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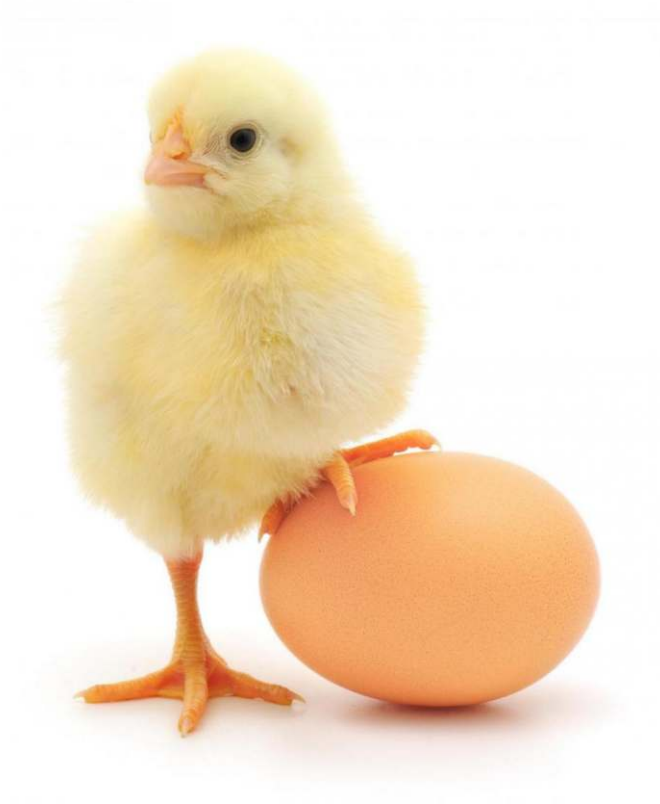

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Berberis vulgaris as Growth Promoter in Broiler Chickens

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Abstract: *Berberis vulgaris* (Zereshk in Persian) is a member of therapeutic plants in herbal medicine. There is evidence that its root contains components, such as berberine, berbamine, culumbamine and berberubine, with a relatively wide spectrum of antimicrobial activity. The aim of the present study was to examine if the plant root has any effect on the growth of broiler chickens. The plant was collected from Shiraz area in sufficient quantity and the roots were dried at room temperature and then ground into powder. One day old broiler chickens were randomly divided into seven groups (twenty chickens each) and were reared under similar conditions. The chickens received either normal diet not containing the root powder or were fed a diet containing one or two percents root powder. Chickens were weighed every five days until the age of fifty. Statistical comparison of average body weights in each group showed that chickens in group two (fed the diet containing 1% root powder from day one) were significantly ($P < 0.05$) heavier than the birds in the control group. It is suggested that the effect of active ingredients of the plant be examined in this respect in the future work.

Key words: *Berberis vulgaris*, chickens, growth promoter

Introduction

Berberis vulgaris is a well known medicinal plant in Iran. The investigations of the chemical composition and immunological properties show that its activity is mainly due to the alkaloid constituents (Amin *et al*., 1969; Petcu and Goina, 1970; Shamsa *et al*., 1999). Berberine is an alkaloid with a long history of medicinal use in Chinese medicine, too (Birdsall and Kelly, 1997). It is present in *Hydrastis canadensis* (goldenseal), *Coptis chinensis* (Coptis or goldenthread), *Berberis aquifolium* (Oregon grape), *Berberis vulgaris* (barberry), and *Berberis aristata* (turmeric tree). The berberine alkaloid can be found in the roots, rhizomes, and stem bark of the plants (Pitea *et al*., 1972; Sturm and Stuppner, 1998). Berberine extracts and decoctions have demonstrated significant antimicrobial activity against a variety of organisms including bacteria, viruses, fungi, protozoans, helminths, and chlamydia (Duta, 1962; Subbaiah and Amin, 1967; Ghosh *et al*., 1985; Iwasa *et al*., 1997; Iwasa *et al*., 1998a; Iwasa *et al*., 1998b; Hong *et al*., 2000). Antibiotics, mainly those that are not used for disease control in animals and/or humans, are added to animal feed to promote their growth. The aim of the present preliminary study was to examine if root of plant *Berberis vulgaris* has any effect on the growth in broiler chickens.

Materials and Methods

Preparing chicken rations: The plant (*Berberis vulgaris*) was collected from Shiraz area in sufficient quantity and the roots were dried at room temperature and then ground into powder. The root powder was added to the proper chicken rations, depending on the age of birds, in various concentrations (one and two percents). The composition and feed analysis of diets are shown in Tables 1 and 2, respectively.

Table 1: Feed constituents of various diets (g kg^{-1})

	Ration		
Composition	Starter[1]	Grower[2]	Finisher[3]
Corn	646	375	360
Soybean	260	255	235
Wheat	-	300	348
Fish powder	70	45	30
Meat powder	6.5	5	5.5
Sodium chloride	-	1.5	1.3
Sea shell	7.5	6	7.5
Dicalcium phosphate	8.5	11	11
Methionine	1	1.25	1.25
Lysine	-	-	0.2
Vitamin E	0.5	0.25	0.25

[1]From the first up to 18th day. [2]From 18th up to 36th day. [3]From 36th to the end of 50th day

Chicken rearing conditions: One day old broiler chickens (Arian breed) were randomly divided into seven groups (twenty chickens each) and were reared under similar conditions. The average weight of chickens at the beginning was 43.2±1.1g. The chickens were vaccinated against Newcastle disease (3 times using ocular, parenteral, and oral routes of administration), and against Gamboro disease (once orally) during the experiment. In addition, due to a minor respiratory infection, antimicrobial therapy (enrofloxacin in drinking water) was performed for all groups during fourth week. Mortality was around 10% in each group.

Birds in the first group received normal diet not containing the root powder. Second, third and fourth

Table 2: Feed analysis (%) of dried root powder and various diets fed to chickens

	Parameter					
Ration	Crude protein	Crude fat	Crude fiber	Dry matter	Calcium	Phosphorous
Dried root powder	7.2 ± 1.1*	2.5 ± 0.9	25.3 ± 3.4	98.1 ± 1.2	0.65 ± 0.23	0.09 ± 0.04
Starter	22.8 ± 1.5	3.8 ± 0.4	3.7 ± 0.5	90.0 ± 2.1	1.0 ± 0.21	0.81 ± 0.27
Grower	24.0 ± 1.4	3.0 ± 0.4	3.6 ± 0.5	88.1 ± 1.8	0.63 ± 0.11	0.57 ± 0.09
Finisher	21.5 ± 1.3	2.8 ± 0.3	3.5 ± 0.4	87.5 ± 2.0	0.21± 0.07	0.45 ± 0.07

*Mean ± S.D. (n=3)

Table 3: Live body weights[1] (g) of chickens in different groups at various time intervals (days)

Age	Group 1[2]	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7
5	71±2	75±2	72±2	73±2	69±1	74±2	73±2
10	131±2	133±2	122±2	127±2	127±2	131±2	142±2
15	218±7	225±6	218±5	215±6	214±5	211±6	238±6
20	341±12	337±8	333±9	349±9	337±8	325±12	365±9
25	541±27	552±21	557±20	570±26	531±21	521±28	569±22
30	752±28	736±22	756±21	739±27	785±29	772±37	839±36
35	992±38	1018±29	1030±28	1007±36	979±40	1000±46	1034±36
40	1318±47	1403±29	1413±49	1334±48	1317±10	1355±59	1355±47
45	1624±37	1781±38	1746±49	1654±49	1642±59	1675±67	1669±58
50	1988±44	2181±45[3]	2141±65	2065±55	2045±53	2074±66	2068±51

[1]Mean ± s.e.m. (n = 17 to 20). [2] Group 1, control; groups 2, 4, and 6, received diets containing 1% root powder; groups 3, 5, and 7, received diets containing 2% root powder (see text). [3]Statistically different compared with the control group (P<0.05).

groups were fed a diet containing 1% root powder starting from first day, 18th day and 36th day, respectively. The other three groups were treated similarly but with the diet containing 2% root powder. It should be mentioned that whole dried root powder has been added to the diets the analytical details of which are shown in Table 2.

Chickens were weighed every five days until the age of 50 and the results are presented as mean ± standard error of mean.

Analysis of data: Non-paired Student t-test and Oneway Analysis of Variance were used to examine the significance of differences ($P \leq 0.05$).

Results

Average body weights of each group of chickens are illustrated in Table 3. The highest and the lowest average weights of chickens at first stage (day 20) belong to groups 7 and 6, respectively. The order for different groups in this respect was: 7, 4, 1, 5, 2, 3, and 6. Groups 7 and 5 had respectively the highest and the lowest average body weights at second stage (day 35); and the order of average body weights for different groups was: 7, 3, 2, 4, 6, 1, and 5. At the time of slaughter (50th day) the average live body weights were about 1990, 2180, 2140, 2065, 2045, 2075, and 2070 grams for groups one to seven, respectively (Table 3). The highest and the lowest average weights of chickens at final stage belong to groups 2 and 1, respectively; and from this point of view, the order for different groups was: 2, 3, 6, 7, 4, 5, and 1.

Discussion

The antihistaminic and anticholinergic properties of aqueous extract of barberry fruit on isolated guinea-pig ileum were demonstrated by Shamsa *et al.* (1999). Furthermore, Ivanovska and Philipov (1996) illustrated the anti-inflammatory properties of major alkaloids berberine and oxyacanthine isolated from *Berberis vulgaris* roots. In addition, it has been illustrated that berberine strongly inhibits *in vitro* the proliferative response of mouse spleen cells to T-dependent mitogens concanavalin A and phytochemagglutinin (Ivanovska *et al.*, 1999). Extracts obtained from the roots of Berberidaceae species have been used in Eastern and Bulgarian folk medicine in rheumatic and other chronic inflammatory disorders (Ivanovska and Philipov, 1996). Currently, the predominant clinical uses of berberine include bacterial diarrhea (Akter *et al.*, 1979; Sack and Froelich, 1982; Sun *et al.*, 1988; Swabb *et al.*, 1981), intestinal parasite infections (Ghosh *et al.*, 1985; Kaneda *et al.*, 1991; Subbaiah and Amin, 1967), and ocular trachoma infections (Babbar *et al.*, 1982; Khosla *et al.*, 1992). The results of the present study also revealed that this plant may be useful as a feed additive to promote growth in the broiler chicken.

Statistical comparison of average body weights between the control group and experiment groups showed no significant difference except for the chickens in group two (fed the diet containing 1% root powder from day one) which were significantly ($P<0.05$) heavier than the control birds on the 50th day. There were no statistical significant differences between groups at other stages ($P<0.05$). However, the pattern of weight gains at various time intervals in different groups generally showed that addition of the plant powder to the starter diet may actually inhibit growth, which might possibly be due to the loss of appetite. This is particularly evident when one realizes the decrease in weight gain of chickens in group 7 after receiving the powder in their feed.

Considering the data in Table 2 and the fact that at most 2% root powder was used, the diets are very close regarding energy and nitrogen contents, so these substitutions may not cause a profound difference on the performance of chickens. However, the reason why the diets containing 2% root powder were not as effective as those containing 1% is due to the possibility that higher concentration of powder may decrease the palatability of the feed.

At the time of slaughter, a difference of 50-200g was observed among the control and experimental groups which seems cost effective. For example, addition of 1% berberis root powder to the diet of broiler chickens will add around 10% to the net profit. Although economical, but it may not be practical to recommend the usage of the plant root as a source of feed additive, particularly in places where there is not enough source of the plant. Therefore, it is suggested to examine the effect of active ingredients of the plant in this respect. In addition, individual follow-up of weight gain, determination of feed conversion factor, and sex of the birds should be considered in the future work.

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