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Research Article

The effects of using Purslane (*Portulaca oleracea L.*) seeds supplementation on performance, some blood parameters and immune response in broiler chicks

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Abstract

The objective of this study was conducted to evaluate the effects of feeding Purslane seeds on performance and some blood parameters of broiler chicks. A total of 350 one day olds chicks were divided into five treatments and five replicates with 14 birds in each in a randomized experimental design. The treatments were divided as basal diet with no Purslane kept as control and 250 g/100 kg (T1), 500 g/100 kg (T2), 1000 g/100 kg (T3) and 2000 g/100 kg (T4) of Purslane seeds. The body weight gains (BWG) and feed intake (FI) and feed conversion ratio (FCR) of chicks were measured. At the end of experimental period, 2 male birds from each replicate (totally 50 birds) were slaughtered for determination of cholesterol profile. At 28 and 30 days of age, blood samples were collected and antibody titres against New Castle Vaccine and SRBC were measured. Data from current study showed that BWG improved significantly in T4 with no effect on FI and FCR. Abdominal fat and heart percentage weight increased significantly in T2 and T4 respectively. Purslane seeds tended to decrease blood cholesterol in T1 and T4. Broilers immune response data showed that supplementing broiler chickens with Purslane seeds increased HI and SRBC none significantly at 28 and 30 days old chicks respectively. In conclusion, we demonstrated that Purslane seeds may be used from 250 to 2000 g/kg to improve the broiler performance and blood biochemistry.

Keywords: Purslane seeds; performance; blood parameters; immune response; broiler chicks

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Introduction

Portulaca oleracea L. (Purslane) is an herbaceous weed widely distributed throughout the world and cultivated in some countries as Iran. The plant has been used as a vegetable and for medical purpose for hundreds of years. Purslane is listed in the World Health Organization (WHO) as one of the most used medicinal plants and it has been given the term 'Global Panacea' (Lim & Quah, 2007). Purslane leaves have been used in foods like soups, salads and pickles and folk medicine to treat several disorders such as hyperlipidemia (Nafisi, 1986), pain and inflammatory disorders (Habibullah et al., 2003) and some other urinary and topical diseases (Minaiyan et al., 2005). The seeds of Purslane are more effective than the herb and are of good use. Many researchers reported that Purslane was the richest vegetable sources of

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omega-3 fatty acids. In addition, similar studies have revealed that Purslane is a rich source of nutrients like flavonoids (kaempferol, quercetin and apigenin), vitamins A, C and E, beta-carotene, and minerals (Lim & Quah, 2007; Dkhil et al., 2011). Zhao et al. (2013) showed that supplementing 0.2% Purslane extract to broiler feed improved weight gain and feed conversion ratio. Compared with chemical drugs, medicinal herbs have shown greater potential as alternatives due to their beneficial effects of antimicrobial actions, as well as their widespread antioxidant activities (Jugl Chizzola et al., 2006). Ghorbani et al. (2014) concluded that Purslane inclusion had a significant effect on cecal microflora composition, but had no effect on immune response in broiler chickens. The objective of this study was to evaluate the effects of Purslane seeds on performance and some haematological parameters in broiler chicks.

Materials and Methods

This study was conducted at the broiler farm belonged to Islamic Azad university Khorasgan branch. A total of 350 one day old chicks with an average weight of 39.50±50 g were divided into five treatments and were further subdivided into five replicates with 14 birds on each in randomized experimental design. Compositions of diet samples were analyzed in the laboratory to assess amount of dry matter, crude protein, calcium, phosphorus and crude fibre with Association of Official Analytical Chemists (AOAC) methods (AOAC, 2000).

Experimental diets and management

The basal diet was balanced on the basis of corn and soybean meal as recommended by National Research council (NRC, 1994). Purslane seeds were bought from local market and they were supplemented into the broilers diet. The treatments were divided as basal diet with no Purslane (control), and the experimental groups, 250 g/100 kg (T1), 500 g/100 kg (T2), 1000 g/100 kg (T3) and 2000 g/100 kg (T4) of Purslane seeds were used. The composition of basal diet is shown in Table 1. Diets and fresh water were provided *ad libitum* during this experiment. The body weight gains and feed consumption of chicks were measured individually; feed conversion efficiency was calculated weekly. At the end of experimental period, 2 male birds form each replicates (total 50 birds) were slaughtered for determination of other parameters. Also dressing percentage was calculated free from giblets and some other organs were weighed separately as percentage of carcass weight.

Evaluation of some blood parameters

Blood collection was carried out at the 4th week (28 and 30 days old) of the experiment. Three birds per treatment were randomly selected and bled via wing veins using sterile 19 needles and syringes. About 5 ml of blood was collected into bottles containing ethylenediaminetetra acetic acid (EDTA). Blood samples for serum biochemical studies were collected into vacuumed capillary tubes in order to determine the blood cholesterol, triglyceride, high-density lipoprotein (HDL) and low-density lipoprotein (LDL) levels. After coagulation, blood samples were centrifuged at 2000 rpm, and then serum was collected and stored at -20°C for later analysis. Blood cholesterol, triglyceride, HDL, and LDL levels were determined spectro-photometrically by using commercial kits (Pars Azmoon Co., Teheran, Iran).

Determination of immune response

To determine of some immune response at 28 day of age, some blood samples were collected and antibody titres against New Castle Vaccine were measured by Haemagglutination inhibition test (HI). Also at 25 day of age, 1 ml of 5% SRBC was injected into brachial vein of 2 chicks per cage and blood samples were taken in non heparinized tubes by puncturing the brachial vein 5 days after each injection. Serum was obtained by centrifuging at 1,500×g for 15 min at 25°C, and stored at -20°C until assayed. Individual serum samples were analyzed for antibody responses against SRBC by hemagglutination (HA) method as described previously (Khatibjoo et al., 2011).

Data analysis

The GLM procedure of SAS software (SAS, 2001) was used for data analysis of variance as completely randomized design. The significant difference among the mean were calculated by Duncan's multiple range (1995) tests.

Results

Table 2 data showed that use of Purslane seeds increased feed intake (g/d) non-significantly in comparison to other groups. Also, body weight gain (g/d) was significantly higher in birds in T4. Feed conversion ratio (g/g) decreased in experimental groups compared to the control ($P \leq 0.05$).

Data from Table 3 showed that abdominal fat increased ($P \leq 0.05$) in chicks fed Purslane seeds especially in group T2. The heart percentage was higher ($P<0.05$) in T4 and lower ($P<0.05$) in T1. Carcass weight was the lowest in T1 and the highest in T4. There were no significant difference ($P \geq 0.05$) between treatments in liver, spleen, bursa of Fabrius and carcass percentage.

The serum biochemical constituents of the birds are shown in Table 4. Purslane seeds tended to decrease ($P<0.05$) the blood cholesterol level in birds in group

Table 1: Composition of the experimental diets for broiler chicks

Ingredients %	1-14 (days old)	14-28 (days old)	28-42 (days old)
Corn grain	55.80	57.30	60.50
Soybean meal	38.50	37.00	34.00
Vegetable oil	1.50	2.00	2.00
Di calcium phosphate	1.90	1.75	1.60
Oyster shells	1.10	0.90	0.85
Methionine D-L	0.31	0.23	0.20
Lysine-L	0.15	0.05	0.05
Edible NaCl	0.25	0.25	0.25
Vitamin Premix*	0.25	0.25	0.25
Mineral Premix*	0.25	0.25	0.25
Calculated nutrient content			
ME(Kcal/Kg)	2.870	2.980	3.000
CP (%)	21.5	20	19
Ca (%)	1.00	0.90	0.82
Available Phosphorus (%)	0.49	0.46	0.41
Lysine (%)	1.34	1.19	1.13
Methionine+Cystine (%)	1.01	0.89	0.80

Supplied per kilogram of feed: 7.500 IU of vitamin A, 2000 IU vitamin D3, 30 mg vitamin E, 1.5 µg vitamin B12, 2 mg B6, 5 mg vitamin K, 5 mg vitamin B2, 1 mg vitamin B1, 40 mg nicotinic acid, 160 µg vitamin Biothine, 12 mg calcium pantothenate, 1 mg folic acid, 20 mg Fe, 71 mg Mn, 100 µg Se, 37 mg Zn, 6 mg Cu, 1.14 mg I,400 µg Cu

Table 2: The effects of Purslane seeds supplementation on broilers performance

Treatments*	FI (g/d)	BW (g/d)	FCR (g/g)
Control	79.38	49.34^{ab}	1.60^{b}
T_1	79.87	47.56^{b}	1.68^{a}
T_2	81.60	$49.6a^{b}$	1.64^{ab}
T_3	81.21	49.71^{ab}	1.63^{ab}
T_4	81.74	50.54^{a}	1.61^{ab}
SEM	1.39	0.780	0.02

FI: Feed intake; BW: body weight; FCR: Feed conversion ratio; Control with no Purslane, 250 g/100 kg (T1), 500g/100 kg (T2), 1000g/100 kg (T3) and 2000g/100 kg (T4) of Purslane. Means within a column with no common letter are significantly different (P<0.05).

T1. No significant differences were found in other parameters between control and treated groups.

Table 5 shows that supplementing broiler chickens with Purslane seeds increased immune response none significantly.

Discussion

In the present study, Purslane supplementation had significant effects on the measured values in growing broiler chicks. The usage of the Purslane seeds had no significant influence on feed intake but it significantly influenced body weight and feed conversion ratio.

Our findings suggest that supplementing diets with Purslane seeds improved overall weight gain and FCR. These results are in disagreement with Ghorbani et al. (2014) who showed that the use of Purslane extract is not beneficial on weight gain and feed effeciency and in agreement with Zhao et al. (2013) who concluded that supplemented broiler diets with 2 and 4 g/kg of Purslane extract significantly improved daily gain. Ghorbani et al. (2013b) showed that broiler FI and BWG were increased with inclusion of 1 and 2% Purslane powder in broilers diet.

The current study revealed that different additive dosages of Purslane seeds in broiler ration would bring different effects on carcass traits. The results of current study showed that use of Purslane in broiler diets increased abdominal fat. These results indicate that a higher dosage of herbal medicine as a feed additive does not always have better effects, which is consistent with the reports of Zhu et al. (2004). Data from this study about bursa of Fabrious weight percentage is in agreement with Ghorbani et al. (2014) who showed that relative weight of bursa was affected with inclusion of Purslane extract in the diet.

In this study, a positive effect of Purslane seeds on some blood parameters of broiler was observed. Rasha and Lamiaa (2011) reported positive effect of Purslane on hyperlipidemia, kidney function and immune response in rats fed high cholesterol diets. Kim et al. (2010) showed reduction in triglyceride and cholesterol levels by dietary Purslane extract in rat. It has been reported that dietary supplementation of Purslane was effective in reducing plasma total cholesterol and triacylglycerol in pigs (Ezekwe et al., 2011). Simopoulos and Salem (1986) reported that Purslane is the richest vegetable sources of omega-3 fatty acids and therefore we expected that presence of omega-3 fatty acids could reduce the triglyceride levels. The ability of Purslane to reduce total cholesterol in spite of added dietary cholesterol indicated its strong hypocholesterolemic potential (Ezekwe et al., 2011; Besong et al., 2011). Purslane was effective in lowering plasma LDL-c and increasing HDL-c in hypercholesterolemic subjects (Movahedian et al., 2007; Besong et al., 2011). The high pectin level in Purslane may be responsible for its hypocholestro-lemic effect (Ezekwe et al., 2011). Similar results were reported by Ghorbani et al. (2013a) in broiler chicks who demonstrated that use of Purslane could dncrease triglyceride and cholesterol in broiler chicks. Many natural products are reported to influence the antioxidant systems and are good cyto protective agents (Dragsted et al., 1997). Scientists reported that inclusion of Purslane in diet has hypolepidemic properties and it can improve antioxidant status of broiler chicken (Ghorbani et al., 2013a). Results of this study are in agreement with Ghorbani et al. (2014) who showed that Purslane had no effect on immune response of broiler chickens. YouGuo et al. (2009) reported that the polysaccharides of Purslane increase T and B lymphocyte proliferation, so the stimulatory effect of

Table 3: The effects of Purslane seeds supplementation on carcass traits

Treatments	Abdominal fat (%)	Liver (%)	Herat (%)	Spleen (%)	Bursa of Fabrius (%)	Carcass (%)
Control	1.16[b]	2.19	0.56[ab]	0.15	0.12	71.03
T_1	1.28[ab]	2.20	0.51[b]	0.14	0.10	69.08
T_2	1.65[a]	2.44	0.61[ab]	0.14	0.12	71.56
T_3	1.39[ab]	2.30	0.57[ab]	0.14	0.10	68.49
T_4	1.60[ab]	2.44	0.63[a]	0.16	0.14	74.21
SEM	0.14	0.11	0.03	0.01	0.01	2.46

Control with no Purslane, 250 g/100 kg (T1), 500g/100 kg (T2) and 1000g/100 kg (T3) and 2000g/100 kg (T4) of Purslane. Means within column with no common letter are significantly different (P<0.05)

Table 4: The effect of Purslane seeds supplementation on some blood parameters (42 days old)

Treatments*	Triglyceride (mg/dl)	Cholesterol (mg/dl)	LDL (mg/dl)	HDL (mg/dl)
Control	157.2	125.8[ab]	130.6	31.48
T_1	125.8	102.2[b]	125.8	37.3
T_2	130.9	127.8[ab]	130.9	38.2
T_3	165.6	145.4[a]	165.6	34.3
T_4	152.3	130.4[b]	152.3	32.1
SEM	15.36	12.83	15.36	4.73

Control with no Purslane, 250 g/100 kg (T1), 500g/100 kg (T2) and 1000g/100 kg (T3) and 2000g/100 kg (T4) of Purslane; Means within column with no common letter are significantly different (P<0.05)

Table 5: The effects of Purslane seeds supplementation on immune response of broiler

Treatments*	HI (28 days old) (log^2)	SRBC (30 days old) (HA)
Control	2.4	7.4
T_1	3.4	9.6
T_2	2.2	9.8
T_3	3.0	8.8
T_4	2.4	9.6
SEM	0.7	0.85

Control with no Purslane, 250 g/100 kg (T1), 500g/100 kg (T2) and 1000g/100 kg (T3) and 2000g/100 kg (T4) of Purslane

Purslane on immune system in our study could be one possible reason.

Conclusion

The use of Purslane seeds in boilers rations during the period from 1 to 42 days may increase weight gain. In the present study a positive effect of Purslane seeds on cholesterol and triglyceride concentration in the blood plasma of broilers was observed. It has also a good effect on immune response of the birds.

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