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Effect of Supplementation of Aloe vera (*Aloe barbadensis*) Powder on Performance of Broiler Chicken

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ABSTRACT

Nutrition is the most important factor that affects the productive performance and economics related to poultry sector project. Phytogenic feed additives (PFA), are included into animal feed to improve the productivity via the improvement in digestibility, absorption of nutrients and elimination of resident pathogens in the animal intestinal tract. Aloe vera is one among many plants that has a great medicinal potential. The present study was undertaken to study the effects of supplementation of Aloe vera leaf powder in feed of broiler birds. An experiment trial was conducted on 240 straight run day-old commercial broiler chicks of Vencobb 430Y strain at the college poultry farm of Krantisinh Nana Patil College of Veterinary Science, Shirwal, Dist. Satara for a period of 42 days (six weeks). The broilers from groups T1, T2 and T3 were given graded levels of Aloe vera powder. Each treatment group was divided into four replicates and each replicate had 15 birds.The findings of our investigation revealed that there was no significant effect (P>0.05) of feeding Aloe vera powder on weekly body weight, weekly body weight gain, weekly feed intake and weekly feed conversion ratio in broiler birds.

KEYWORDS: Aloe vera, Broilers, Phytogenic feed additives.

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INTRODUCTION

Nutrition is the most important factor that affects the productive performance and economics related to poultry sector project. To achieve maximum performance in broiler birds different types of feed additives and feed supplements have been used (Hafez et al., 2020). Growth promoters are defined as chemical compounds which are added in the poultry feed in order to improve the feed conversion efficiency as well as body growth(Yadav et al., 2017).Phytogenics are defined as a group of natural growth promoters which are derived from herbs, spices and other plants (Hashemi et al., 2010). Aloe vera is a well-known and one of the oldest herb which has received particular interest from researchers (Christaki and Florou-Paneri, 2010). Hence, the present study was undertaken to study the effects of supplementation of Aloe vera leaf powder in feed of broiler birds.

MATERIALS AND METHODS

An experiment trial was conducted on 240 straight run day-old commercial broiler chicks of Vencobb 430Y strain at the college poultry farm of Krantisinh Nana Patil College of Veterinary Science, Shirwal, Dist. Satara, Maharashtra for a period of 42 days (six weeks) during August-September 2020. The chicks were randomly assigned to groups. Aloe vera powder was purchased from a local vendor at the rate of Rs. 100/Kg. Following dietary treatment was given: T0 (Control: Basal diet), T1 (Basal diet + 0.5% Aloe vera powder), T2 (Basal diet + 1.0% Aloe vera powder) and T3 (Basal diet + 1.5% Aloe vera powder). Each treatment group was divided into four replicates and each replicate had 15 birds.

For the experiment purpose, broiler chicken feeding was done in three phases viz. broiler pre-starter (0-7 days), broiler starter (8-21 days) and broiler finisher (22-42days) as per BIS (2007) for all the four treatment groups.

The nearly similar body weight chicks were divided into groups and within the groups were allotted to different replicates. All the broiler birds were housed in the deep litter system. Rice husk was used as litter material. The poultry shed used for research trial was cleaned, washed, disinfected and finally fumigated before the start of the experiment. Litter material of thickness 5cm was spread on floor for each group.All the treatment groups and their replicates were provided with similar environmental and management conditions throughout the experimental period.For brooding bamboo basket electric brooders were used for two weeks. For all birds fresh, clean and chlorinated drinking water was given *ad-libitum* throughout the experimental period.

The observations of weekly body weight, weekly body weight gain, weekly feed intake, weekly feed conversion ratio (FCR) and economics of broiler production were recorded. Data was analysed statistically by ANOVA using WASP. Means were compared at $P<0.05$ (Snedechor and Cochran, 1994).

RESULTS AND DISCUSSION

Average weekly body weight (g)

The experimental broiler birds fed on control diet and experimental diets did not show any significant differences ($P>0.05$) in average body weight (Table 1) during the entire experimental period. However, numerically higher live body weight was recorded in birds fed on diets supplemented with Aloe vera powder than the birds fed basal broiler diet.

Table 1. Percent ingredients and chemical composition of Broiler chickenPre-starter, Broiler chickenStarter and Broiler chickenFinisher diet of all groups used inthe experiment as per BIS 2007.

Percent ingredients (%)	Broiler Pre-starter	Broiler Starter	Broiler Finisher
Maize	63.19	66.62	69.3
Soya DOC	29.32	26.60	23
MBM	5.0	4.5	4.0
Oil	0	0	1.5
LSP	0.5	0.5	0.5
Antioxidant	0.0125	0.0125	0.0125
Toxin binder	0.05	0.05	0.0125
Vitamin mixture	0.05	0.05	0.05
Trace mineral	0.05	0.05	0.05
Choline chloride	0.1	0.1	0.1
DL-Methionine	0.3	0.22	0.21
Lysine	0.543	0.45	0.475
Salt	0.3	0.3	0.3
Soda	0.2	0.15	0.1
Threonine	0.14	0.12	0.11
Maduramycin	0.05	0.05	0.05
Phytase	0.01	0.01	0.01
Liver tonic	0.05	0.05	0.05
Betain	0.05	0.05	0.05
Protease	0.01	0.01	0.01
BMD	0.025	0.025	0.025
Lipidin	0.05	0.05	0.05
Total	100	100	100

Percent ingredients (%)	Broiler Pre-starter	Broiler Starter	Broiler Finisher
Nutrients			
ME (Kcal/kg)[1]	2995	3102	3204
CP (%)[2]	23.0	21.9	20.2
CF (%)[2]	3.12	3.85	3.25
EE (%)[2]	3.20	3.31	3.34
AIA (%)[2]	2.80	2.78	2.56
Ca (%)[2]	0.98	1.02	0.97
P (%)[2]	0.87	0.74	0.51

[1]Calculated (As per AOAC, 2012)
[2]Analysed

The findings of Sinurat et al. (2002), Mehala and Moorthy (2008), Singh et al. (2014), Mohamed et al. (2017), Jamir et al. (2019), and Riswanda et al. (2021) regarding incorporation of Aloe vera powder in standard broiler diet can be compared with present findings who reported that no significant difference in body weight was observed in experimental birds given Aloe vera powder. However, Darabighane et al. (2011), Mmereole (2011), Khan et al. (2014), Nalge et al. (2017), Bejar (2018), Zayed et al. (2020) recorded significantly higher body weight of birds given Aloe vera than the birds fed basal diet. The increased body weight in birds fed Aloe vera can be attributed to improved liver functions resulting in better digestion and assimilation of nutrients (Jagadeeswaran et al., 2012).

Average weekly body weight gain (g)

The results of the study (Table 2) indicated that the supplementation of Aloe vera powder in broiler diet did not significantly (P>0.05) affect the average weekly body weight gain in broilers fed with Aloe vera powder than that of broilers without supplementation of Aloe vera powder in the diet.

Table 2. Average weekly live body weight (g) of experimental broilers from different groups

Weeks	Treatment groups					
	T0 (±SEM)	T1 (±SEM)	T2 (±SEM)	T3 (±SEM)	CV	CD
Day old	46.9±0.22	46.9±0.37	47.1±0.33	47.1±0.46	1.54	NS
1	219.1±4.47	219.3±2.30	222.2±2.73	220.7±2.78	2.88	NS
2	496.0±8.71	527.4±4.48	531.6±10.05	507.9±12.56	3.65	NS
3	943.1±29.76	1004.6±13.87	1000.4±12.59	1000.9±6.01	3.61	NS
4	1544.1±12.86	1604.3±18.96	1597.1±22.95	1572.1±22.04	2.47	NS
5	2038.2±18.63	2167.4±42.44	2141.6±42.23	2083.1±37.05	3.45	NS
6	2533.3±6.25	2606.9±48.31	2541.4±50.11	2583.8±22.91	2.86	NS

NS – Non-significant

Table 3. Average weekly body weight gain (g) of experimental broilers

Weeks	Treatment groups				CV	CD
	T0 (±SEM)	T1 (±SEM)	T2 (±SEM)	T3 (±SEM)		
1	172.4±3.25	172.3±2.17	175.0±2.98	173.6±2.96	3.75	NS
2	254.9±4.64	308.0±4.89	373.2±52.45	287.2±12.27	17.74	NS
3	469.0±28.44	477.2±11.47	459.0±10.73	493.0±11.21	7.24	NS
4	601.0±24.00	599.6±14.96	596.7±14.19	571.1±26.15	6.93	NS
5	511.6±41.32	563.1±27.95	544.4±27.13	511.0±40.59	13.10	NS
6	468.5±14.98	441.0±32.03	446.3±15.43	516.6±23.65	9.66	NS
Cumulative	2447±3.71	2560±48.05	2532±39.13	2586±62.55	3.48	NS

NS – Non-significant

At the end of 6th week the average feed consumption was found to be 1319.2±18.96, 1386.08±3.12, 1368.3±9.16 and 1407.6±12.66 g for treatment groups T0, T1, T2 and T3, respectively. The statistical analysis of data revealed that birds of group T3 had significantly($P<0.05$) higher average feed intake followed by T2, T1 and the control group T0 which showed the lowest average feed intake. The present observations are in corroboration with those recorded by Darabighane et al. (2011), Amaechi et al. (2014), Khan et al. (2014), Nalge et al. (2017), and Bejar (2018) who reported significant effect in increasing average feed intake by experimental birds fed Aloe vera in their diet than the birds which were fed on basal diet.

Windisch et al. (2008) reported that the increased feed intake in birds fed Aloe vera may be due to changes in taste of feed and stimulation of appetite. Moreover, Wenk (2003) stated that herbs can help stimulate the appetite as well as enhance the endogenous secretions. However, Mehala and Moorthy (2008), Singh et al. (2014), Zayed et al. (2020) and Riswanda et al. (2021) recorded no significant difference in feed intake among birds fed Aloe vera and the birds fed control diet.

Average weekly feed conversion ratio

The data on FCR of broiler birds (Table 4) on statistical analysis showed that the FCR was found to be non-significant ($P>0.05$) among various treatment groups. However, numerically lowest cumulative FCR was calculated from the treatment group T1. The increase in FCR in birds fed Aloe vera diet is because of the increase in feed intake by treatment groups due to the addition of Aloe vera.

Table 4. Average weekly feed consumption (g) in experimental broilers

Weeks	Treatment groups				CV	CD
	T0 (±SEM)	T1 (±SEM)	T2 (±SEM)	T3 (±SEM)		
1	217.6±4.29	203.1±3.06	213.9±4.50	217.3±3.67	3.68	NS
2	365.7±2.18	378.4±10.39	390.1±1.62	374.0±2.25	2.91	NS
3	612.4±17.68	637.2±9.59	657.6±26.01	659.5±6.24	5.21	NS
4	938.5±16.88	934.6±19.03	930.9±12.11	976.0±15.46	3.40	NS
5	1146±18.06^{b}	1227±27.56^{a}	1262±16.29^{a}	1245±16.39^{a}	3.29	62.02
6	1319±18.96^{c}	1386±3.12^{ab}	1368±9.16^{b}	1407±12.66^{a}	1.80	38.17
Cumulative	4600±31.13^{c}	4766±53.07^{b}	4823±33.85^{ab}	4880±10.18^{a}	1.48	109.3

a, b, c, d- Means with different superscript differ significantly ($P<0.05$) within the weeks.
NS – Non-significant

Table 5. Average weekly feed conversion ratio (FCR) in experimental broilers

Weeks	Treatment groups				CV	CD
	T0 (±SEM)	T1 (±SEM)	T2 (±SEM)	T3 (±SEM)		
1	1.25±0.01	1.17±0.02	1.21±0.03	1.25±0.03	4.18	NS
2	1.35±0.04	1.22±0.02	1.22±0.002	1.31±0.06	6.42	NS
3	1.32±0.09	1.33±0.01	1.43±0.07	1.34±0.01	9.33	NS
4	1.56±0.07	1.56±0.03	1.56±0.05	1.72±0.06	7.75	NS
5	2.29±0.21	2.18±0.06	2.34±0.11	2.48±0.18	3.40	NS
6	2.82±0.06	3.20±0.26	3.07±0.08	2.74±0.11	10.37	NS
Overall FCR	1.85±0.02	1.86±0.03	1.90±0.03	1.91±0.01	3.16	NS

NS – Non-significant

The findings of the present study are in agreement with the results reported by Mehala and Moorthy (2008a), Darabighane et al. (2011), Mohamed et al. (2017), Bejar (2018), and Riswanda et al. (2021) who reported non-significant difference in FCR when Aloe vera was added to basal broiler diet.

Whereas, Amaechi et al. (2014), Singh et al. (2014), Naghi Shokri et al. (2016), Nalge et al. (2017), Jamir et al. (2019), Zayed et al. (2020) observed the significant difference in feed conversion ratio (FCR) when Aloe vera was added to the basal broiler diet. Thus, their results cannot be compared with the findings of the present study on Aloe vera.

Economics

While estimating the profit per bird the profit per kg of live weight, the cost of inputs such as day-old chicks, feed, vaccines, medications, electricity and labour and the amount after selling of the broiler birds was also taken into account. Feed expense per week differed because of the disparity in the part of ingredients used for supplementation in the control feed (T0) and treatment group (T1), (T2) and (T3).

The net cost of production per bird for T0, T1, T2 and T3 treatment group were Rs. 203.17, 213.93, 220.97and 234.96, respectively (Table 6).The cost of production per bird for the treatment group T1, T2, and T3 was higher in comparison to the birds fed basal broiler diet. For birds of all treatment groups, the selling price of live broiler birds per kg was Rs. 91/kg.

Table 6. Effect of Aloe vera supplementation on economics of broiler production.

Parameters	Treatment Groups			
	T0	T1	T2	T3
Total feed cost/bird	163.17	173.93	180.97	187.69
Feed cost/kg of gain	49.28	49.15	52.00	54.15
Net cost of production	203.17	213.93	220.97	227.69
Net Profit/bird (Rs)	27.06	23.17	10.17	7.27
Net Profit/kg (Rs)	10.69	8.91	4.00	2.81

The net profit per bird for the control group T0 was Rs. 27.06, 23.17 for T1, 10.17 for T2and 7.27 for T3. The net profit per kg of body weight for group T0, T1, T2 and T3 were Rs. 10.69, 8.91, 4.00 and 2.81, respectively. It was seen that the broiler birds given basal diet showed better net profit per bird as compared to the broiler birds under group T1, T2 and T3. This was because of the higher feed intake by birds fed Aloe vera powder than the birds of control group. However, no significant difference was observed in net profit per bird in groups fed Aloe vera powder and basal broiler diet. Similar to the present findings Singh et al. (2014) reported that the benefit cost ratio (BCR) was significantly lower in case of birds fed Whole leaf Aloe vera powder (WLAP) than the birds of the control group.

CONCLUSION

The results indicated that the effect of supplementation of Aloe vera powder did not significantly ($P>0.05$) affect the overall weekly body weight, weekly body weight gain and weekly feed conversion ratio while significantly ($P<0.05$) increasing the feed intake.

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REFERENCES

Amaechi, N., and Iheanetu, E. 2014. Evaluation of dietary supplementation of broiler chicks with different levels of aloe vera as a replacement for antibiotic growth promoter on broiler production in the humid tropics. International Journal of Veterinary Science. 3(2):68-73.

AOAC. 2012. Official Method of Analysis, 19th Edn. Association of Official Analytical Chemists, Washington, DC.

Bejar, F. R. 2018. Growth and sensory evaluation of broilers supplemented with Aloe Vera (*Aloe barbadensis*) extract in drinking water. International Research Journal of Agriculture and Rural Development.1(7):1-7.

B.I.S. 2007. Bureau of Indian Standards, Poultry Feeds. Specification (Fifth Revision). IS: 1374-2007, 3-7.

Christaki, E. V. and Florou-Paneri, P. C. 2010. Aloe vera: a plant for many uses. Journal of Food, Agriculture and Environment. 8(2):245-249.

Darabighane, B., Zarei, A., Shahneh, A. Z. and Mahdavi, A. 2011. Effects of different levels of Aloe vera gel as an alternative to antibiotic on performance and ileum morphology in broilers. Italian Journal of Animal Science. 10(3): 36.

Hashemi, S. R. and Davoodi, H. 2010. Phytogenics as new class of feed additive in poultry industry. Journal of Animal and Veterinary Advances. 9(17):2295-2304.

Hafez, H. M. and Y. A. Attia, 2020. Challenges to the poultry industry: current perspectives and strategic future after the COVID-19 outbreak. Frontiers in Veterinary Science. 7:516.

Jagadeeswaran, A., Selvasubramanian S. and Chandrasekaran, D.2012. Effect of supplementation of Aloe vera extracts on growth performance in commercial broilers. The Indian Journal of Veterinary Sciences and Biotechnology. 8(1):47-49.

Jamir, J., Savino, N. and Vidyarthi, V. K. 2019. Effect of dietary supplementation of Aloe vera powder as a feed additive on the performance of broiler chicken. Livestock Research International. 7(2):151-158.

Khan, M.J.A., Khan, S.H., Naz, S., Gilani, S.S., Shafi, J., Hassan, F., Hassan, M. and Anwar, M. 2014. Effect of Dietary supplementation of Aloe vera leaves on growth performance and immunity of Fayoumi Chicks. Pakistan Journal of Nutrition. 13(4):191.

Mehala, C. and Moorthy, M. 2008. Production performance of broilers fed with Aloe vera and *Curcuma longa*

(Turmeric). International Journal of Poultry Science. 7(9):852-856.

Mmereole, F. U. C. 2011. Evaluation of the dietary inclusion of aloe vera as an alternative to antibiotic growth promoter in broiler production. Pakistan journal of Nutrition. 10(1):1-5.

Mohamed, S. M., El-Eraky, W. and Al-Gamal, M. 2017. Effects of feeding Aloe Vera Leaves Powder on Performance, Carcass and Immune Traits of Broiler Chickens. Zagazig Veterinary Journal. 45(1):72-78.

NaghiShokri, A., Ghasemi H. A. and Taherpour, K. 2017. Evaluation of Aloe vera and synbiotic as antibiotic growth promoter substitutions on performance, gut morphology, immune responses and blood constitutes of broiler chickens. Animal Science Journal. 88(2):306-313.

Nalge, P. S., Koley, K. M., Bhave, K. G. and Maiti, S. K. 2017. Effect of Aloe vera Leaf Extract on Performance Parameters in Broiler Birds. Advances in Bioresearch. 8(4):60-65.

Riswanda, N., Mujnisa, A. and Hakim, M. R. 2021. The study of aloe vera powder effect as feed additive on the performance of broiler. In: IOP Conference Series: Earth and Environmental Science. 788(1):12187.

Singh, J., Sethi, A. P. S., Sikka, S. S., Chatli, M. K. and Mehta, N. 2014. Effect of sun dried whole leaf Aloe vera powder on growth, carcass characteristics and meat quality of commercial broilers. Indian Journal of Poultry Science. 49(1): 21-24.

Sinurat, A. P., Purwadaria, T., Togatorop, M. H., Pasaribu, T., Bintang, I. A. K., Sitompul, S.and Rosida, J. 2002. Responses of broilers to Aloe verabioactives as feed additive: the effect of different forms and levels of bioactives on performances of broilers. JurnalIlmuTernakdanVeteriner. 7(2):69-75.

Snedecor, G. W. and W. G. Cochran, 1994. Statistical Methods. Statistical Methods. Iowa State University Press, Ames, Iowa, 196: 55-51.

Wenk, C. 2003. Herbs and botanicals as feed additives in monogastric animals. Asian-Australasian Journal of Animal Sciences. 16(2):282-289.

Windisch, W., SchedleK., PlitznerC. and Kroismayr, A. 2008. Use of phytogenic products as feed additives for swine and poultry. Journal of Animal Science. 86(14):140-148.

Yadav, D. C. 2017. Aloe vera as a feed additive in broiler chicken production: A review. International Journal of Veterinary Sciences and Animal Husbandry. 2(5):30-38.

Zayed, R., Abd-Ellatieff, H., Goda, W., El-shall, N., Bazh, E., Ellakany, H. and Abou-Rawash, A. R. 2020. Effects of aqueous extract of Aloe vera leaves on performance, hematological and cecal histological parameters in commercial broiler chickens. Damanhour Journal of Veterinary Sciences. 5(1):4-10.