

Research Article

Effect of Supplementation of Aloe Vera on Growth Performance in Broilers Chicks

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Abstract

The 120 one-day-old male broiler chicks (Cobb 400 strain), were randomly assigned to 4 treatments with 3 replication. Treatment groups were; Control group in Standard ration, in Standard ration 0.1% Aloe vera (treatment 2), in Standard ration 0.2 % Aloe vera (3) and in Standard ration 0.3% Aloe vera (4) and Chicks were reared for forty-two days. The results of this study indicated that feed consumption for the entire period (up to 6 weeks) were significantly ($P < 0.05$) increased in the treatments 1 and 4, when was added at a rate of 0 and 0.3%, compared with the other treatments (2 and 3). Body weight gain for the entire period (up to 6 weeks) were significantly ($P < 0.05$) increased in the treatments 2, 3 and 4, when Aloe vera was added at a rate of 0.1, 0.2 and 0.3%, compared with the other treatments (1). These birds also had a significantly ($P < 0.05$) higher feed conversion ratio than others group and finally the lowest feed cost per kg of body weight was observed in the group containing Aloe vera. More studies are required to determine the best form and to compare Aloe vera with other medicinal herbs.

Keywords: Aloe vera, Growth, Broiler and Medicinal herbs

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Introduction

All over the globe, many plants have been exploited for their medicinal value, [1] reported about the considered opinion of World Health Organization, which states that, '80% of the world's population dependent on ancestral medicines for their haleness'. For the health care of the remaining 20% population mainly residing in developed countries, therapeutic product of plants plays an important role. Still there is a requisite for the development of scientific technology for the enhancement of medicinal plants and their products. Medicinal herbs, as a new class of additives to animal and poultry feeds, have beneficial properties such as anti-oxidant, anti-microbial, and anti-fungal [2] as well as immunomodulatory and anticoccidial effects, which lead to increased use of herbs. Furthermore, many countries around the world, with plenty resources of different kinds of medicinal herbs, can use these herbs as natural feed additives for animals and poultry. The emphasis here is on those herbs that, when used to supplement feeds, are helpful in achieving a larger number of objectives (improving growth performance, improving immunity response, improving intestinal microflora, and controlling particular diseases); in other words the focus is on multifunctional herbs. A well-known herb that has received particular attention from researchers is Aloe vera (*Aloe barbadensis* Miller), known as one of the oldest herbs with a history that dates back to traditional medicine thousands years ago [3]. Aloe vera is found in tropical and sub-tropical climates and many countries have proper geographic features required for growing Aloe vera. The most important part of Aloe vera is its leaf which is composed of two main sections: latex and gel [4]. The gel contained in Aloe vera leaves is composed of about 98.5% to 99.5% water [5] which have medicinal effects that are useful in treating diseases. Major ingredients of Aloe vera include anthraquinones, saccharides, vitamins, enzymes, and low-molecular-weight compounds [6] which give Aloe vera its anti-inflammatory, immunomodulatory, wound-healing, anti-viral, anti-fungal, anti-tumor, anti-diabetic, and anti-oxidant effects [3]. Numerous studies suggest that many benefits of Aloe vera are attributable to polysaccharides contained in Aloe vera gel, which compose a large part of dry matter in this gel [7]. A compound often analyzed by researchers is the polysaccharide acemannan which has immunomodulatory, anti-microbial, and anti-tumor effects [6].

The poultry meat production is estimated to be about 2.47 million tonnes. The current per capita availability of eggs is around 55 eggs per year. Exports of poultry products are currently at around 457.82 crore in 2011-12 as per the report of Agricultural and Processed Food Products Export Development Authority (APEDA) [8].

Methods and Materials

Birds and Diets

The study was conducted at the Poultry Research and Training Centre, Sardar Vallabhbhai Patel University of Agriculture & Technology, Meerut. A total of one hundred and twenty (120) day old chicks of Cobb 400 broiler were used for the experiment. Chicks were brooded in a warmed fumigated brooder deep Litter house and feed on a commercial broiler starter Top Feed for three weeks divided into four diet groups with three replicates (30 chickens each) on a completely randomized design. The control group was basal diet feed. For the next three groups, the diets were mixed with 0.1, 0.2 and 0.3% Aloe Vera powder, respectively. The raw Aloe Vera was purchased from a reputable dealer. The whole Fresh and matured Aloe Vera leaf was over dried and grinded using manual grinder into finer particles. The powder was submitted to the laboratory to determine the nutrient and chemical contents.

Composition

Table 1 The present investigation was carried out to study the Composition of the basal diet

Ingredient	Starter ration	Finisher ration
Composition g/kg what values	Starter 0 - 21 days	Finisher 22 - 42 days
Yellow maize	60.00	61.50
Wheat bran	6.00	10.75
Soyabean meal	22.00	18.50
Fat	1.00	1.00
Fish meal	8.00	2.25
Mineral mixture	2.00	2.25
Comman salt	0.25	0.25
Vitamin mixture	0.25	0.50
L-lysine	0.15	0.10
DL-methonine	0.10	0.15
Energy	3.244kcal	Energy
Carbohydrate	0.791g	Carbohydrate
Protein	0.008g	Protein
Fat	0.005g	Fat

Housing and Management

The broiler chicks were housed in pens which were cleaned properly. The birds were weighed at day old to determine the initial body weight and subsequently weighed weekly to determine the body weights and body weight gains. The birds were vaccinated against New Castle disease and Infectious Bursal disease, likewise all other medications were given. The experiment lasted for 8 weeks. Body weight gain, feed conversion ratios and feed intake were obtained by calculation.

Statistical analysis

Statistical analysis was done using completely randomized design (CRD), two way analysis of variance (ANOVA) as per the procedure given by DMRT 19.0 (1995, SPSS Inc., USA). The test was employed for identifying the significant differences amongst the different treatments. A P-value less than 0.05 is considered to be statistically significant.

Results and Discussion

The feed consumption up to 6 weeks of age

All the treatment groups of broiler chicks was reported in **Table 2**. The average feed consumption was found 3508.267 ± 0.706 , $3516.227 \pm 6.508g$, $3537.243 \pm 7.840g$ and $3563.443 \pm 1.951g$ in T₁, T₂, T₃ and T₄ group respectively (Table 2). Overall average feed consumption for all the treatment groups was 3531.295 ± 4.251 g up to six weeks of age (Table 2). The feed consumption up to 6 weeks of age ranged from 3508.267 ± 0.706 g (T₁ group) to 3563.443 ± 1.951 g (T₄ group) (Table 2). The feed consumption of up to 6 weeks of broiler chicks of all the treatment groups was differ significantly (P<0.05) each other groups (Table 2).

Table 2 Feed Consumption up to 6 weeks of age (gram)

Treatments	No. of Replication			Mean	SEM
	R1*	R2*	R3*		
T1	3508.84±0.709	3509.34±0.712	3506.62±0.697	3508.267 ^a	0.706
T2	3521.75±6.508	3523.66±6.507	3503.27±6.509	3516.227 ^{ab}	6.508
T3	3523.43±7.831	3537.76±7.849	3550.54±7.840	3537.243 ^{bc}	7.840
T4	3560.71±1.952	3567.06±1.953	3562.56±1.948	3563.443 ^c	1.951
CD	17.196Overall mean			3531.295	4.251

* (n=10 chicks) a, b, c, d: Means with different superscripts in each column Differ significantly (p<0.05).
* The results are reported as Mean ± SEM

Sohail et al., 2012 [9] Reported average feed consumption ranged from 3214.5 g to 3065.00g per chicks fed different diets, while average value of feed consumption in present study was $3699.92 \pm 13.837g$ which is in between the above value. Hence our results are in agreement with above study. [10] Who supplemented Aloe vera (10^8 , 10^9 , 10^{10} cfuAloe vera/kg) in broiler chicks increase the feed consumption in supplemented (treatment) group 4022 ± 30.80 g in comparison to non-supplemented group (control). [11] Reported the average feed consumption during 0-6 week of age for commercial broiler ranged from 2506.0g to 2812.0g with FCR 1.90. The average feed consumption was lower than present investigation. This may be due to effect of strain of broilers used in experiment and further may be effect of diet composition. [12] Reported the average feed consumption during 0-6 week of age for commercial broiler ranged from 1789.33 g to 2012.0 g. The average feed consumption was lower than present investigation. This may be due to effect of strain of broilers used in experiment and further may be effect of diet composition. [13] Who supplemented Aloe vera T3 group (0.5% *L. acidophilus*) in broiler chicks increase the feed consumption in supplemented (treatment) group $3700.07 \pm 88.58g$ in comparison to non-supplemented group (control). [14] Who reported that dietary supplementation of broilers diets with Aloe Vera did not affect the feed consumption 4664 ± 38 g compared to the control group. [15] Who supplemented Aloe Vera (T2 0.05%, 0.05% Aloe Vera and Bio-moss 0.1%) in broiler chicks decrease the feed consumption in supplemented (treatment) group $4142 \pm 36.8g$ in comparison to non-supplemented group (control).

The body weight gain up to 6 weeks of age

All the treatment groups of broiler chicks was presented in **Table 3**. The average body weight gain was found $1672.260 \pm 4.153g$, $1689.597 \pm 3.223g$, $1722.863 \pm 7.603g$ and $1753.500 \pm 4.748g$ in T₁, T₂, T₃ and T₄ group respectively (Table 3). Overall average body weight gain for all the treatment groups was 1709.55 ± 4.931 g up to 6 weeks of age (Table 3). The body weight gain up to 6 weeks of age ranged from 1672.260 ± 4.153 g (T₁ group) to 1753.500 ± 4.748 g (T₄ group). The body weight gain of up to 6 weeks of broiler chicks of all the treatment groups was differ significantly (P<0.05) each other (Table 3).

Table 3 Body Weight Gain up to 6weeks of age (gram)

Treatments	No. of Replication			Mean	SEM
	R1*	R2*	R3*		
T1	1664.38±4.149	1673.92±4.158	1678.48±4.153	1672.260 ^a	4.153
T2	1685.33±3.223	1695.9±3.221	1687.56±3.224	1689.597 ^b	3.223
T3	1711.11±7.600	1720.38±7.601	1737.1±7.608	1722.863 ^c	7.603
T4	1744.82±4.740	1754.54±4.756	1761.14±4.748	1753.500 ^d	4.748
CD	17.201Overall mean			1709.55	4.931

* (n=10 chicks) a, b, c, d: Means with different superscripts in each column Differ significantly (p<0.05).
*The results are reported as Mean ± SEM

The overall body weight gain up to 6 week of age was higher for the group fed diet T₄. Since there was inclusion of 0.3 % Aloevera in diet T₄. The growth may be due to inclusion Aloevera. [10] Who supplemented Aloevera (10⁸, 10⁹, 10¹⁰cfuAloevera/kg) in broiler chicks similar the body weight gain supplemented in (treatment) group 2230 ± 17.40 g in comparison to non-supplemented group (control). [16] Who supplemented Aloevera Protexin (150gr/ton of the starter diets and 50gr/ton of the finisher diets) in broiler chicks lower the body weight gain supplemented in (treatment) group 2075.57 ± 23.87 g in comparison to non-supplemented group (control). [14] Who supplemented Aloevera PRIMALAC (0 and 900 g/ton and prebiotic FERMACTO (0, 1000 and 2000 g/ton) in broiler chicks increase the body weight gain supplemented in (treatment) group 2343.67 ± 32.89 g in comparison to non-supplemented group (control). [12] Who supplemented Aloevera (0.5 ml of Aloevera per one liter of water for the whole growth period) in broiler chicks lower the body weight gain supplemented in (treatment) group 1748.15 ± 9.68 g in comparison to non-supplemented group (control). [17] Conducted experiment on growth performance of broiler, body weight gain was reported from 1919.0 to 1770.0 g during 0-6 weeks of age with average weight gain was 1774.53 g. Mean value was lower than present investigation (1872.95 ± 4.008 g). This difference can be contributed by genetically potential of chicks. [15] who supplemented Aloevera (T2 0.05%, 0.05% Aloevera and Bio-moss 0.1%) in broiler chicks increase the body weight gain supplemented in (treatment) group 2274 ± 18.6g in comparison to non-supplemented group (control).

The feed conversion ratio up to 6 weeks of age

All the treatment groups of broiler chicks were reported in **Table 4**. The average feed conversion ratio was found 2.090 ± 0.006, 2.073 ± 0.003, 2.047 ± 0.003 and 2.030 ± 0.006 in T₁, T₂, T₃ and T₄ group respectively (Table 4). Overall average feed conversion ratio (FCR) for all the treatment groups was 2.06 ± 0.004 up to six weeks of age (Table 4). The feed conversion ratio (FCR) at up to 6 weeks of age ranged from 2.090 ± 0.006 (T₁ group) to 2.030 ± 0.006 (T₄ group) (Table 4). The feed conversion ratio (FCR) of up to 6 weeks of broiler chicks of all the treatment groups was differ significantly (P<0.05) to each other except T₁ vs. T₂, T₂ vs. T₃ and T₃ vs. T₄ (Table 4).

Table 4 Feed Conversion ratio up to 6 weeks of age

Treatments	No. of Replication			Mean	SEM
	R1*	R2*	R3*		
T1	2.10±0.005	2.09±0.003	2.08±0.010	2.090 ^c	0.006
T2	2.08±0.001	2.07±0.004	2.07±0.002	2.073 ^{ab}	0.003
T3	2.05±0.003	2.05±0.002	2.04±0.004	2.047 ^b	0.003
T4	2.04±0.004	2.03±0.008	2.02±0.006	2.030 ^a	0.006
CD	0.016 Overall mean			2.06	0.004

* (n=10 chicks) a, b, c, d: Means with different superscripts in each column Differ significantly (p<0.05).
*The results are reported as Mean ± SEM

The feed conversion ratio up to 6 weeks of age of all the treatment groups of broiler chicks was reported in Table 4. Average feed conversion ratio for growing chicks was varies from 2.03 to 2.28 as reported [17] reported that the average value of feed conversion ratio ranged from 1.757 to 1.945 which are lower than the reported by above scientist this difference may be due to difference in composition of diet or it may be due to genetic improvement in chicks. [11] Reported feed conversion ratio value ranges from 1.86 to 1.95. These results are in agreement with present experiment. [18] Who found that using dietary supplementation of Aloeveras alone in broilers had a significant positive effect on the feed conversion ratio compared to the control. [16] Reported that feed conversion ratio improved by the supplementation of dietary Aloevera Protexin (150gr/ton of the starter diets and 50gr/ton of the finisher diets) 1.925 ± 0.033 compared to the control group. [13] Who found that using dietary supplementation of Aloeveras alone in broilers had a significant positive effect on the feed conversion ratio compared to the control. [12] Reported that feed conversion ratio improved by the supplementation of dietary Aloevera (0.5 ml of Aloevera per one liter of water for the whole growth period) 2.45 ± 0.021 compared to the control group. [14] Reported that feed conversion ratio improved by the supplementation of dietary Aloevera (without or with 1.5 × 10⁵ cfu/g feed) 1.680 ± 0.018 compared to the control group. [15] Reported that feed conversion ratio low by the supplementation of dietary Aloevera (T2 0.05%, 0.05% Aloevera and Bio-moss 0.1%) 1.82 ± 0.1 compared to the control group.

Conclusion

In last decade, there is a renewed interest in the development of herbal drugs which has underlined understanding the mechanism of action rather than blind faith in people and stories, as in the past. Several approaches in exploiting the herbal wealth of the world in phytomedicine have explored many phytochemicals from variety of plants. Nonetheless, even with the limited reports on mechanism of activity it has become obvious that numerous mechanisms would have been involved in different activities of a given herbal medicine.

It could be concluded that, under the condition of the present study, Aloe Vera powder at 0.3% dietary inclusion are more efficient than control group on improving broiler performance. Therefore, dietary inclusion of Aloe Vera in broiler diets is highly recommended, it will be interesting to try different inclusion levels of Aloe Vera since there was no detrimental effect recorded both health wise and performance.

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