

USING AQUEOUS EXTRACT OF ALOE GEL AS ANTICOCCIDIAL AND IMMUNOSTIMULANT AGENT IN BROILER PRODUCTION

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ABSTRACT

The effect of aqueous extract of aloe gel (10%w/v) on growth performance, antibody titer against ND, IB and IBD and faecal coccidial oocysts count following natural progression of coccidiosis in broilers reared at Peshawar was studied. One hundred and sixty, day old chicks were randomly allotted to four different groups, designated as A, B, C and D in an open sided house. Each group was replicated four times with ten chicks per replicate. Group A, B and C received aqueous extract of aloe gel (10%w/v) @ of 5, 10 and 15ml/liter of water and group D was kept control for 35 days. On day-21 of the experiment, all the chicks were inoculated with oocysts of different species of *Eimeria* and in addition, oocysts were seeded in the litter. Water and feed intake, abdominal fat deposition and weight of breast, thigh gizzard, heart and liver of broilers given aloe extract in drinking water was not different among groups. Significantly higher body weight gain, dressed weight and lower feed conversion ratio was observed for broilers in group B. Significantly higher mortality (10%) was found in control group and. On the other hand, significantly higher coccidia oocysts' count was found in the litter of group D as compared to group B and C on both day-28 and day-35 of the experimental period.

Key Words: Aloe Gel Aqueous Extract, Broilers, Coccidiosis, Immunity, Growth Performance

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INTRODUCTION

Coccidiosis is one of the major pandemic in poultry industry. Coccidiosis could lead to severe economic losses as chickens are continually exposed to coccidial oocysts found in litter (Mathis *et al.*, 1984). *Coccidia* usually results in metabolic and structural changes in the intestinal mucosa of the host animal (Ruff and Allen, 1990). Efforts have always been made to add coccidiostates on regular basis in chicken's diet. Consistent use of coccidiostates has not only narrowed the gap between cost of production and returns, it could be a potential threat to human being as a result of their residual effects. With increasing demand of broiler meat consumption, efforts would be required to assure healthy food and better economic gains. Herbal products in past have been effectively used for the control and treatment of several ailments in poultry and human beings. Aloe vera, a medicinal plant, could be an effective substitute for coccidiostates because of its chemical nature and antimicrobial activities. Aloe gel has been used as antibiotics (Swaim *et al.*, 1992), wound healing (Davis *et al.*, 1994), anti-inflammatory (Udupa, 1994) anti coccidial (Mwale *et al.*, 2005) and anti ulcer (Koo, 1994) agent. It has been reported to be an effective tool in increasing density of microvilli and enhancing immunity of broilers (Jinag *et al.*, 2005). Aloe gel is one of the readily available herbal extract in Asia that is expected to produce desirable results. The present study was therefore, an effort to use aloe vera gel as natural growth promoter and an effective tool for the control of coccidiosis in broilers.

MATERIALS AND METHODS

This study was planned to investigate the efficacy of 10% (w/v) concentrated aloe vera gel (AG) infusion as a coccidiostat, growth promoter and immunostimulant agent in broiler production practices at the NWFP Agricultural University Peshawar, Poultry Farm.

Experimental Design

This experiment was conducted in a completely randomized design (CRD). One hundred and sixty (160), day-old chicks of approximately the same weight was purchased from a local hatchery. The chicks were randomly distributed into four groups (A, B, C, and D) and further replicated four times with ten chicks per replicate. Chicks were reared in pens in an open sided house under similar environment. Group A, B and C received aqueous extract of aloe gel (10%w/v) @ of 5, 10 and 15 ml/liter of water, respective, whereas, group D was kept control.

Preparation of 10% Aloe Gel Infusion

Fresh Aloe leaves were collected from District D. I. Khan for the extraction of gel. The Aloe gel was extracted from the leaf manually by making a cut, using a pocket knife. Latex of the leaf was removed and gel was collected in a beaker. A 10% (w/v) concentrated infusion was prepared by taking 100 g of fresh gel in a glass bottle and one liter of hot boiled distill water was poured on it. The bottle was shaken for 5-7 minutes to ensure thorough mixing and was then kept for 6-8 hours at room temperature prior to use.

Preparation of Coccidian Inoculums and Subjecting Birds To Coccidia Oocysts

Guts of the infected birds, obtained from Veterinary Research Institute Peshawar, Pakistan, were subjected to microscopic examination. Those found positive for coccidiosis upon examination were separated and mixed with 2% potassium dichromate solution. Then oocysts were extracted from that infected material adopting the procedure described by Conway and Mckenzie (1991). Each experimental bird was induced in all groups with a dose of 30,000 of coccidia oocysts on day-21. Feecal and litter samples were collected on weekly basis, post infection to determine oocysts per gram of sample by McMaster technique as described by Theinpont *et al.*, (1979).

Eggs per gram (EPG) of fecal sample were calculated as follows;

$$\text{EPG} = X \ 200$$

Where, X was the average number of Oocysts

On day-35 the experiment was terminated.

Data Collection and Analyses

Data were recorded for delivered body weight, dressed weight, weight of different body organs (thigh, legs, and breast), water and feed intake and mortality. Antibody Titer against Newcastle Disease, Infectious Bronchitis and Infectious Bursal Disease was worked out.

The data were statistically analyzed with the standard procedures of analysis of variance (ANOVA), using completely randomized design. Means were compared for significance of differences by least significance differences (LSD) as suggested by Steel and Torrie (1981).

RESULTS AND DISCUSSION

Water and Feed Intake

No significant difference in mean water and feed intake was found among groups (Table I). Ismail *et al.* (2004) and Chand *et al.* (2005) reported similar findings whereas, Mehmet *et al.* (2005) reported higher water intake. Findings pertaining to feed intake were in agreement with the findings of Mehmet *et al.* (2005) and Hernandez *et al.* (2004). Contrary to the present finding with respect to feed intake, Durani *et al.* (2007), Proudfoot *et al.* (1990) and Guo *et al.* (2004), reported significant differences in feed consumption of broilers fed various herbal extracts and antibiotics. No conclusive evidence could be grasped from the present findings with respect to water and feed intake as the data was a total feed and water consumption of all the 10 birds in a replicate.

Table I. Mean Body weight gain, feed, and water intake, FCR, feed cost and gross return from broilers given aloe extract in drinking water

Group	Volume of 10% w/v Aloe gel (ml)	Body weight gain/chick (g)	Feed intake/chick (g)	Water intake/chick (ml)	Feed Conversion Ratio	Feed cost (Rs./Chick)	Gross return (Rs./chick)
A	5	1461 ^b	2548	7122	1.74 ^b	39.50	86.500
B	10	1548 ^a	2458	6912	1.58 ^c	40.50	85.750
C	15	1358 ^c	2581	6823	1.90 ^a	48.00	84.95
D	0	1381 ^{bc}	2499	6961	1.80 ^{ab}	38.00	84.35

Means in column with different superscripts were significantly different at $\alpha = 0.05$.

Body Weight Gain, Dressed Weight and Feed Conversion

Mean body weight gain and feed conversion ratio values are given in Table I. Significantly ($P < 0.05$) higher body weight gain, dressed weight and lower feed conversion ratio was observed for broilers in group B as compared to other groups. Similar findings have been reported by Jiang *et al.* (2005), Jamrose and Kamel (2002), Wheeler *et al.* (1994), Guo *et al.* (2004), Mehmet *et al.* (2005), Chand *et al.* (2005) and Durrani *et al.* (2007). The higher body weight gain and improved FCR values of the broilers given 10 ml of aqueous extract of aloe gel per liter of drinking water could be due to better performance of the broilers and the diversified antimicrobial activities of aloe gel that had also been demonstrated by Swaim *et al.* (1992), giving aloe vera extract to chicken.

Abdominal Fat, Breast, Thigh and Offal Weight

Abdominal fat deposition and breast, and thigh weight of the broilers was not affected by giving aloe extract in drinking water (Table II). Similar results were found for gizzard, liver, and heart weight (Table III). Findings of the present study were in agreement with Ismail *et al.* (2004), Hernandez *et al.* (2004) reported similar findings whereas, Failey *et al.* (1985) associated an increase in the relative weight of Gizzard for the broilers given antimicrobial agents in their diets.

Intestinal was significantly ($P < 0.01$) influenced by giving aloe extract to broilers in drinking water. Significantly ($P < 0.05$) higher intestinal weight was found for broilers in group A and B as compared to group C and D (Table III). Contrary to the present findings, Guo *et al.* (2004) and Hernandez *et al.* (2004) reported no effect of feeding herbal extracts on intestinal weight.

Table II. Mean growth parameters of broilers given aloe extract in drinking water

Group	Volume of 10% w/v Aloe gel (ml)	Breast weight (g)	Thigh weight (g)	Abdominal fat (g)	Dressing percentage
A	5	288 ^a	71	31	56.27 ^a
B	10	289 ^a	72	28	57.20 ^a
C	15	249 ^b	64	24	54.07 ^b
D	0	264 ^b	65	22	54.15 ^b

Means in column with different superscripts were significantly different at $\alpha = 0.05$.

Table III. Mean weight of offal of broilers given aloe extract in drinking water

Group	10% W/V Aloe gel Aqueous Extract in ml given to broilers per liter of drinking water	Liver weight (g)	Heart weight (g)	Gizzard weight (g)	Intestine Weight (g)
A	5	43	9	26	97 ^a
B	10	47	10	26	98 ^a
C	15	40	9	24	86 ^b
D	0	42	9	24	82 ^b

Means in column with different superscripts were significantly different at $\alpha = 0.05$.

Antibody Titers against IBD, IB and ND

Serum antibody titer for IBD was found significantly higher ($P < 0.05$) in broilers in group C as compared to others. The remaining contrasts were not significant (Table III). Valle *et al.* (2005), Ziauddin *et al.* (1995), Agarwal *et al.* (1999), Sham *et al.* (2003), Wheeler *et al.* (1994), Balwinder *et al.* (2005) and Gautam *et al.* (2004), Durrani *et al.*, (2007) and Durrani *et al.*, (2005) also reported increased levels of immunities in chicken given various herbal extracts in drinking water.

Mortality and Coccidia Oocysts' Count

Findings on mean mortality and coccidia oocysts' count in different groups of broilers given varying levels of aloe extract in drinking water are presented in Table IV. Significantly ($P < 0.05$) higher mortality (10%) was found in control group and compared to group B (2.5%) and group C (2.5%). On the other hand, significantly higher coccidia oocysts' count was found in the litter of group D as compared to group B and C on both day-28 and day-35 of the experimental period (Table IV). Findings of the present study were in agreement to Youn *et al.* (2001), Das and Panda (2001) and contrary to those reported by Mwale *et al.* (2005). The smaller oocysts' count in group of

broilers given aloe extract in drinking water revealed that aloe extract reduced damages resulting from coccidiosis in exposed chicken.

Table IV. Mean Antibody Titer against IBD and IB and mortality and oocysts count per gram of broiler litter given aloe extract in drinking water

Gro up	Volume of 10% w/v Aloe gel (ml)	Antibody Titer against IBD	Antibody Titer against ND	Antibody Titer against IB	Mortality (%)	Oocysts/gram of litter on day 28 th	Oocysts/gram litter on day 35 th
A	5	2794.5 ^b	2.50	6.0	5 ^b	3163 ^b	3980 ^b
B	10	2003.7 ^b	1.75	5.0	2.5 ^c	2852 ^b	1165 ^c
C	15	4375.0 ^a	2.75	7.5	2.5 ^c	1095 ^c	2057 ^c
D	0	2238.7 ^b	1.50	5.2	10 ^a	7460 ^a	7573 ^a

Means in column with different superscripts were significantly different at $\alpha = 0.05$.

Feed Cost and Gross Return

Mean feed cost and gross return per broiler was not affected by giving aloe extract to broilers in drinking water (Table I). Although, not significant, the relatively higher gross return per broiler in group A and B than in group D revealed the importance of aloe extract given to broilers in drinking water. This could be due to favourable effects of aloe extract avoiding and or coping with stressful environment.

CONCLUSION

Giving aloe extract @ 10 ml/liter to broilers in drinking water resulted in better weight gain and feed efficiency. On the other hand, better antibody titer against IB and IBD and lower coccidia oocysts' count in bedding material of the broilers was found in birds, receiving aloe extract @ 15 ml/liter of drinking water.

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