

Research Article

Comparative efficacy of various medicinal plants suspension on broilers chicks growth performance

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Abstract

The present research study was undertaken to investigate the effect of medicinal plants (*berbery*, *garlic*, *ginger* and *aloe vera*) water based infusion with different schedule of administration on overall production performance of broilers. A total of 240, day old broiler chicks, obtained from the same parent flock were divided in to four groups. Groups were further sub-divided in to sub groups having 10 chicks per replicate and reared in separate pens for 35 days in an open sided house. The schedule designated as the group one receiving infusion on alternate day, group second alternate two days and third group alternate three days. The infusion was provided at the rate of 10 ml/lit to each group according to the schedule. Water based infusion significantly ($p < 0.05$) influenced feed consumption, body weight gain and feed conversion ratio. Significantly higher ($p < 0.05$) feed consumption, higher weight gain, dressing percentage, breast, leg and thigh weight were found in group receiving the infusion on alternate days. Better feed conversion ratio (FCR) was also found in the same group. Weight of spleen, thymus and bursa were also significantly high ($p < 0.05$) in the group received treatment on alternate day. These results indicate that the water based infusion provided at alternate day schedule gave better results compared to other schedules.

Key words: Broilers, feed intake, medicinal plants, production, water-based-infusion.

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Introduction

Plants derivatives are a source of natural additives such as herbs and their extracts can be valuable alternatives as they play a significant role in health and nutrition. They have many fold significant activities such as stimulation of feed intake and endogenous secretions with antimicrobial, coccidiostatic or anthelmintic activities. Plants contain a wide range of secondary metabolites, which belong to classes of isoprene derivatives and flavonoids. These active compounds act as antibodies and antioxidants in feed as well as in a bird's body. Barbery (*Berberis lycium*) roots are used in lipid lowering, antihypertensive, intropic and antiarrhythmic properties which make it useful in the treatment of cardio vascular disease [1, 2]. It is an immunomodulatory, hypolipidemic and improves overall performance of broiler chicks. Barberry's roots are used as folk remedy worldwide for the treatment of various inflammatory ailments including lumbago, rheumatism and to reduce fever. *Berberis lycium*, contains a well-known alkaloid known as *berberine*, which has marked antibacterial effects. Extract of the *berberis lycium* fruit has antihistaminic and anticholinergic activities. Moreover *Berberis vulgaris* also possesses stomachic, astringent, and anti-inflammatory effects [3].

Garlic (*Allium stiuvm*) is used to treat the symptoms of acne (local inflammation of skin) and there is some evidence that it can assist in managing high cholesterol levels, garlic has an international reputation for lowering both blood pressure and blood cholesterol levels and generally improves cardiovascular system [4]. It has antibacterial, antimicrobial [5], immuonomadulatory activities [6]. Epidemiological and animal studies have shown that garlic consumption reduces the incidence of cancer e.g. in the stomach, colon and liver parenchyma. Risk factors for cardiovascular disease, including high cholesterol, high homocysteine, hypertension and inflammation, increase the risk of dementia, including its most common form, Alzheimer's disease, LDL oxidation, arterial plaque formation, and platelet aggregation is controlled by garlic [7]. The garlic extract exhibited a concentration dependent reduction of microbial contamination [8].

Aloe Vera (*Alovera berbedinesis*) is a well-documented medicinal plant in the literature, abundantly found in Asia. Aloe plants have pod like leaves, consist of two parts gel and latex. Aloe gel has important medicinal values compared to latex portion because it is composed of mainly of 99% water, mono and polysaccharide (25% of the dry wt of the gel) [9].

Most prominent monosaccharide in Aloe Vera gel is mannose-6-phosphate and most common polysaccharide, called gluco-mannans (beta 104 acetylated mannan) [9]. Active components of aloe vera plant are acids (glutaminic, aspartic, aloetic, formic, palmitic, estearic and ascorbic), essential oils (cineole, cariofilene and pinene), minerals (calcium, magnesium, potassium, zinc, phosphorus, manganese and aluminium), amino acids (aloin, aloesin, arginine, barbaloin, glycine, glutamine, histidine and serine). Aloe vera gel possesses anti-inflammatory activity [10], heals lesions, created by coccidian parasites on the intestinal Wall and could effectively control Coccidiosis [11]. Aloe vera gel also has excellent antiviral, antiulcer and antidiabetic, and anticancer properties.

Ginger (*Zingiber officinale*) is a herb cultivated in U.S.A, India, China, West Indies and tropical regions of Pakistan. Ginger contain 44 constituents mostly Zingiberine, beta sisquiphellandrence and terinole, and contains various amount of nutrients such as protein, lipids and minerals. Ginger has been used as anti-microbial [12]. Ginger has been used as growth

promoter, immune stimulator, and decrease mortality with better FCR [13].

Keeping in view the effectiveness and significant importance of medicinal plants, the mixture of (Aloe Vera, Ginger, Garlic and Barbary) with different administration schedule was used in broiler production.

Materials and Methods

Experimental design

Total 240 day old Chicks (DOC) were given various treatments. These chicks were alienated into four treatments. Each group was carrying three replicate (20 chicks/replicate). One group received infusion on alternate day basis, second group received infusion at alternate two day while third group received infusion alternate three days. The infusion was given @ of 10 ml/L of water to each group except control. Chicks were reared in an open sided house in pens. All the birds were vaccinated against most common disease according to schedule already in practice. The experimental trial continued for 35 days. The feed offered per day is shown in table 1.

Table 1: Ingredients and composition of basal diet (feed)

Ingredients (% of diet)	Starter	Grower	Finisher
Maize, yellow	35.40	32.90	25.00
Soybean meal (480 g CP/Kg)	27.50	20.50	17.00
Sunflower meal 350 g CP/Kg)	11.00	15.10	11.05
Wheat	9.90	13.05	33.10
Wheat bran	-	3.70	-
Meat-bone meal	6.50	5.55	4.95
Vegetable oil	7.39	8.55	7.35
Limestone	1.35	-	-
Mineral-vitamins premix ¹	0.35	0.31	0.35
Sodium chloride	0.31	0.25	0.25
L-lysine	0.04	-	0.01
DL-Methionine	0.16	0.01	0.17
Calculated chemical composition (% of diet)			
ME (Kcal)	3152.76	3200.53	3200.53
Crude Protein (g)	23.12	21.20	18.98
Calcium (g)	1.00	0.90	0.80
Available phosphorus (g)	0.50	0.47	0.39
Lysine (g)	1.20	1.00	0.85
Methionine (g)	0.56	0.40	0.52
Methionine + cystine (g)	0.93	0.76	0.84
Sodium chloride (g)	0.34	0.29	0.29

Notes: ¹Provides per kg of diet: Mn 80 mg; Zn 60 mg; Fe 60 mg; Iron 5mg; Cu 5 mg; Co 0.2 mg; I 1 mg; Se 0.15 mg; choline chloride 200 mg; vitamin A 12 000 IU; vitamin D3 2 400 IU; vitamin E 50 mg; vitamin K3 4 mg; vitamin B1 3 mg; vitamin B2 6 mg; niacin 25 mg; calcium-d- pantothenate 10 mg; vitamin B6 5 mg; vitamin B12 0.03 mg; d-biotin 0.05 mg; folic acid 1 mg

The infusion prepared from different plants was as follows; in drinking water, *Garlic* was 4 gm/liter, *Barbary* 10 gm/liter, *Aloe Vera* 10 gm/liter and *Ginger* 6 gm/liter.

Measurement Methodology

Body weight gain

Data was recorded for body weight gain on weekly basis. Chicks were weighed at day first and then at the end of each week. Initial weight was subtracted from final weight to obtain weight gain. Total weight gain was calculated at the end of study.

Feed consumption

Commercial ration was used for research study. Feed was offered to each group *ad-libitum* on daily basis, and the refusal was weighed at next morning and subtracted from the daily feed offered to calculate daily feed intake. The total feed intake was calculated at the end of study.

Feed conversion ratio (FCR)

Feed conversion ratio (FCR) was calculated on weekly basis by dividing weekly feed intake on weekly weight gain basis. Total FCR was calculated from the total feed intake divided by weight gain.

$$FCR = \text{Feed Intake} / \text{Weight gain}$$

Dressing percentage

On the termination of the research work, two birds from each replicate were randomly selected on live

weight basis and then slaughtered. Head, feet, and all internal visceral organs including abdominal fat were removed and then the dressed body was weighed. The dressed body weight was expressed in terms of dressing percentage.

$$\text{Dressing percentage} = \text{Dressed Weight} / \text{Live Weight} \times 100$$

Weight of different body organs

Dressed carcasses of the birds were then cut in to different parts (thigh, leg and breast) were weighed individually.

W Weight of giblet

Giblet of slaughtered birds were weighed individually and recorded.

Statistical Analysis

The data was statistically analyzed using standard procedure of analysis of variance (ANOVA) as described by Steel and Torrie [14]. The statistical package SAS. (1988) was used to perform the data analysis [15].

Results and Discussion

The research study was conducted to investigate the effect of different schedule of administration of medicinal plants (*Aloe vera gel*, *Garlic*, *Barbery* and *Ginger*) infusion on overall performance. Mean body weight, feed intake, FCR, dressing percentage, breast, thigh and leg weight are displayed in table 2.

Table 2. Mean (gm±SE) body weight, feed intake, feed conversion ratio, dressing percentage, breast weight, leg weight and thigh weight of broiler chicks dosed with medicinal plants (garlic, ginger, berberine and aloe vera) at different schedules

Parameters	Control	Alternate day	Alternate 2 days	Alternate 3 days
Body weight (gm)	1260.00±22.13 ^c	1539.33±24.11 ^a	1449.1±13.11 ^b	1246.67±12.65 ^c
Feed intake (gm)	2892.00±50.33 ^b	3361.83±65.32 ^a	2925.08±45.37 ^b	2985.00±55.65 ^b
FCR	2.28±0.91 ^b	1.91±0.1 ^c	2.77±0.51 ^{ab}	2.40±0.99 ^a
Dressing percentage (%)	52.61±7.55 ^c	62.31±4.32 ^a	58.74±6.44 ^b	53.19±5.65 ^c
Breast weight (gm)	327.05±13.45 ^c	446.50±20.65 ^a	363.33±15.33 ^b	342.16±17.22 ^{bc}
Leg weight (gm)	64.00±4.22 ^c	83.00±5.32 ^a	73.16±6.44 ^b	64.00±4.33 ^c
Thigh weight (gm)	65.50±3.12 ^c	99.00±4.22 ^a	84.16±5.34 ^b	64.50±5.44 ^c

Notes: Mean in rows with different superscripts are significantly different at (p < 0.05).

Mean body weight gain was significantly (p < 0.05) affected by water based Infusion and significantly (p < 0.05) higher body weight gain was found for broilers in group received infusion on

alternate day. These results are in corroboration of earlier findings of Durrani et al [16] who treated broilers with *Mentha longifoli* and observed significantly higher body weight gain. These results

are also in agreement with the earlier suggested feeding of herbal plants (*Pimpinella anisum* and *Zingiber officinale*) [17], medicinal plant extracts in feeding water to broiler chicks and reported an increase in the body weight gain in broiler chicks [18, 19]. The higher weight gain in group C suggested that broilers given the infusion at the rate of 10 ml/L three days in a week were more potent than other schedules of medicine administration.

Water based infusion of *Aloe vera gel*, *Garlic*, *Barbery* and *Ginger* given to broilers in drinking water significantly ($p < 0.01$) influenced feed intake. Mean feed consumption was significantly ($p < 0.05$) low in control group as earlier reported in earlier studies [20]. Although, some scientists reported contrary findings to the present study with a least feed consumption [21]. In general, lower feed intake was also observed same as reported in previous studies by feeding medicinal plants [18, 19, 22, 23].

Feed conversion ratio (FCR) was significantly ($p < 0.01$) influenced by water based infusion and was best (1.91) in group received water infusion on alternate days. Different medicinal plants have been reported for better FCR [18, 19]. Findings of the present study were more precisely inline to that of Imran and Durrani [24] who reported better FCR for broilers given *Carum copticum* at the rate of 10 g/L of drinking water. Similarly, increased levels of fenugreek in drinking water also increases the FCR [25].

Significantly higher dressing percentage was found in group doses with infusion on alternate days. However, contrarily *B. Lycium* different levels in feed affected the dressing percentage in earlier studies who

reported higher ($p < 0.05$) dressing percentage, using medicinal herbs *curcuma longa* in broiler chicks [22, 26]. However, earlier Milk thistle feeding studies showed similar results to our findings regarding dressing percentage [18].

Mean comparison of breast weight of broilers given water based infusion revealed significant differences. Our observation is contrary to the finding of El-Deek et al [27], who noticed that aniseed feeding to broiler chicks resulted in non-significant difference in mean breast weight than control group, same results were reported by others research studies too [16, 22], using different levels of herbal plants extracts in broiler production. Research studies on *withania somnifera* on breast weight also had no significant effect [19]. Significant ($p < 0.05$) difference was recorded among the treated groups in term of leg and thigh weight. Higher leg weight was observed in the group treated with infusion on alternate day. In earlier studied feeding of *Caram copticum* to the broiler chicks also increased the leg weight, which is an agreement to our results [22]. Chand et al [18] also used different levels of medicinal plants in broiler chicks and found significant improvement in leg weight. However, *withania somnifera* feeding had no effect on leg weight [19]. Contrarily, thigh mean weight difference has not been proven by feeding *Wild mint* [16], aniseed [27], *withania somnif* [19] and milk thistle [18].

Mean liver, heart, gizzard, intestines, abdominal fat, spleen, thymus and bursa weight are presented in table 3.

Table 3. Mean (gm±SE) giblet weight, intestines, abdominal fat and lymphoid organs in broiler chicks dosed with medicinal plants (Garlic, Ginger, Berberine, Aloe Vera) at different schedules

Parameters (gm)	Control	Alternate day	Alternate 2 days	Alternate 3 days
Liver	45.00±5.33	46.66±6.44	50.00±2.98	48.33±4.77
Heart	12.83±3.98	13.83±3.55	14.00±2.77	14.33±1.87
Gizzard	32.66±3.21	32.83±5.32	32.16±6.54	26.83±8.46
Intestines	116.16±11.32 ^b	80.16±9.76 ^d	100.50±6.87 ^c	124.83±9.66 ^a
Abdominal fat	25.83±2.98	26.66±5.34	29.16±2.98	22.16±3.44
Spleen	1.33±0.54 ^b	3.46±0.23 ^a	1.16±0.12 ^b	1.66±0.33 ^b
Thymus	3.18±0.16 ^b	7.13±0.01 ^a	3.8±0.13 ^b	3.95±0.22 ^b
Bursa	3.06±0.13 ^b	7.06±0.11 ^a	3.6±0.23 ^b	2.96±0.11 ^b

Note. Mean in rows, with different superscripts are significantly different at ($p < 0.05$).

Liver weight showed non-significant ($p > 0.05$) difference among the groups. These results are in agreement with that of Durrani et al [16] who reported that liver weight had not influenced in broiler chicks with treating wild mint. Also feeding of *fenu greek*

extracts and other herbal plants had no difference in the mean weight of liver in broilers [18, 19]. Moreover, the milk thistle extract feeding showed impaired liver function in broiler chicks [23]. The gizzard weight data, showed non-significant ($p >$

0.05) difference among the various treatments. Different research work has been reported on the effect of different medicinal plants on gizzard weight. The use of medicinal plants in the broiler chicks' production significantly improves the gizzard weight [18, 19]. Results of the present study are similar to the result of Durrani et al [22], who reported non-significant difference in the mean Gizzard weight by using medicinal herbs *curcuma longa* in broiler chicks.

The heart weight data and mean abdominal fat weight showed non-significant ($p > 0.05$) difference among the treatments. Infusion of different herbal plants had non-significantly ($p > 0.05$) influenced to alter the among the treatments. Infusion of different herbal plants had significant ($p < 0.05$) effect to alter the mean intestinal weight among the various treatments. Significantly ($p < 0.05$) higher intestinal weight was found in group treated with plant infusion on alternate three days as compared with others. However, contrarily Durrani et al [16] used herbal plant extract to broiler chicks and found no difference in the mean intestinal weight at the term of the experiment [28].

Significant ($p < 0.05$) differences were recorded among the group in term of spleen weight. These

findings are contrary to the feeding various levels of *Fenugreek* extract and *Withania somnifera* had no effect on the development of spleen [19]. Mean thymus and bursa weight was significantly ($p < 0.05$) different among the various treatment groups. These results are not in line with the findings of Durrani et al [29], who fed different levels of herbal plant extract and found no significant difference in mean weight of thymus. Milk thistle also had significant effect on the bursa weight gain as earlier reported by Chand et al [18].

Conclusion

In summary, various broiler groups were given different schedule for administration of medicinal plants infusion i.e. aloe vera gel, barbery, garlic and ginger. It was concluded that an increasing trend in feed consumption was observed with the decreased gap between the days of schedule for administration of medicinal plants infusions. Moreover, higher weight gain and FCR were found in a group given with 10 ml of water based infusion on alternate day. The overall performance was better in a group receiving infusion on the alternate days.

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