660.76±1.80^d	609.23±0.31^b	*
56th	692.40±0.057^a	743.66±0.32^b	780.46±1.87^d	752.26±0.61^c	*
63th	792.74±0.029^a	893.81±1.49^c	908.10±3.03^c	854.03±8.75b	*

Values are expressed as mean ± standard error of means (SEM). NS: Statistically not significant (P> 0.05). $^{a\ b\ c\ d}$ means having different superscript in the same row differed significantly (P<0.05), * indicates 5% level of significance. ** indicates 1% level of significance. Here, T_0=Control diet, T_1=Diet containing 2 ml per littre, T_2=Diet containing 4 ml per littre, T_3=Diet containing 6 ml per littre.

Live Weight Gain

Table 2 shows the experimental birds' weekly live weight gain. The body weight gain during the experiment's first to third weeks was not significant, but 4 to 9 weeks were the statistically significant (P< 0.05). In comparison to the control group T_0 (766.91±1.55), the basak-supplemented group T_2 (873.48±0.72) demonstrated the highest final live weight gain. The control group demonstrated the lowest final live weight gain.

Table 2: Effect of dietary supplementation of Basak on live weight gain (g) in different treatment groups of the Sonali birds.

Live weight gain (g)/bird (days)	Treatment Group				Level of significance
	T_0	T_1	T_2	T_3	
7th	45.57±0.381	46.40±0.32a	47.53±0.22	46.36±0.06	NS
14th	56.31±0.044	56.52±0.093	57.59±0.124	60.23±0.033	NS
21st	59.53±0.533	64.06±0.017	65.31±0.044	64.42±0.062	NS
28th	95.52±0.111^a	105.36±0.030^b	104.67±0.129^b	109.36±0.038^c	*
35th	90.84±0.393^b	97.67±0.090^c	103.49±0.032^d	81.40±0.057^a	*
42th	88.40±0.057^a	112.10±0.057c	131.32±0.041^d	106.72±0.117^b	*

49th	131.97±0.025[b]	125.40±0.057[b]	127.20±0.057[b]	116.42±0.062[a]	*
56th	101.43±0.021[a]	111.42±0.041[b]	113.69±0.052[b]	143.10±0.043[c]	*
63th	100.34±0.056[a]	150.36±0.109[d]	122.68±0.021[c]	101.67±0.054[b]	*
(1-63th)	766.91±1.558[a]	869.29±0.814[c]	873.48±0.720[d]	829.68±.488[b]	*

Values are expressed as mean ± standard error of the means (SEM). NS: Statistically not significant (P> 0.05). [a b c d] means having different superscript in the same row differed significantly (P<0.05), * indicates 5% level of significance. ** indicates 1% level of the significance. Here, T_0=Control diet, T_1 = Diet containing 2 ml per littre, T_2=Diet containing 4 ml per littre, T_3=Diet containing 6 ml per littre.

In a recent study with broilers, (Kannan *et al.,* 2017) suggested that feed intake and body weight gain were not significantly affected by dietary supplementation with basak. The most recent study found Saran *et al.* (2019) that basak had the greatest effect on the body weight due to the ability of the *Justicia adhatoda* leaf extracts to combat 1, 1-diphenylpicrylhydrazyl, hydroxyl, and the nitrous oxide free radicals. According to the latest report, the Chowdhury *et al.* (2020) demonstrated that basak had the significant impact on the serum lipid profile, which was dramatically reduced in each treatment group. Body weights, total serum protein, LDH, and relative liver and adipose tissue weights all the significantly returned to baseline levels, with the combined extract producing the lowest atherogenic index. The combined treatment dramatically increased the antioxidant capacity and total phenolic content and dramatically enhanced membrane stability, but had no discernible impact on the prevention of the protein denaturation.

Feed Intake

Table 3 shows the impact of Basak on the Sonali birds' feed consumption. It was noted that there were no significant differences in feed intake between the treatment groups at 1 to 5 weeks (P>0.05). Between the dietary treatment groups, there were significant differences in feed intake from 6 to 9 weeks (P< 0.05). The highest feed intake T_2 (1680.54±7.791) and lowest feed intake T_0 (1591.73± 6.163) were observed. The author noted that adding basak juice to Sonali feed led to a noticeable increase in feed conversion ratio when compared to the control group. Due to the minimal side effects of herbal items, basak supplementation had no negative effects on Sonali's feed intake. A recent study by (Shruti Shukla *et al.,* 2017; Kapgate *et al.,* 2018) showed that basak had the greatest potential to reduce the amount of Listeria monocytogenes in chicken meat, which can affect feed consumption.

Table 3: Effect of the dietary supplementation of Basak on Feed intake (g) in different treatment groups of the Sonali birds.

Feed intake (g)/ bird (days)	Treatment Group				Level of significance
	T_0	T_1	T_2	T_3	
7th	51.13±0.240	50.83±0.536	50.90±0.702	50.60±0.513	NS
14th	92.43±0.581	91.83±0.920	92.86±1.09	91.66±0.611	NS
21st	117.90±0.230[a]	127.06±1.21[b]	130.33±1.22[b]	128.66±3.53[b]	NS
28th	148.46±0.384[a]	154.60±0.901[b]	159.20±1.09[c]	162.23±1.12[c]	NS
35th	177.46±0.611	183.43±1.186	188.26±1.00	180.93±0.779	NS
42th	220.43±2.278[a]	228.46±0.554[b]	233.10±1.28[bc]	237.66±0.617[c]	*
49th	255.96±0.352[a]	261.66±1.01[b]	265.56±0.371[c]	269.56±0.480[d]	*
56th	265.33±0.606[a]	273.93±0.202[b]	277.90±0.721[c]	281.60±1.55[d]	*
60th	262.63±0.881[a]	273.50±0.838[b]	282.43±0.317[d]	270.36±0.290c	*
(1-63th)	1591.73±6.163[a]	1645.3±7.357[b]	1680.54±7.791[c]	1668.26±9.49[d]	*

Values are expressed as mean ± standard error of the means (SEM). NS: Statistically not significant (P> 0.05). [a b c d] means having different superscript in the same row differed significantly (P<0.05), * indicates 5% level of the significance. ** indicates 1% level of significance. Here, T_0=Control diet, the T_1=Diet containing 2 ml per littre, T_2=Diet containing 4 ml per littre, T_3=Diet containing 6 ml per littre.

Feed Conversion Ratio (FCR)

The Feed Conversion Ratio (FCR) of the experimental birds is shown in **Table 4**. 1st to 3rd weeks, the FCR in various treatment groups was not significant ($P > 0.05$). Age groups receiving treatment were shown to significantly ($P<0.05$) differed from the 4^{th} to the 9^{th} weeks. At 1-63 days of age, the diet treatment group T_1 had the lowest FCR (1.827±0.034), and the diet treatment group T_0 had the greatest FCR (1.990± 0.012). According to the table, the basak-supplemented group (T_1) displayed the highest results but had a lower FCR, while the control diet-supplemented group (T_0) displayed a greater FCR. Basak-supplemented group T_3 had (1.942±0.008), while Basak-supplemented group T_2 had (1.847±0.156). Basak was shown to have the largest impact on phytochemical screening & anti-oxidant activity, thus improving FCR, according to a recent study by Khan *et al.* (2019) and Iqbal Chowdhury *et al.* (2020).

Table 4: Effect of dietary supplementation of Basak on Feed conversion ratio (FCR) in different treatment groups of Sonali birds.

Feed conversion ratio (days)	Treatment Group				Level of significance
	T_0	T_1	T_2	T_3	
7^{th}	1.12±.012	1.095±0.039	1.070±0.003	1.091±0.032	NS
14^{th}	1.641±0.005	1.624±0.005	1.612±0.005	1.521±0.005	NS
21^{st}	1.98±0.012	1.983±0.033	1.995±0.032	1.997±0.004	NS
28^{th}	$1.55±0.005^{c}$	$1.467±0.057^{a}$	$1.520±0.054^{b}$	$1.483±0.005^{a}$	*
35^{th}	$1.95±0.005^{c}$	$1.878±0.004^{b}$	$1.819±0.005^{a}$	$2.222±0.005^{d}$	*
42^{th}	$2.493±0.005^{d}$	$2.038±0.005^{b}$	$1.775±0.005^{a}$	$2.226±0.003^{c}$	*
49^{th}	$1.939±0.005^{a}$	$2.086±0.003^{b}$	$2.087±0.002^{b}$	$2.315±0.008^{c}$	*
56^{th}	$2.615±0.005^{d}$	$2.458±0.004^{c}$	$2.444±0.005^{b}$	$1.967±0.005^{a}$	*
63^{th}	$2.617±0.003^{c}$	$1.818±0.005^{a}$	$2.302±0.028^{b}$	$2.659±0.005^{d}$	*
$(1\text{-}63^{th})$	$1.990±0.012^{d}$	$1.827±0.034^{a}$	$1.847±0.156^{c}$	$1.942±0.008^{c}$	*

Values are expressed as mean ± standard error of the means (SEM). NS: Statistically not significant ($P> 0.05$). $^{a\ b\ c\ d}$ means having different superscript in the same row differed significantly ($P<0.05$), * indicates 5% level of significance. ** indicates 1% level of the significance. Here, T_0=Control diet, T_1=Diet containing 2 ml per littre, T_2=Diet containing 4 ml per littre, T_3=Diet containing 6 ml per littre.

Effect of dietary supplementation of Basak on the carcass characteristics of sonali birds

The effect of Basak on live weight and carcass weight shown in **Table 5**. It showed that live weight (g) and carcass weight (g) significantly ($P<0.05$) differed among the dietary treatment groups. The highest live weight was found in treatment group T_2 (873.48± 0.720) followed by T_1 (869.29±0.814), T_3 (829.68± .488), and T_0 (766.91±1.558). T_2 (607.70±0.208) group had significantly ($P<0.05$) higher the carcass weight compared to T_0 (492.73±0.785) whereas T_1, T_3 had (590.30±0.51) and (530.90±0.818) respectively. Breast weight differed significantly ($P<0.05$) among the dietary treatment groups shown in **Table 5**. The highest breast meat weight was found in T_2 (133.30±0.057) and the lowest in T_0 was (98.53±0.145) where as T_1 (124.60±0.057) and T_3 (117.73±0.120). The Thigh meat weight and drumstick weight was also significantly ($P<0.05$) differed among the dietary treatment group presented in **Table 5**. The highest drumstick + thigh meat weight was in T_2 (226.36±0.240) and the lowest in control group T_0 (187.33±0.14) whereas T_1 (217.56±0. 176) and T_3 (203.06±0.375). The T_2 group had the highest thigh meat weight (146.30±0.23) and the T_0 control group had the lowest (123.50±0.173), compared to T_1 (137.36±0.290) and T_3 (130.56±3.43). In comparison to T_1 (81.133±1.13) and T_3 (72.63± 0.63), the T_2 group had the highest drumstick meat weight (92.033±0.97) while the T_0 control group had the lowest (66.50±0.757). **Table 5** demonstrated that there was no difference in weight between the various treatment groups for Sonali's liver, heart, and gizzard weight. Wings weight varied across the T_1 (59.53±0.34), T_3 (55.60±0.40), and T_2 (63.53±0.59) groups, with the T_2 group having the highest weight and the T_0 group having the lowest (52.36±1.46). **Table 5** showed that there is no effect of basak leaf extract on Lungs weight of sonali among the different treatment groups. A recent study by Hossain and Hoq, (2016) showed that basak had the greatest influence on therapeutic use & body fitness.

Table 5: Effect of dietary supplementation of Basak on carcass characteristics in different treatment groups of Sonali birds.

Carcass yield (g)	Treatment Group				Level of significance
	T_0	T_1	T_2	T_3	
Live Weight	766.91±1.558^a	869.29±0.814^c	873.48±0.720^d	829.68±.488^b	*
Carcass Weight	492.73±0.785^a	590.30±0.51^c	607.70±0.208^d	530.90±0.818^b	*
Breast Weight	98.53±0.145^a	124.60±0.057^c	133.30±0.057^d	117.73±0.120^b	*
Drumstick+Thigh Weight	187.33±0.14^a	217.56±0. 176^c	226.36±0.240^d	203.06±0.375^b	*
Thigh Weight	123.50±0.173^a	37.36±0.290^c	146.30±0.23^d	130.56±3.43^b	*
Drumstick Weight	66.50±0.757^a	81.133±1.13^c	92.033±0.97^d	72.63±0.63^b	**
Liver Weight	27.03±0.371	29.23±0.08	28.53±0.18	25.13±0.14	NS
Heart Weight	7.16±0.32	7.43±0.44	7.28±0.046	6.50±0.152	NS
Gizzard Weight	44.60±0.554	42.46±0.458	46.53±0.44	43.70±0.26	NS
Wings Weight	52.36±1.46^a	59.53±0.34^b	63.53±0.59^b	55.60±0.40^a	*
Lung Weight	9.09±0.29	10.33±0.088	9.50±0.529	9.09±0.48	NS

Values are expressed as mean ± standard error of means (SEM). NS: Statistically not significant (P> 0.05). $^{a\ b\ c\ d}$ means having different superscript in the same row differed significantly (P<0.05), *indicates 5% level of significance. **indicates 1% level of the significance. Here, T_0=Control diet, T_1=Diet containing 2 ml per litre, T_2=Diet containing 4 ml per litre, T_3=Diet containing 6 ml per litre.

Lipid Profile

Table 6 shows the impact of basak on Sonali's lipid profile. Total cholesterol levels significantly (P< 0.05) varied among the treatment groups, with T_0 recording higher levels (162.43±0.80) mg/dl blood and T_3 recording lower levels (111.33±0.60) mg/dl blood. Triglycerides were also statistically significant (P< 0.05), with T_0 having higher blood triglyceride levels (104. 53±0.17) mg/dl and T_3 having lower levels (50.73± 0.81) mg/dl. High density lipoprotein (HDL) levels in the blood were statistically significant (P<0.05), with T_2 having higher levels (48.40±0.26) mg/dl and T_0 having lower levels (35.23±0.81) mg/dl. In terms of low-density lipoprotein (LDL), T_0 recorded a greater value of 108.53±0.17 and T_3 recorded a lower value of 68.23±0.14 mg/dl blood. This difference was statistically significant (P <0.05). Latest research by M.A. Islam *et al.* (2022) showed that basak had the greatest effect on the serum lipid profile, which was the significantly improved in each treatment group. The combined extract resulted in the lowest atherogenic index, whereas the body weights, total serum protein, LDH, and relative liver and adipose tissue weights all notably reverted to baseline levels. The combination treatment significantly improved membrane stability, antioxidant capacity, and total phenolic content but had no appreciable effect on the prevention of protein denaturation.

Table 6: Effect of dietary supplementation of Basak on Lipid profile in different treatment groups of Sonali birds.

Lipid profile (mg/dl)	Treatment Group				Level of significance
	T_0	T_1	T_2	T_3	
Total cholesterol	162.43±0.80^d	146.76±0.14^c	134.46±0.31^b	111.33±0.60^a	*
Triglyceride	93.03±0.08^d	80.06±0.58^c	63.70±0.36^b	50.73±0.81^a	*
HDL	35.23±0.81^a	37.89±0.14^b	48.40±0.26^c	46.73±0.41^c	*
LDL	104.53±0.17^d	95.38±0.09^c	82.73±0.81^b	68.23±0.14^a	*

Values are expressed as mean ± standard error of the means (SEM). NS: Statistically not significant (P> 0.05). $^{a\ b\ c\ d}$ means having different superscript in the same row differed significantly (P<0.05), * indicates 5% level of significance. ** indicates 1% level of the significance. Here, T_0=Control diet, T_1=Diet containing 2 ml per litter, T_2=Diet containing 4 ml per litter, T_3=Diet containing 6 ml per litter.

According to a previous study by (Abdu-lazeez *et al.,* 2016; Bonadiman *et al.,* 2009; Adeyemi *et al.*, 2000; Uddin *et al*., 2023; Ladokun *et al.,* 2008), we can distinguish between normal and the abnormal blood lipid profile counts, the detrimental consequences of the abnormal blood cell count, and the positive benefits of natural medicinal plants on blood health.

Cost effectiveness of production

Table 7 presents a cost-effective examination of the production performance of Sonali birds supplemented with basak. At the conclusion of the study, it was discovered that the experimental groups' total production costs per bird varied non-significantly (P< 0.05). Total production cost per bird: T_0(145.46±0.005), T_1 (149.2±0.088), T_2(151.4±0.057), and T_3(151.95±0.021). Significant (P< 0.05) differences in net profit were reported across the experimental groups. Net profit per bird (Tk) data revealed that the T_2 group had the largest profit (66.52±0.018), while T_0 had the lowest profit (44.58±0.014), followed by T_1 (65.36± 0.018) and T_3 (53.01±0.012). The experimental groups showed the significantly (P>0.05) different benefits compared to the control. Benefit over control was substantially (P >0.05) different between the T_1 group (20.78± 0.384), T_2 group (21.94±0.218), and T_3 group (8.43± 0.011) than the control group. The organic mineral diet has a good effect on the economy, claim Abdallah *et al.* (2009).

It was discovered that the substituting organic natural minerals for inorganic minerals improved bird performance and the chick immunological responses. The current research backs up Zafar and Fatima's, (2018) assertion that poultry is increasingly adopting organic rather than inorganic sources of natural minerals. They are supposed to lower feed costs through lower dose rates without adversely affecting performance since they are more bioavailable and effective.

Table 7: Effect of dietary supplementation of Basak on cost analysis in different treatment groups of sonali birds.

Parameters	Treatment Group				Level of significance
	T_0	T_1	T_2	T_3	
Cost / bird (Tk)	15.00±0.00	15.00±0.00	15.00±0.00	15.00±0.00	NS
Avg. feed consumed (kg/bird)	1591.73±6.163^a	1645.3±7.357^b	1680.54±7.791^c	1690.26±9.49^d	*
Feed price (Tk/kg)	55.00±0.00	55.00±0.00	55.00±0.00	55.00±0.00	NS
Feed cost (Tk/bird)	87.45±0.026	90.2±0.028	92.4±0.030	92.95±0.020	NS
Miscellaneous (Tk/ bird)	43.00±0.00	43.00±0.00	43.00±0.00	43.00±0.00	NS
Medicine & vaccination Cost	16.00±0.00	16.00±0.00	16.00±0.00	16.00±0.00	NS
Total cost / sonali (Tk)	87.45±0.026	90.2±0.028	92.4±0.030	92.95±0.020	NS
Average live weight (g)	792.74±0.029^a	893.81±1.49^c	908.10±3.03^c	854.03±8.75^b	*
Sale price / kg live wt (Tk)	240.00±0.00	240.00±0.00	240.00±0.00	240.00±0.00	NS
Sale price /Sonali (Tk)	190.04±0.008^a	214.56±0.029^c	217.92±0.008	204.96±0.132^b	*
Net profit / Sonali (Tk)	44.58±0.014^a	65.36±0.018^c	66.52±0.018^c	53.01±0.012^b	*
Benefit over control/Sonali (Tk)	0.00±0.00^a	20.78±0.384^c	21.94±0.218^c	8.43±0.011^b	*

Values are expressed as mean ± standard error of means (SEM). NS: Statistically not significant (P> 0.05). $^{a\ b\ c\ d}$ means having different superscript in the same row differed significantly (P<0.05), * indicates 5% level of significance. ** indicates 1% level of the significance. Here, T_0=Control diet, T_1=Diet containing 2 ml per litter, T_2=Diet containing 4 ml per litter, T_3=Diet containing 6 ml per litter.

CONCLUSION:

In accordance with the study's findings, using basak extract as a feed supplement improves feed intake, average weekly body weight gain, and feed conversion ratio, as well as rewarding higher gross profit in the commercial Sonali production. Among the various treatment groups, feeding the Sonali chicken basak at a rate of 4 ml/L resulted in higher production performances in terms of the body weight and FCR, which generated economic returns. Thus, dietary supplementation with basak extract may have a significant impact on economic and commercial Sonali chicken output. The medicinal plants, basak, are included in diets for poultry and may be a useful method for the production of organic Sonali chicken.

ACKNOWLEDGEMENT:

The authors thank the Ministry of Science & Technology for providing the funding to conduct the research.

CONFLICTS OF INTERESTS:

The authors declare that there is no conflict of interest.

REFERENCES:

1) Abdallah, A. G., El-Husseiny, O. M., and Abdel-Latif, K. O. (2009). Influence of some dietary organic mineral supplementations. *Int. J. Poult. Sci*, **8**, 291-298. https://www.researchgate.net/profile/Osama-El
2) Abdulazeez, H., Gwayo, G. J., and Muhammad, A. I. (2016). Haematology and serum biochemistry of broiler chickens fed graded levels of Baobab (*Adansonia digitata L.*) seed meal. *J. Agri. Vet. Sci*, **9**, 48-53.
3) Adeyemi, O. A., Fasina, O. E., and Balogun, M. O. (2000). Utilization of Full-Fat Jatropha Seed in Broiler Diet: Effect on Haematological Parameters and Blood Chemistry. In *Proc. 25th Conf. Nigerian Soc. Anim. Prod* (pp. 19-23).
4) Al-Shaibani, I. R. M., Arijo, A., and Qureshi, T. A. (2008). Ovicidal and larvicidal properties of *Adhatoda vasica* (L.) extracts against gastrointestinal nematodes of sheep in vitro. *Pak Vet J.*, **28**(2), 79-83. http://pvj.com.pk/pdf-files/28_2/79-83.pdf
5) Banerjee, L. K. (1998). Floral status of Buxa tiger reserve, West Bengal. *Plant Diversity in the Tiger Reserves of India*, **71**.
6) Bhujbal, S. S., More, L. S., & Patil, M. J. (2009). Antioxidant effects of roots of Clerodendrum serratum Linn. *Pharmacognosy Research*, **1**(5). https://www.phcogres.com/sites/default/files/PharmacognRes-1-5-294_0.pdf
7) Bonadiman, S. F., G. R., and DaMatta, R. A. (2009). Leukocyte ultrastructure, hematological and serum biochemical profiles of ostriches (*Struthio camelus*). *Poultry science*, **88**(11), 2298-2306. https://doi.org/10.3382/ps.2009-00176
8) Brinda, R., Uma, D., & Velazhahan, R. (2013). Role of *Adhatoda vasica* (*L.*) Nees leaf extract in the prevention of aflatoxin-induced toxicity in Wistar rats. *J. of the Science of Food and Agriculture*, **93**(11), 2743-2748. https://doi.org/10.1002/jsfa.6093
9) Chavan, R., & Chowdhary, A. (2014). In vitro inhibitory activity of Justicia adhatoda extracts against influenza virus infection and hemagglutination. *Int J. Pharm Sci Rev Res*, **25**(2), 231-236. https://www.researchgate.net/profile/Rahul-Chavan/publication/281456959
10) Chowdhury, B. K., & Bhattacharyya, P. (1985). A further quinazoline alkaloid from *Adhatoda vasica*. *Phytochemistry*, **24**(12), 3080-3082. https://doi.org/10.1016/0031-9422(85)80070-4
11) Demir, E., Sarica, S., and Suicmez, M. (2005). The use of natural feed additives as alternatives to an antibiotic growth promoter in broiler diets. *Archiv fur Geflugelkunde*, **69**(3), 110-116. https://www.academia.edu/download/89892781/m03-28mk_Mjc3MTA.pdf
12) Haifa, N. M., & Ali, S. M. (2016). Insecticidal effect of cruide plant extract of *Adhatoda vasica* against *Brevicoryne brassicae*. *World J. of Experimental Biosciences*, **4**(1), 49-52.
13) Hossain, M. T., & Hoq, M. O. (2016). Therapeutic use of *Adhatoda vasica*. *Asian J. of Medical and Biological Research*, **2**(2), 156-163.
14) Hsieh, P. C., Mau, J. L., & Huang, S. H. (2001). Antimicrobial effect of various combinations of plant extracts. *Food Microbiology*, **18**(1), 35-43. https://doi.org/10.1006/fmic.2000.0376
15) Iqbal Chowdhury, I., Rahman, M. A., and Bakhtiar, M. T. B. (2020). Supplements of an aqueous combination of *Justicia adhatoda* and *Ocimum tenuiflorum* boost antioxidative effects and impede hyperlipidemia. *Animal models and experimental medicine*, **3**(2), 140-151. https://doi.org/10.1002/ame2.12115
16) Islam, M. A., Haque, A., and Nishibori, M. (2022). Growth Performance, Meat Yield and Lipid Profiles of the Blood of Broiler and Sonali Chickens. *Meat Yield and Lipid Profiles of the Blood of Broiler and Sonali Chickens.* https://doi.org/10.1016/j.vas.2022.100272
17) Juven, B. J., Kanner, J., and Weisslowicz, H. (1994). Factors that interact with the antibacterial action of thyme essential oil and its active constituents. *J. of applied bacteriology*, **76**(6), 626-631. https://doi.org/10.111/j.1365-2672.1994.tb01661.x

18) Kannan, K., Mathivanan, R., & Velazhahan, R. (2017). Effect of *Adhatoda Vasica* Leaf Powder as Herbal Feed Additive on Growth Performance and Biochemical Parameters of Serum and Liver of Broilers. *Biochemical* and *Cellular Archives,* **17**(1).

19) Kapgate, S. M. (2017). *Adhatoda vasica*: A critical review. *Inter J. of Green Pharmacy,* **11**(04). https://doi.org/10.22377/ijgp.v11i04.1341

20) Khan, A. M., Bhadauria, S., & Yadav, R. (2019). Phytochemical Screening & Antioxidant activity of extract of different parts of *Adhatoda vasica. Research J. of Pharmacy & Technology*, **12**(12), 5699-5705. http://dx.doi.org/10.5958/0974-360X.2019.00986.7

21) Khanna, N., & Bhatia, J. (2003). Antinociceptive action of *Ocimum sanctum* (Tulsi) in mice: possible mechanisms involved. *J. of Ethnopharmacology*, **88**(2-3), 293-296. https://doi.org/10.1016/S0378-8741(03)00215-0

22) Ladokun, A. O., Otite, J. R., and Onyeji, E. (2008). Haematological and serum biochemical indices of naked neck and normally feathered Nigerian indigenous chickens in a sub humid tropical environment. *Inter J. of Poultry Science,* **7**(1), 55-58. https://www.academia.edu/download/77127616/fin996.pdf

23) Pandit, S., Sur, T. K., Sen, S., & Bhattacharyya, D. (2004). Prevention of carbon tetrachloride-induced hepatotoxicity in rats by *Adhatoda vasica* leaves. *Indian j. of pharmacology*, **36**(5), 312. https://www.ijp-online.com/article.asp?issn=0253-7613;year=2004;volume=36;issue=5;spage=312;epage=313;aulast=Pandit

24) Saran, N., Anandharaj, B., and Surendhar, P. A. (2019). In vitro antioxidant potential of *Justicia adhatoda* leaf extracts against 1, 1-diphenyl picryl hydrazyl, hydroxyl, and nitrous oxide free radicals. *Drug Invention Today*, **12**(8), 1736-1740. https://www.researchgate.net/profile/BupeshGiridharan/publication/337657332_

25) Saxena, B. P., Atal, C. K., & Koul, O. (1986). Insect antifertility and antifeedant allelochemics in *Adhatoda vasica*. *Inter J. of Tropical Insect Science*, **7**, 489-493.

26) Shahen MZ, Mahmud S, Islam MM, Uddin ME and Alam MS. (2019). Effect of antibiotic susceptibility and inhibitory activity for the control of growth and survival of microorganisms of extracts of *C. officin*alis. *Eur. J. Med. Health Sci*., **1**(3), 1-9. https://doi.org/10.34104/ejmhs.0190109

27) Shukla, S., Huh, Y. S., and Han, Y. K. (2017). Growth inhibitory effects of *Adhatoda vasica* & its potential at reducing Listeria monocytogenes in chicken meat. *Frontiers in microbiology*, **8**, 1260. https://doi.org/10.3389/fmicb.2017.01260

28) Uddin ME, Hossain A, Kundu SK, Hossain MF, and Khan MMH, (2023). Ameliorate and Standardization of the In vitro Micropropagation of Night-blooming Jasmine (*C. nocturnum L.*), *Emerging Issues in Agricultural Sciences*, **2**, pp. 166-180. https://doi.org/10.9734/bpi/eias/v2/3938B

29) Vijayanandraj, S., Brinda, R., & Velazhahan, R. (2014). Detoxification of aflatoxin B1 by an aqueous extract from leaves of *Adhatoda vasica* Nees. *Microbiological Research*, **169**(4), 294-300. https://doi.org/10.1016/j.micres.2013.07.008

Citation: Sabuz SH, Roy J, Salma U, Amin MN, Habib MA, Jaman MA, and Jha JK. (2023). Effectiveness of Basak (*Adhatoda vasica*) leaf extract on growth performance and heamato-biochemical profile of sonali chicken. *Am. J. Pure Appl. Sci.*, **5**(6), 163-172. https://doi.org/10.34104/ajpab.023.01630172