

**USE OF ALOE VERA AS NATURAL GROWTH PROMOTER ON PRODUCTION PERFORMANCE OF SONALI CHICKEN**

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<https://doi.org/10.35410/IJAEB.2022.5750>

**ABSTRACT**

This study was conducted to evaluate the efficacy of dietary supplementation of Aloe vera gel on production performance, dressing yield and hematological parameters of sonali chicken.

Methods: A total number of 180 day old chicks were randomly assigned into five treatment groups namely (T0, T1, T2, T3 and T4) having three replication in each treatment group. Chicks were brooded upto 7 days then randomly separated into pen upto 8 weeks. Each treatment group contains 36 birds whereas each replication contain 12 birds. Experimental birds in T2, T3 and T4 were provided aloe vera gel @ 7.5,15, and 22.5 gm per litre drinking water while T0 was provided only plain water and T1 provided 1ml amino plus per litre water those were maintained as control group.

Results: The study indicated that final live weight gain and feed efficiency of birds was significantly ( $p<0.05$ ) higher that received @22.5gm/L aloe vera gel compared to control T0 while insignificant in commercial growth promoter group. This result also indicated that body weight gain, feed intake and feed efficiency were increased along with increasing dose of aloe vera gel. In meat yield parameters there were no significant difference among the treatment group except breast meat weight. Blood parameters (RBC, PCV, Hb and Total WBC) showed significant ( $p<0.05$ ) difference among the treatment groups except the total white blood cells (WBC) count. Aloe vera treated group T4 showed the lowest feed cost while untreated group showed the highest price.

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Conclusion: It could be concluded that the supplementation of aloe vera gel upto @22.5g/L drinking water has the potentiality as growth promoter for production of sonali chicken.

**Keywords:** Aloe vera, sonali chicken, production performance, and blood parameters.

## 1. INTRODUCTION

Bangladesh is considered as one of the most suitable countries in the world for rearing poultry for its geographical location. The poultry industry plays a crucial role in economic growth and simultaneously, creates numerous employment opportunities (Shamsuddoha and Sohel, 2003). The Sonali is a cross-breed of Rhode Island has been reported to perform better with respect to egg and meat production, rapid growth and low mortality under scavenging. Sonali birds are well adapted to the country's environmental conditions so require less care and attention than other breeds, making them easier for women and children to rear (Saleque and Saha, 2013). The Sonali population has been increasing and in 2010 about 150.9 million Sonali DOCs were produced, representing about 35 percent of the country's total commercial broiler and layer production (Huque, 2011). As an important segment of livestock production, the Sonali chicken is considered a great avenue for the economic growth and simultaneously creates numerous employment opportunities. About 76 percent of Sonali beneficiary has improved their conditions by rearing this type of poultry (Hossen et al, 2012). Nutrition is one of the most important consider in poultry enterprise for successful production. Birds' survival and production performances are dependent on the availability of feedstuffs. The unavailability of grains and the high cost of imported ingredients have made the price of commercial animal feed to increase day by day. Feed cost of Sonali contributes 65-70 percent of total cost. The high cost of conventional feedstuff has already sent a lot of livestock farmers out of business, thus leading to reduction in overall animal protein production. Hence it is necessary to improve the efficiency of feed at a minimum cost. Many farmers a number of feed additives are use in poultry to maintain nutritional requirement like nutritional growth promoter, antibiotic growth promoter enzymes for improving feed efficiency, and growth performance of birds. Growth promoters can play a vital role in poultry industries to shorten the time period required for attaining the market weight by stimulating growth (Bunyan *et al.* 1977). The frequent use of drug as growth promoter and feed additives in poultry ration resulted in resistant to pathogenic microorganism affecting the feed efficiency and growth performance of poultry and also adverse residual effect on human health. Therefore, the researchers have been giving their attention on medicinal plants like, Aloe Vera to achieve the targeted nutritional and health status of poultry. In many countries, aloe vera plants have been adopted because of easy availability, low cost unconventional feedstuff, good antimicrobial activity, good antioxidant, reduce diseases associated risks, high nutritional value, anticancer, antidiabetes, low PH, finally consumer have high demand to get herbs product because of its have no side effect on animal and human body. Aloe vera is rich in vitamins and minerals source. Specific vitamins include: Vitamin A (Beta-Carotene), Vitamin B1 (Thiamine), Vitamin B2 (Riboflavin), Vitamin B3 (Niacin), Vitamin B5, Vitamin B6 (Pyridoxine), Vitamin B12, Vitamin C, Vitamin E, Choline, and Folic Acid. Among the important minerals found in aloe vera are: calcium, chromium, copper, iron, magnesium, manganese, potassium, phosphorous, sodium, and zinc. These minerals are essential for good health and are known to work in synergistic combinations with each other. Aside from vitamins and minerals, aloe vera is rich with enzymes (Gluconase, Amylase, Protease), amino acids (Essential and non-essential amino acid) that are basic building blocks of proteins in the production of muscle tissue (Amar et

al, 2008). Aloe vera can stimulate haemopoietic system to produce blood cells. Supplementation of aloe vera gel in drinking water increase feed efficiency, final body weight gain, carcass weight and blood parameters (RBC, WBC, PCV & ESR) in broiler ( Olupona et al, 2010). However, there is a limited research works have been conducted to evaluate the efficacy of aloe vera gel on production performance and blood haematological parameters of Sonali chicken. Research objectives of the study is to evaluate the effect of aloe vera gel on production performance, dressing yield, meat yield parameters and cost on the production of sonali chicken as well as to determine the hematological parameters of sonali chicken.

## **2. MATERIALS AND METHODS**

The experiment was conducted at the Dairy and Poultry farm of Hajee Mohammad Danesh Science & Technology University (HSTU), Bangladesh during the period from mid-July to September 2021. Commercial sonali chick was used in this study for a period of 9 weeks to find out the effects of aloe vera leaf gel on performance of Sonali chicken. The experiment was conducted in complete randomized design (CRD). One hundred eighty vigorous day-old Sonali chicks were randomly distributed to five dietary treatment groups (T<sub>0</sub>, T<sub>1</sub>, T<sub>2</sub>, T<sub>3</sub>, and T<sub>4</sub>) having three replications in each treatment. The chicks were reared in separated pens according to treatments and replications, each dietary treatment group contain of 12 birds. Where T<sub>0</sub> (control), T<sub>1</sub> (commercial growth promoter 1ml/L drinking water, Amino plus), T<sub>2</sub> (Aloe vera gel 7.5 gm/L drinking water), T<sub>3</sub> (Aloe vera gel 15 gm/L drinking water) and T<sub>4</sub> (Aloe vera gel 22.5 gm/L drinking water).

### **2.1 Preparation of the experimental house**

HSTU poultry farm was used for rearing experimental birds to evaluate the efficacy of aloe vera gel. Aloe vera leaves were collected from the local market of Bangladesh. Aloe-vera gel was prepared (Durrani et al, 2008). The experimental diet was provided into two phases (Sonali-starter and Sonali-grower), starter was provided 0 to 30 days and grower was days 31 to end day of experiment. The experimental diets composition is shown in Appendix 1. The birds were exposed to similar care and management in all treatment groups throughout the experimental period. Each pen 4.5×3.5 sq. ft. was allocated for feeding, watering, and housing for 12 birds. Temperature and humidity recorded by using clinical thermometer and hygrometer. The birds were exposed to 23 hours of lighting, 1 hour dark period, ad libitum feed and water was provided throughout the experimental period. Proper vaccination and hygienic measure was performed. Weekly Body weight gain and feed intake was recorded replication wise in each treatment group at end day of week. Mortality was recorded daily if death occurred. The different meat yield parameters like, carcass, thigh, breast meat, head, heart, liver, spleen, gizzard and shank weight for individual birds were recorded after slaughtering. Hematological parameters (RBC, PCV, WBC and Hb) were recorded replication wise in each treatment group after laboratory examination. Temperature and relative humidity was recorded three times daily. The data of feed consumption, growth performance, carcass characteristics and hematological parameters were recorded and analyzed by SPSS version-20 software by using one way ANOVA accordance with the principles of Complete Randomized Design (CRD). All values were expressed as Mean± SEM and significance was determined when (P<0.05). Mean was compared among the treatment groups by using Duncan test.

### **3.RESULTS AND DISCUSSION**

*This experiment was conducted to evaluate the efficacy of aloe vera gel on production performance in terms of weekly body weight gain, final live weight gain, feed intake, feed efficiency, dressing percentage, meat yield parameters, blood parameters and cost analysis of Sonali Chicken at different dietary treatments are showed*

#### **3.1 Weekly Body weight gain**

*In (Table 1) showed that after 7 days of brooding, initial body weight of chicks in different dietary treatment was similar. The live weight of birds in 1st, 2nd, 3rd, 4th, 5th, 6th and 7th weeks did not significantly ( $P<0.05$ ) vary among the treatment groups. The efficacy of supplementation of aloe vera gel @ 7.5 gm/L, 15 gm/L and 22.2 gm/L in drinking water upto 7 weeks increase live weight gain day by day compared to the control T<sub>0</sub> group. In commercial growth promoter group T<sub>1</sub> similar to the treatment group T<sub>3</sub>, slightly higher than treatment T<sub>0</sub> and T<sub>2</sub> whereas slightly lower than treatment T<sub>4</sub> group. In 7th weeks the highest values was found (612.6±11.8g) in aloe vera group that was received @ 22.5 gm/L water and the lowest values was found (532.7±18g) that receive plain water T<sub>0</sub>. Within the aloe vera group respective treatment @ 7.5 gm/L, 15 gm/L and 22.2 gm/L in drinking water live weight was found (604.6±14g) , (578.5±16 g) and (612.6±11.8 g). The result of this study clearly showed that increase inclusion level of aloe vera gel increase live weight upto 7 weeks of age. Live weight of 8th and 9th weeks there were a significant ( $p<0.05$ ) differences among the treatment group. Supplementation of aloe vera @ 22.5 gm/L was showed the maximum live weight gain and statistically significant ( $p<0.05$ ) compare to plain water group and aloe vera group T<sub>2</sub>, but similar result was found with T<sub>1</sub> treatment group. However the highest inclusion level of aloe vera gel 22.5 gm/L drinking water was showed maximum live weight (841.8±29 g) and minimum live weight was showed (726.5±20g) in T<sub>0</sub> treatment group at the terminal stage of experiment. Within aloe vera treatment group 7.5 gm/L drinking water group was represented lowest live weight gain whereas, 22.5 gm/L drinking water treatment group represent highest live weight gain. It is clearly stated that increase inclusion level of aloe vera increase live weight. The significant effect of aloe vera gel on body weight gain was in agreement with the findings of some previous studies by Singh et al (2017) who reported that supplementation of aloe vera at different inclusion level (0.1%, 0.2% and 0.3%) result of this study (up to 6 weeks) indicated that growth performance increase significantly that receive (0.1%, 0.2% and 0.3%) aloe vera compared to the control group in broiler. Islam et al. (2017) showed that the live weight gain and feed efficiency were significantly ( $P<0.05$ ) better in the broilers provided water containing 15 ml/L aloe vera aqueous extract compare to control.*

#### **3.2 Body weight gain**

*Initial body weight of sonali chicks fed on different dietary treatments was similar ( $p>0.05$ ). Final live weight gain was statistically significant ( $p<0.05$ ) among the different treatment group. The highest body weight gain was attained in birds that received ALG 22.5 g/L drinking water. This was followed by amino plus 1 ml/L drinking water, ALG 15 g/L drinking water, ALG 7.5g/L drinking water and only basal diet group respectively (Table 1). However, treatment group T<sub>4</sub> was significantly ( $p<0.05$ ) higher body weight gain compared to control group T<sub>0</sub> while*

non-significant ( $p>0.05$ ) to commercial growth promoter group. Within aloe vera group treatment T4 was significant ( $p<0.05$ ) compare to treatment T<sub>2</sub>. The result of this study was indicated that higher inclusion level of ALG showed highest body weight gain compared to control group at the end of feeding trial. This study agree with bolu et al. (2013), they found growth parameters such as survival, weight gain, feed conversion efficiency were significantly ( $p<0.05$ ) higher in poult given 30 ml/L Aloe vera gel in broiler. Better growth performance of groups that received Aloe-vera gel at 1.5%, 2%, and 2.5%, compare to control group ( Darabighane et al 2011b) that is also in accordance with the findings of the study. Similarly, significantly higher body weight and body weight gain found that receive (1%) aloe vera compare to the control group in broiler (Mmereole, 2011)

Table 1

Parameters	T <sub>0</sub> 0 ml/L	T <sub>1</sub> 1 ml/L	T <sub>2</sub> 7.5 gm/L	T <sub>3</sub> 15 gm/L	T <sub>4</sub> 22.5gm/L	Level of Sign.
Initial live wt.	28.5	28.5	28.5	28.5	28.5	NS
1 <sup>st</sup> week	77.00±3.0	77.80±4	77.45±3.6	77.74±3.5	77.54 ± 3.0	NS
2 <sup>nd</sup> week	133.7±3.5	135.4±4	136.1±3.6	136.5±5	141.5±4	NS
3 <sup>rd</sup> week	201.1±5.7	203.5±4.6	201.5±4.8	202.6±5.1	217.1±5.8	NS
4 <sup>th</sup> week	284.3±13.1	297.9±11.6	289.8±12.4	293.7±9.3	306.5±9.5	NS
5 <sup>th</sup> week	384.3±13.5	389.1±11.4	388.4±15.6	392.2±10.3	411.8±11	NS
6 <sup>th</sup> week	457.4±28.3	490.5±21.4	468.7±26.3	490.1±15.5	501.7±13.3	NS
7 <sup>th</sup> week	532.7±18	604.6±14	555.2±20.9	578.5±16	612.6±11.8	NS
8 <sup>th</sup> week	627.5±21 <sup>a</sup>	707.7±15.8 <sup>bc</sup>	662.4±18 <sup>ab</sup>	688.6±15.7 <sup>b</sup>	720.3±14.8 <sup>c</sup>	*
9 <sup>th</sup> week	726.7±20 <sup>a</sup>	798.6±26 <sup>ab</sup>	754.6±27.5 <sup>a</sup>	788.4±18 <sup>ab</sup>	841.8±29 <sup>b</sup>	*
Body wt. gain	698.2±18 <sup>a</sup>	770.1±23.2 <sup>ab</sup>	726.1±25 <sup>a</sup>	759.1±15 <sup>ab</sup>	813.3±27 <sup>b</sup>	*

The mean values with different superscript (a to c) within the same row differs significantly, at least ( $p < 0.05$ ). All values indicate mean  $\pm$  Standard error of mean NS=Non significant, \* statistically significant ( $P < 0.05$ )

**3.3 Feed intake**

The cumulative feed intake of sonali chicken in different dietary treatment during experimental periods was almost statistically similar and the differences were insignificant ( $p > 0.05$ ). However, the lowest feed intake ( $1950 \pm 41g$ ) was found  $T_0$  group. The birds of  $T_4$  group took containing 22.5 g/L aloe vera gel showed higher feed intake ( $2065 \pm 43g$ ) due to the phytogetic substance in aloe vera that may stimulate appetite and endogenous secretion which in turn improved performance from (Table 2) we found that increase inclusion levels of aloe vera increase feed intake respectively. Olupona et al (2010) reported that the feed intake was higher in the broilers took aloe gel treated drinking water similar to this study. Total feed intake was gradually increased with increased level of aloe gel in drinking water.

**3.4 Feed efficiency**

At the experimental period feed efficiency of different treatment groups statistically significant ( $P < 0.05$ ). The birds of  $T_4$  groups took containing 22.5 gm/L aloe vera gel converted feed to meat most efficiently. The feed efficiency of  $T_4$  treatment groups was statistically significant ( $P < 0.05$ ) with  $T_0$  and  $T_2$  treatment group. Commercial growth promoter (Amino plus) 1ml/L was equal to the treatment group  $T_3$  and significantly ( $P < 0.05$ ) higher than the  $T_0$  treatment group. From (Table 2) feed efficiency was increased with increasing level of aloe vera gel in drinking water. This study agree with Islam et al. [13] who found that supplementation of aloe vera aqueous extract in drinking water feed efficiency significantly ( $P < 0.05$ ) higher than the untreated group.) Significant differences ( $P < 0.05$ ) were observed in feed conversion ratio between the groups treated by Aloe vera powder, antibiotic (Enramycin) and the control group (Amaechi and Iheanetu, 2014) supported the study.

**Table 2. Effect of aloe vera gel on feed intake, feed efficiency, mortality, and mortality percentage of sonali chicken**

Parameters	T <sub>0</sub> 0 ml/L	T <sub>1</sub> 1 ml/L	T <sub>2</sub> 7.5 gm/L	T <sub>3</sub> 15 gm/L	T <sub>4</sub> 22.5gm/L	Level of Sign.
Feed intake(g)	1950 $\pm$ 41	2009 $\pm$ 62	1974 $\pm$ 67	2006 $\pm$ 50	2065 $\pm$ 43	NS
Feed efficiency	2.81 $\pm$ 0.04 <sup>c</sup>	2.61 $\pm$ 0.05 <sup>ab</sup>	2.72 $\pm$ 0.07 <sup>bc</sup>	2.64 $\pm$ 0.03 <sup>ab</sup>	2.54 $\pm$ 0.03 <sup>a</sup>	NS
Mortality	1	0	0	0	0	NS
Mortality%	2.77	0	0	0	0	NS

The mean values with different superscript (a to c) within the same row differs significantly, at

least ( $p < 0.05$ ). All values indicate mean  $\pm$  Standard error of mean NS=Non significant, \* statistically significant ( $P < 0.05$ ).

### **3.5 Dressing percentage**

After slaughtering and eviscerating, remove all edible and nonedible by-product, dressing percentage of different treatment group showed in (Table 3). The Table indicated that, there were no significant differences among the treatment group. Relatively the heavier dressing percentage was observed in  $T_4$  (52.6%) than other treatments  $T_1$  (51.27%),  $T_3$  (51.12%),  $T_2$  (50.5%) and  $T_0$  (50.1%) respectively. The highest dressing percentage was found ( $52.6 \pm 0.48\%$ ) in  $T_4$  treatment group and lowest was found ( $50.1 \pm 0.35\%$ ) in  $T_0$  treatment group. This finding favorably compared with earlier reports of Darabighane et al. (2011) who found that the groups treated by Aloe vera gel has heavier dressing percentage compared to the control group. In same viewed reported the group that was given Aloe vera showed numerically higher dressing percentage as compared to control group and drug control group reported by Singh et al. (2013) Eevuri and Putturu (2013) described same that Aloe vera supplementation in broilers decreased the fat accumulation, increased dressing percentage, liver weight, spleen weight and whole giblet weights.

### **3.6 Breast meat**

Breast meat obtained (Table 3) was statistically significant ( $P < 0.05$ ) among the different treatment group. Supplementation of aloe vera 22.5g/L drinking water was significant ( $P < 0.05$ ) compare to control group and  $T_2$  treatment group. However, highest weight was found ( $126.2 \pm 4.8g$ ) that receive aloe vera gel 22.5g/L drinking water and lowest was found ( $105.9 \pm 4.3g$ ) in untreated group. In commercial growth promoter group  $T_1$  similar to  $T_3$  treatment and close to  $T_4$  treatment group. This result near with Fallah (2015) who found that highest thighs, breast and total carcass weights were observed with supplementation of Aloe vera gel + garlic powder than other groups.

Data obtained from (Table 3) thigh meat of sonali chicken was statistically non-significant ( $p > 0.05$ ) among the different treatment group. Best result was observed in supplementation of aloe vera gel treated group  $T_4$  (75.5g) whereas nutritional commercial group  $T_1$  (71.4g) then  $T_3$  (70g)  $T_2$  (67g) and  $T_0$  (64g) respectively.

Head, heart, gizzard and liver weight of sonali chicken in different dietary treatment groups was statistically insignificant ( $p > 0.05$ ). From (Table 3) it was seen that head weight maximum in  $T_4$  treatment group and minimum in  $T_0$  treatment group. Heart and liver weight was similar while gizzard weight was maximum ( $30 \pm 2g$ ) found in  $T_4$  treatment group.

Results on shank weight (from Table 3) on day 63 were not significant, the relatively the heavier shank weight was observed in  $T_4$  (38g) than other treatments  $T_3$  (36.4g),  $T_1$  (34.6g),  $T_2$  (33.4g) and  $T_0$  (31.5g) respectively. Aloe vera group was showed better shank weight due to synergistic effect of calcium and phosphorus of aloe vera gel.

**Table 3. Effects of aloe vera gel on meat yield parameters of sonali chicken**

Parameters	T <sub>0</sub> 0 ml/L	T <sub>1</sub> 1 ml/L	T <sub>2</sub> 7.5 gm/L	T <sub>3</sub> 15 gm/L	T <sub>4</sub> 22.5gm/L	Level of Sign.
Final Live wt. (g)	726.8±20 <sub>a</sub>	798.6±25 <sub>ab</sub>	754.5±27.2 <sub>a</sub>	788.3±18 <sub>ab</sub>	841.8±29.4 <sub>b</sub>	*
Dressing (%)	50.10±0.35	51.27±0.24	50.5±0.43	51.12±0.31	52.1±0.48	NS
Breast meat wt. (g)	105.9±4.3 <sub>a</sub>	120.3±6 <sub>ab</sub>	112.3±3.6 <sub>a</sub>	117.4±5.5 <sub>ab</sub>	128.7±3.8 <sub>b</sub>	*
Thigh meat wt.(g)	64±3	71.4±4	67±2	70±3	75.5±3.5	NS
Head (g.)	28±2	30±1.5	29±2	31±2	34±2	NS
Heart (g)	3	4	3	4	4	NS
Liver (gm)	20±2	22±1	21±2	22±1	22±1.5	NS
Gizzard (gm)	23±2	28±1	26±2	29±1	30±2	NS
Shank (gm)	31.7±2	34.6±1	33.4±2	36.5±2	38±1.66	NS

The mean values with different superscript (a to b) within the same row differs significantly, at least ( $p < 0.05$ ). All values indicate mean  $\pm$  Standard error of mean NS=Non significant, \* statistically significant ( $P < 0.05$ )

### 3.7 Blood parameters

Supplementation of aloe vera, the results of the haematological analysis of the experimental birds are present in (Table 4). It was observed that there were significant ( $p < 0.05$ ) differences among the treatment groups in all the haematological parameters except the total white blood cells (WBC) count. RBC value with birds on treatments T<sub>3</sub> and T<sub>4</sub> this was significantly ( $p < 0.05$ ) higher than the RBC value of birds on treatment T<sub>0</sub> and T<sub>2</sub> due to phyto-genic effect of aloe vera. RBC values of birds on treatments T<sub>3</sub> and T<sub>4</sub> were statistically similar ( $p > 0.05$ ). The RBC values of treatment T<sub>0</sub> and T<sub>3</sub> did not differ significantly ( $p > 0.05$ ). However, the highest values of RBC found in supplementation of aloe vera @ 22.5 gm/L drinking water and lowest values was found in control group .Treatment T<sub>3</sub> and T<sub>4</sub> have significant ( $p < 0.05$ ) difference compared to control group T<sub>0</sub> while insignificant ( $p > 0.05$ ) to T<sub>1</sub> nutritional commercial group significant ( $p > 0.05$ ) difference among the treatment group. In neutrophil percentage the highest value (29.61%) was found in Aloe vera group that receive @ 22.5 gm/L drinking water and lowest value was found (28.8%) in T<sub>0</sub> control group. Lymphocyte percentage nutritional commercial group T<sub>1</sub> showed lowest result (64.8%) and highest result found (65.9%) in control group. Eosinophil percentage was higher in T<sub>0</sub> (2.56±0.24%) then T<sub>3</sub> (2.43±0.29%), T<sub>1</sub> (2.41±0.27%), T<sub>4</sub> (2.37±0.32%) and T<sub>2</sub>



( $2.33 \pm 0.30\%$ ) respectively. In monocyte and basophil percentage the result in all treatment was statistically similar. In case of Hb concentration there was a significant ( $p < 0.05$ ) difference among the different treatment group. supplementation of ALG 22.5g/L drinking water was significantly higher compared to control group  $T_0$  and  $T_1$  and  $T_2$  treatment group. Thus the current study clearly stated that supplementation of aloe vera through drinking water @ (7.5 gm/L, 15 gm/L and 22.5 gm/L) increase haematological parameters. The similar result obtained from Singh et al. (2013) who reported that Hb, PCV, TLC, total plasma glucose and serum calcium values was higher in Aloe vera treated group that receive (ALG) @ 20g/L in drinking water compared to control group in broiler. Mmereole (2011) reported that increase TEC, PCV, TLC, MCH, MCV, MCHC values in Aloe vera treated group that receive (1% aloe vera leaf powder) as compared to antibiotic supplemented group in broiler. Aloe vera gel in drinking water significantly increases blood parameters (RBC, WBC, PCV & ESR) in broiler described by Olupona et al. (2010). Blood analysis result of sonali chicken was near to normal blood reference values of Gallus Gallus domesticus which was reported by Jain (1993). This results disagree with Valle paraso et al. (2005) who found that Aloe vera at 2% solution in broiler there was a significantly ( $P < 0.05$ ) increase in total WBC count along with absolute differential count of monocytes, lymphocytes and heterophils.

**Table 4. Effect of aloe vera gel on hematological parameters of sonali chicken**

Parameters	T <sub>0</sub> 0 ml/L	T <sub>1</sub> 1 ml/L	T <sub>2</sub> 7.5 gm/L	T <sub>3</sub> 15 gm/L	T <sub>4</sub> 22.5 gm/L	Level of sign.
RBC (cells $10^6 / \mu\text{l}$ )	$2.58 \pm 0.04^a$	$2.86 \pm 0.10^a$ b	$2.65 \pm 0.08^a$	$3.01 \pm 0.09^b$	$3.1 \pm 0.08^b$	*
PCV %	$26.41 \pm 0.32$ a	$27.5 \pm 0.25^a$ b	$26.9 \pm 0.33^a$	$28.10 \pm 0.41^b$	$28.66 \pm 0.39$ b	*
WBC (cells $10^3 / \mu\text{l}$ )	$2.16 \pm 0.03$	$2.18 \pm 0.04$	$2.17 \pm 0.04$ 2	$2.19 \pm 0.047$	$2.2 \pm 0.038$	NS
Neutrophil %	$28.8 \pm 1.16$	$29.79 \pm 1.8$ 8	$29.66 \pm 1.8$ 5	$29.10 \pm 1.41$	$29.61 \pm 1.50$	NS
Lymphocyte %	$65.9 \pm 1.7$	$64.8 \pm 1.9$	$65.4 \pm 1.92$	$65.8 \pm 1.3$	$65.1 \pm 1.5$	NS
Eosinophil %	$2.56 \pm 0.24$	$2.41 \pm 0.27$	$2.33 \pm 0.30$	$2.43 \pm 0.29$	$2.37 \pm 0.32$	NS
Monocyte %	$1.55 \pm 0.17$	$1.58 \pm 0.23$	$1.65 \pm 0.24$	$1.66 \pm 0.13$	$1.75 \pm 0.18$	NS
Basophil %	$1.10 \pm 0.04$	$1.13 \pm 0.03$	$0.88 \pm 0.02$	$1.1 \pm 0.05$	$0.91 \pm 0.04$	NS
Hb (g/dl)	$8.13 \pm 0.10^a$	$8.35 \pm 0.24^a$	$8.38 \pm 0.17^a$	$8.61 \pm 0.23^a$ b	$9.26 \pm 0.31^b$	*

The mean values with different superscript (a to b) within the same row differs significantly, at least ( $p < 0.05$ ). All values indicate mean  $\pm$  Standard error of mean NS=Non significant, \* statistically significant ( $P < 0.05$ )

### 3.8 Economic efficiency of production

Production cost of sonali chicks in this study are presented in (Table 5). Spending on feed, chick, vaccine, medicine, litter, amino plus, aloe vera, miscellaneous (labour, electricity, transport cost) were constituted cost/chick and cost/kg live weight. Total production cost per kilogram weight gain lowest was ( $130.33 \pm 2\text{Tk.}$ ) found in commercial growth promoter group and highest was found ( $132.66 \pm 4\text{Tk.}$ ) in control group. Total feed cost per chick in different dietary treatment was statistically similar ( $p > 0.05$ ). However, the total feed cost decrease that was received aloe vera gel 22.5g/L water whereas increased total feed cost in control group. The net profit from per kilogram sonali was statistically similar ( $p > 0.05$ ). The highest profit ( $24.6 \pm 2\text{Tk.}$ ) was found commercial growth promoter group and lowest ( $22.43 \pm 4\text{Tk.}$ ) was found in control group. Aloe vera treatment group net profit higher was found in T4 ( $24 \pm 3\text{Tk.}$ ) then T3 ( $23.68 \pm 3.2\text{Tk.}$ ) and T2 ( $23.14 \pm 4\text{Tk.}$ ) respectively.

**Table 5: Cost benefit analysis of different dietary treatment on sonali chicken production**

Parameters (Tk.)	T <sub>0</sub> 0 ml/L	T <sub>1</sub> 1 ml/L	T <sub>2</sub> 7.5 gm/L	T <sub>3</sub> 15 gm/L	T <sub>4</sub> 22.5gm/L	Level of sign.
Chick cost	8	8	8	8	8	NS
Litter cost/chick	4	4	4	4	4	NS
Vaccine + medicine	10	10	10	10	10	NS
Dietary treatment cost/ chick	0	6	3	6	9	NS
Feed cost/ kg production	107.16 $\pm$ 4	99.33 $\pm$ 5	103.86 $\pm$ 5.5	100.32 $\pm$ 5.7	97 $\pm$ 6	NS
Miscellaneous cost/ chick	3.5	3	3	3	3	NS
Total cost Tk./kg production	132.66 $\pm$ 4	130.33 $\pm$ 2	131.86 $\pm$ 3	131.32 $\pm$ 3	131 $\pm$ 3	NS
Selling price Tk./kg	155	155	155	155	155	NS

Net profit Tk./kg	22.43±4	24.6±2	23.14±4	23.68±3.2	24±2.5	NS
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The mean values with different superscript (a to b) within the same row differs significantly, at least ( $p < 0.05$ ). All values indicate mean  $\pm$  Standard error of mean NS=Non significant, \* statistically significant ( $P < 0.05$ ) From the above discussion, it is said that body weight gain, feed efficiency, blood parameters (RBC, PCB and Hb) was significantly better with increased level of aloe vera gel. Dressing percentage and feed intake was increased along with increase dose

#### 4. SUMMARY AND CONCLUSION

At the terminal stage of experiment the cumulative body weight gain of different treatment groups was T<sub>0</sub> (726.5±20), T<sub>1</sub> (798.6±26), T<sub>2</sub> (754.6±27.5), T<sub>3</sub> (788.4±27), and T<sub>4</sub> (841.8±29) gram respectively. Birds that received aloe vera gel 22.5g/L drinking water was gained highest (841.8±29 g) body weight and lowest (726.5±20 g) in control group. Within aloe vera group increased live weight along with increase dose. The feed intake among different treatments were statistically similar ( $p > 0.05$ ). The cumulative maximum feed intake was observed aloe vera treated T<sub>4</sub> group (2065±43g) and minimum in control group (1950±41g). Feed efficiency of different treatment was statistically significant ( $P < 0.05$ ) compared to T<sub>0</sub> control group. Respective feed efficiency was found T<sub>0</sub> (2.81±0.04), T<sub>1</sub> (2.61±0.05), T<sub>2</sub> (2.72±0.07), T<sub>3</sub> (2.64±0.03) and T<sub>4</sub> (2.54±0.03). Aloe vera treated group T<sub>4</sub> converted feed to meat most efficiently then T<sub>1</sub>, T<sub>3</sub>, T<sub>2</sub> and T<sub>0</sub> treatment respectively. Obtained data on meat yield parameters and dressing percentage there was no significant ( $P > 0.05$ ) difference among treatments group except breast meat weight. The breast meat weight was significantly ( $p < 0.05$ ) higher in treatment T<sub>4</sub> group compare to control group and 7.5g/L aloe vera group. Among the treatment highest dressing percentage (52.1±0.48%) was observed in 22.5/L drinking water group and lowest (50.1±0.35%) in control group.

Data obtained on blood parameters (RBC, PCV, WBC and Hb) were statistically significant ( $P > 0.05$ ) among treatments group except the total WBC count ( $P > 0.05$ ). The highest WBC ( $2.2 \times 10^3$  cells/ $\mu$ l) was observed in supplementation of aloe vera group T<sub>4</sub> and lowest ( $2.16 \times 10^3$  cells/ $\mu$ l) in control group. In neutrophil percentage the highest value (29.61%) was found in Aloe vera group that receive @ 22.5 gm/L drinking water and lowest value was found (28.8%) in T<sub>0</sub> control group. Lymphocyte percentage nutritional commercial group T<sub>1</sub> showed lowest result (64.8%) and highest result found (65.9%) in control group. Eosinophil percentage was higher in T<sub>0</sub> (2.56±0.24%) then T<sub>3</sub> (2.43±0.29%), T<sub>1</sub> (2.41±0.27%), T<sub>4</sub> (2.37±0.32%) and T<sub>2</sub> (2.33±0.30%) respectively. In monocyte and basophil percentage the result in all treatment was statistically similar.

Based on the result of present study it may be concluded that aloe vera leaf gel is a good source of natural growth promoter and it has significant effect on body weight gain and feed efficiency on sonali chicken. The result of this study suggests that supplementation of aloe vera gel up to 22.5g/L drinking water can be used as alternative to commercial growth promoter for the production of sonali chicken. Therefore, more studies are required to determine cost effective doses to determine cost effective doses and form of use.

**Acknowledgement:** The authors are thankful to all the staff of department of Dairy and Poultry science of HSTU to help in the research work which improved the quality of the manuscript.

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**APPENDIX I****Chemical composition of basal diet**

Chemical composition	Starter	Grower
Moisture %	11-12	11-12
Crude protein %	21	21
Crude fiber %	5	4
Crude fat %	0	5
Ether extract %	4	0
Calcium %	1	1
Available phosphorus %	0.5	0.5
ME (Kcal/Kg)	2950	3100

**Chemical composition of commercial growth promoter (Amino Plus)**

Ingridients	Amount
DL-Metheonin	510mg
L-Lysin	170 ml
L-Tryptophan	50mg
L-Histidin	60mg
L-Valine	136 mg
L- Glutamic Acid	136 mg
L-Threonine	79 mg
L-Phynyl alanine	119 mg
L-Leucine	187 mg
L-Isoleucine	350 mg
L-Arginine	142 mg

Vitamin A	1000000 IU
Vitamin D3	80000 IU
Vitamin B1	200 mg
Vitamin B2	12 mg
Vitamin B6	12 mg
Vitamin B12	12 mg
Vitamin K3	400 mg
Vitamin C	10 mg
Vitamin E	600 mg
Calcium	7000 mg
Elemented Phosphorus	3500 mg
Digestive Stimulant	2000 mg
Nicotinamide	150 mg
Methylparaben	175 mg
Propylparaben	35 mg

**APPENDIX II:** Daily temperature ( $^{\circ}\text{C}$ ) was recorded by clinical thermometer at 6 AM, 2 PM and 7 PM

Sl No	Date	6 AM	2 PM	7 PM
1	25-7-17	27	30	25
2	26-7-17	25	30	28
3	27-7-17	29	31	30
4	28-7-17	31	32	32
5	29-7-17	29	30	27
6	30-7-17	28	31	29
7	31-7-17	29	33	29

8	1-8-18	30	32	29
9	2-8-18	29	32	29
10	3-8-18	28	33	30
11	4-8-18	29	33	31
12	5-8-18	30	34	30
13	6-8-18	32	33	30
14	7-8-18	32	33	29
15	8-8-18	29	31	29
16	9-8-18	30	32	31
17	10-8-18	25	23	24
18	11-8-18	26	22	23
19	12-8-18	22	25	24
20	13-8-18	27	29	28
21	14-8-18	31	32	30
22	15-8-18	28	32	29
23	16-8-18	30	32	29
24	17-8-18	31	33	30
25	18-8-18	29	32	31
26	19-8-18	29	33	30
27	20-8-18	30	34	30
28	21-8-18	29	33	30
29	22-8-18	28	32	29
30	23-8-18	29	31	30
31	24-8-18	30	33	29
32	25-8-18	27	32	29



33	26-8-18	30	33	31
34	27-8-18	28	30	29
35	28-8-18	29	31	28
36	29-8-18	30	32	30
37	30-8-18	27	31	28
38	31-8-18	28	30	29
39	1-9-18	29	31	30
40	2-9-18	30	33	31
41	3-9-18	26	29	28
42	4-9-18	27	30	28
43	5-9-18	29	31	29
44	6-9-18	30	32	30
45	7-9-18	29	31	28
46	8-9-18	28	32	29
47	9-9-18	27	30	27
48	10-9-18	29	31	30
49	11-9-18	28	32	29
50	12-9-18	30	33	30
51	13-9-18	28	30	29
52	14-9-18	27	31	28
53	15-9-18	30	33	29
54	16-9-18	29	33	30
55	17-9-18	28	31	29
56	18-9-18	27	30	28

Relative humidity (%) was recorded by digital hygrometer at 6 AM, 2 PM and 7 PM

SI No	Date	6 AM	2 PM	7 PM
01	25-7-17	91	90	88
02	26-7-17	92	78	85
03	27-7-17	94	75	84
04	28-7-17	88	71	82
05	29-7-17	87	75	88
06	30-7-17	88	77	87
07	31-7-17	89	76	82
08	1-8-18	94	78	89
09	2-8-18	92	76	86
10	3-8-18	89	77	84
11	4-8-18	86	75	86
12	5-8-18	94	82	86
13	6-8-18	88	72	76
14	7-8-18	79	71	75
15	8-8-18	78	73	78
16	9-8-18	81	75	82
17	10-8-18	85	74	90
18	11-8-18	86	79	90
19	12-8-18	80	82	87
20	13-8-18	90	95	97
21	14-8-18	93	79	84
22	15-8-18	96	77	86
23	16-8-18	85	76	82
24	17-8-18	80	71	85

25	18-8-18	83	78	81
26	19-8-18	81	77	83
27	20-8-18	79	64	78
28	21-8-18	84	73	84
29	22-8-18	82	72	83
30	23-8-18	79	69	79
31	24-8-18	83	73	82
32	25-8-18	88	76	80
33	26-8-18	90	79	81
34	27-8-18	81	74	80
35	28-8-18	77	69	74
36	29-8-18	80	73	77
37	30-8-18	90	79	84
38	31-8-18	78	72	77
39	1-9-18	80	75	80
40	2-9-18	81	73	80
41	3-9-18	79	69	81
42	4-9-18	75	68	77
43	5-9-18	82	72	79
44	6-9-18	85	75	83
45	7-9-18	80	70	81
46	8-9-18	86	79	85
47	9-9-18	73	68	77
48	10-9-18	78	69	75
49	11-9-18	80	71	75

50	12-9-18	79	71	76
51	13-9-18	80	76	78
52	14-9-18	82	72	78
53	15-9-18	85	76	80
54	16-9-18	80	73	81
55	17-9-18	79	75	78
56	18-9-18	80	72	79

**APPENDIX III:** Normal blood values of (*Gallus Gallus domesticus*)

Parameters	Reference values of Jain (1993)
RBC (cells $10^6/\mu\text{l}$ )	2.5-3.5
PCV %	22-35
WBC ( cells $10^3 /\mu\text{l}$ )	1.2-3
Neutrophil %	15-40
Lymphocyte %	45-70
Eosinophil %	1.5-6
Monocyte %	1-5
Basophil %	Rare
Hb (g/dl)	7-13