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Growth performance and serum lipid profile as affected by *Aloe vera* (*Aloe barbadensis*) supplementation in broilers

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Abstract

An experiment was aimed to evaluate the effect of supplementation of *Aloe vera* powder as alternative to antibiotic on Growth performance and serum lipid profile in broiler. One-hundred-and-sixty-day old broiler chicks were assigned into four treatment groups with four replicates of ten birds in each treatment groups. The first treatment group T₀ kept as control fed as standard basal diet without any supplementation of *Aloe vera*, T₁ fed basal diet with zinc bacitracin at 20mg/kg and 60mg/kg salinomycin, T₂ and T₃ were provided basal diet with 1% and 1.5% *Aloe vera* powder respectively. Result depicted that significantly ($p>0.05$) higher body weight was recorded in treatment T₂ (1% *Aloe vera* powder) group. Non-significant effect was observed in feed intake in all treatment group. Better feed conversion ratio observed in T₂ treatment groups. There was decreased level of total cholesterol, ALT, ALP and AST whereas glucose content was increased as compared to control.

Keywords: *Aloe vera* powder, growth performance, FCR, serum lipid profile

Introduction

In poultry industry, researchers are focused on use of natural feed additives as alternative to antibiotics. Researches are interested in *Aloe vera*, Fenugreek, Ashwagandha, Shatavari, Moringa, Tulasi, Garlic and other well-known plants. These plants assist in digestion and are considered safe, cost effective and ecologically friendly. As a result, including them in the diet should be encouraged in order to improve the bird's performance, feed utilization and overall health as well as to mitigate the harmful impacts of environmental stress. *Aloe vera* has substantial potential to use as a broiler chicken feed supplement for increasing growth performance, carcass features, haemato-biochemical parameters, intestinal health, immune system response and production cost. *Aloe vera* has been found to have antibacterial, antiseptic, anti-inflammatory and immune-modulating properties in numerous research studies (Moorthy *et al.*, 2009; Gautam *et al.*, 2004 and Madan *et al.*, 2008) [10, 5, 8]. *Aloe vera* has also been demonstrated to have anti-oxidant and anti-cancer effects in numerous researches. (El-Shemy *et al.*, 2010 and Nwaoguikpe *et al.*, 2010) [4, 11]. Apart from the preceding experimentations, several researches have reported that *Aloe vera* has anti-mutagenic and anti-hypersensitivity properties (Snezana *et al.*, 2007 and Strickland, 1993) [15, 18]. Hence, taking into accounts vast benefits of *Aloe vera* the current study was designed to investigate the performance and serum lipid profile of broiler chickens.

Materials and Methods

This study was investigated for a period of 42 days, at Poultry Unit, Veterinary Polyclinic & A.I. Centre, Department of Animal Husbandry and Dairy Science, Mahatma Phule Krishi Vidyapeeth, Rahuri, Maharashtra. One hundred and sixty day-olds straight run Ven Cobb broiler chicks were randomly distributed to four treatment groups. Each treatment further divided into four replicates 10 birds in each treatment groups. Four treatments were T₀: Basal diet without *Aloe vera* powder (Control), T₁: Basal diet with Antibiotic (20mg/kg zinc bacitracin and 60mg/kg salinomycin), T₂: Basal diet with 1.0 % *Aloe vera* powder and T₃: Basal diet with 1.5 % *Aloe vera* powder.

All the broiler chicks were fed with ground maize for first two days of age. During experiment chicks feed standard feed purchased from market for a pre-starter (0-1 week), Starter (1-3 weeks) and finisher (4-6 weeks) feed were used. Feeding and watering was done in identical feeders and waterers specified for the deep litter. The birds under all treatment groups had *ad-*

libitum access to feed by adding required amount of *Aloe vera* powder as per treatment. The experimental feed viz. broiler starter and finisher which were supplemented with *Aloe vera* powder as per treatment details. The proximate composition of the rations is presented in Table 1. The serum sample were collected at 42 days of age from experimental birds and analyzed for Total protein, Albumin, globulin, Glucose, Urea, BUN, triglyceride, cholesterol, ALT, AST, ALP and GGT. All samples of serum were analyzed in the laboratory of Division of Animal Husbandry and Dairy Science, College of Agriculture, Pune, Maharashtra. Proximate composition of broiler ration and feed additives analysis was carried out as per the method given in A. O. A. C., 1990. The data were analyzed by standard statistical techniques (Snedecor and Cochran, 1994) [14].

Results and Discussion

Growth Performance

Average weekly body weight of birds presented in the Table 2. Birds supplemented with *Aloe vera* powder in the basal diet showed increase in body weight during the experiment period as compared to control. There was no significant difference in body weight among four treatment groups during period of first two weeks of experiment. However, from third week onwards, significant differences observed in body weight between various treatment groups. At the end of 6th week, significantly ($p < 0.05$) higher body weight was recorded in treatment T_2 (2171.99 ± 19.04), followed by T_0 (2000.90 ± 21.31), T_1 (2038.42 ± 23.32) and T_3 (2078.00 ± 22.20).

This observations was accordance with the Jagadeeswaran (2007) [6], who revealed that broilers fed 1 per cent *Aloe vera* at six weeks of age had significantly greater body weights than those in control group. Padvi (2019) [12] observed that higher body weight in broilers supplemented with 1 per cent *Aloe vera*. In contrast to this finding, Mehala and Moorthy (2008) [9] reported that for the first week of treatment, researchers fed broilers *Aloe vera* powder (0.1% and 0.2%) and Curcuma longa powder (0.1% and 0.2%) and a blend of these two powders and found no significant change in body weight gain or FCR. Kumar *et al.* (2005) [19] also compared the body weights and weight gains of birds fed diets containing *Aloe vera* feed supplement to those fed diets containing antibiotic growth promoters, they observed similar performance.

Feed intake

Feed consumption in different groups for period of 42 days

was showed in Table 3. The overall feed consumption of the broiler birds showed non-significant differences in all treatment groups for entire experimental period. The treatment T_0 (3652.95 ± 20.25) showed lowest feed consumptions followed by T_1 (3661.33 ± 14.41), T_2 (3706.38 ± 22.70) and T_3 (3721.15 ± 24.91). The present study is similar to Silahi *et al.* (2009) [16] they found that the effects of dry and fresh *Aloe vera* barbadens gels on feed intake were not significant. Result obtained correspondence to Padvi (2019) [12] studied effect of *Aloe vera* powder on growth, carcass characteristics, serum biochemical parameter and meat quality of broilers and investigated that there was no significant difference in weekly feed intake among all treatments.

Feed Conversion Ratio

The overall FCR of birds presented in Table 4. The overall feed conversion ratio ranged from 1.69 to 1.97. ($T_0 = 1.97 \pm 0.01$, $T_1 = 1.77 \pm 0.03$, $T_2 = 1.69 \pm 0.01$, $T_3 = 1.78 \pm 0.02$). (Table The difference was statistically significant ($P > 0.05$), and the level of *Aloe vera* inclusion was increased up to 1 per cent which resulted in a better FCR when compared to the control group. Accordance to Singh *et al.* (2014) [17] discovered that dietary inclusion of whole leaf *Aloe vera* powder had no effect on FCR during the starting phase. The FCR of birds fed 1 per cent and 1.5 per cent WLAVP was significantly higher ($p < 0.05$).

Serum Biochemical parameters

Blood serum biochemical profile is presented in the Table 5. The level of total cholesterol, ALT, ALP and AST was decreased whereas Glucose content was significantly increased as compared to control. Serum total protein, Albumin, Globulin, triglycerides, GGT, BUN, Urea was no significant differences compared to control. The results of this study similar to Rehman *et al.* (2011) [13], who found that feeding treatments made from several plants resulted in significantly decreased ALT, AST, and ALP levels (garlic, barbary, *Aloe vera* and ginger). Ginger and garlic had a concentration of 6 and 4 gm per litre, respectively, whereas barbary and *Aloe vera* gel had a concentration of 10 gm per liter of water infusion. Chandrakar. A. (2011) [3] evaluated that *Aloe vera* leaves as alternative to antibiotic growth promoter in broiler birds and reported that Supplementation of *Aloe vera* powder results had decline levels of total cholesterol, ALT, ALP, and AST as compared to other treatments. Mehala and Moorthy (2008) [9] found that broilers fed with *Aloe vera* in feed, there was no significant difference in cholesterol value.

Table 1: The proximate composition of experimental broiler starter and finisher ration

Particulars	Starter (0-3 week)	Finisher (3-6 week)
	Ingredients %	
Yellow maize	62.17	70.31
Soybean meal	34.2	26.40
Vegetable oil	0.30	00
Dicalcium phosphate	1.40	1.40
Limestone	1.20	1.20
Salt	0.30	0.30
DL-methionine	0.15	0.12
B-complex	0.02	0.02
Choline chloride	0.06	0.05
Trace mineral premix1	0.10	0.10
Vitamin premix2	0.10	0.10
Total	100.00	100.00

Nutrient composition %		
Dry matter	94.71	94.32
Crude protein	23.02	20.01
Ether extract	04.80	04.30
Crude fiber	04.60	03.78
Total ash	07.20	06.85
ME, kcal/kg	2951.20	3006.44

Table 2: Average body weights changes (g/bird) of broilers in response to *Aloe vera* feeding

Weeks	Treatments			
	T ₀	T ₁	T ₂	T ₃
First	198.13±1.52	200.36±1.33	202.13±1.55	200.59±1.48
Second	412.03±4.38	413.43±3.91	417.3±4.03	415.59±3.77
Third	696.18±5.8 ^a	701.55±4.76 ^a	742.14±4.1 ^o	733.48±5.25 ^b
Fourth	1091.98±7.59 ^a	1121.7±8.83 ^b	1184.09±8.14 ^d	1156.15±7.71 ^c
Fifth	1504.04±12.56 ^a	1565.33±15.44 ^b	1644.78±11.62 ^d	1604.93±13.73 ^c
Six	2000.9±21.31 ^a	2038.42±23.32 ^{ab}	2171.99±19.04 ^c	2078±22.2 ^b

Values bearing different superscripts in coloumn differ significantly ($p < 0.05$)

Table 3: Cumulative feed intake changes (g/bird) of broilers in response to *Aloe vera* feeding

Weeks	Treatments			
	T ₀	T ₁	T ₂	T ₃
First	175±1.8	175.33±1.82	176.03±1.8	176.03±2.54
Second	560.25±3.21	561.38±4.09	561.1±4.4	562.2±5.4
Third	1165.35±5.97	1175.4±5.37	1185.25±6.11	1187.7±11.46
Fourth	1963.28±8.8	1975.4±8.23	1977.25±10.09	2001.53±13.15
Fifth	2747.35±21.44	2753.23±11.75	2790.25±13.59	2795.65±13.79
Six	3652.95±20.25	3661.33±14.41	3706.38±22.7	3721.15±24.91

Table 4: Weekly feed conversion ratio of broilers on feeding *Aloe vera*

Weeks	Treatments			
	T ₀	T ₁	T ₂	T ₃
First	1.01±0.01	1.00±0.01	1.00±0.01	1.00±0.02
Second	2.02±0.03	2.01±0.04	2.01±0.03	2.03±0.04
Third	2.07±0.04 ^d	1.94±0.03 ^b	1.83±0.02 ^a	1.95±0.03 ^c
Fourth	2.68±0.06 ^d	2.33±0.03 ^c	1.91±0.06 ^a	1.99±0.03 ^b
Fifth	2.11±0.07 ^c	1.9±0.06 ^b	1.74±0.05 ^a	1.97±0.1 ^c
Six	1.93±0.07 ^b	1.44±0.17 ^a	1.66±0.05 ^{ab}	1.74±0.04 ^b
Overall	1.97±0.01 ^c	1.77±0.03 ^b	1.69±0.01 ^a	1.78±0.02 ^b

Values bearing different superscripts in coloumn differ significantly ($p < 0.05$)

Table 5: Effect of supplementation of *Aloe vera* on blood serum biochemical profile in broilers

Parameters	Treatments											
	Total protein	Albumin	Globulin	Glucose	Urea	BUN	Cholesterol	Triglyceride	ALT	AST	ALP	GGT
T ₀	3.57±0.06	1.98±0.07	1.64±0.12	183.05±1.94	4.05±0.35	0.61±0.03	153.13±1.97	100.42±2.13	256.38±9.48	6.16±0.51	858.38±9.48	11.06±0.34
T ₁	3.61±0.08	1.85±0.17	1.61±0.06	190.31±2.95	3.17±0.66	0.42±0.02	140.4±2.93	100.61±1.92	223.31±7.12	5.05±0.72	813.98±4.19	10.93±1.05
T ₂	3.64±0.07	1.96±0.08	1.61±0.1	190.69±2.49	2.35±0.42	0.54±0.06	131.41±1.99	100.12±1.05	227.36±12.11	4.93±0.76	815.89±7.55	10.67±1.08
T ₃	3.66±0.05	1.97±0.08	1.62±0.1	198.96±2.41	2.47±0.35	0.52±0.06	129.96±1.61	99.81±1.28	217.13±8.23	3.01±0.4	825.86±9.39	10.97±0.3

Conclusion

It can be concluded that supplementation of *Aloe vera* powder @ 1% in the feed of broiler improved growth performance without any adverse effect on health of broilers. It also observed, the increased in levels of Glucose and a decreased in level of Total cholesterol, ALT, ALP and AST in the supplementation of *Aloe vera*. It may be suggested that *Aloe vera* can be used as alternative growth promoter in the feed of broiler birds.

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