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THE EFFECTS OF USING PURSLANE EXTRACT IN COMPARISON TO VIRGINIAMYCINE ANTIBIOTIC SUPPLEMENTATION ON PERFORMANCE AND SOME BLOOD PARAMETERS ON FEMALE BROILER CHICKS

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ABSTRACT

The objective of this study was conducted to evaluate the effects of feeding purslane extract on performance and some blood parameters of female broiler chicks. A total of 240 one days old chicks were divided into 3 treatments and were further subdivided into 4 replicates with 20 birds on each in randomized experimental design. The treatments were divided as basal diet with no purslane extract kept as control 20 ppm of purslane extract and 200 gr /ton virginiamycine antibiotic respectively. The body weight gains and feed consumption of chicks were measured individually, feed conversion efficiency were calculated weekly. At the end of experimental period, 4 female birds from each replicates (totally 48 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. Also for hematological determination (cholesterol, triglyceride, high-density lipoprotein (HDL) and low-density lipoprotein (LDL) levels) blood sample were taken and were referred to laboratory. To determine of some immune response at 28 and 30 days of age some blood samples were collected and antibody titers against New Castle Vaccine and SRBC were measured. Data from current study showed that use of Purslane extract FI, BW and FCR compared to control. As result showed that abdominal fat was increased ($p \leq 0.05$) were chicks fed by Purslane extract. Also the heart percentage was higher than control. Carcass weight was at the lowest on T1 and at the highest on T4. There were no significant differences between treatments about liver, spleen, bursa fabrius and carcass percentage. Purslane extract tended to decrease the blood Triglyceride level of the birds also reducing the cholesterol level only in T1 and T2. Data showed that HDL and LDL tended to increase in experimental groups. Broilers immune response data showed that supplementing broiler chickens with Purslane extract increased HI and SRBC none significantly at 28 and 30 days old chicks respectively. In conclusion we could demonstrate that purslane extract may be used as ingredient in chicks ration up to 20ppm without harming effects on performance of broiler chicks.

Keywords: *Purslane Extract, Virginiamycine, Performance, Blood Parameters, Broiler Chicks*

INTRODUCTION

Antibiotic growth promoters were supposed to increase growth rate as a result of improved gut health, resulting in better nutrients utilization and improved feed conversion (Demir *et al.*, 2003). Virginiamycine is a streptogramin antibiotic similar to pristinamycine and quinupristin/dalfopristin. It is a combination of virginiamycine M₁ and virginiamycine S₁. It was used in the fuel ethanol industry to prevent microbial contamination. It was also used in agriculture, specifically in livestock, to accelerate the growth of the animals and to prevent and treat. Virginiamycine was also used in agriculture, specifically in livestock, to accelerate the growth of the animals and to prevent and treat infections (Teymourizadeh *et al.*, 2009). Nowadays, the non prescription use of antibiotics in poultry feeds has been eliminated or severely limited in many countries because of the potential risks associated with their use and development of resistant strains of bacteria, mainly in humans. A complete ban on antibiotics in poultry feeds was brought into force on January 1st by European Union; thus, all of the antibiotics used at sub-

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therapeutic doses for growth promotion were withdrawn (Nollet, 2005). Herbal feed additives are plant derived products that used in animal feeding to improve performance of animals through amelioration of feed properties, promotion of production performance, and improving the quality of their food (Gill, 1999; Windich *et al.*, 2008). *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 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 extract of purslane are more effective than the herb and are of good use. Many researchers reported that purslane was the richest vegetable sources of 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 *et al.*, 2006). The objective of this study was conducted to evaluate the effects of Purslane extract 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 Shahrekord branch. A total of 240 one days old chicks with an average weight of 38.40 ± 50 g were divided into 3 treatments and were further subdivided into 4 replicates with 20 birds on each in randomized experimental design. Compositions of diet samples were analyzed in the lab for determine amount of dry matter, crude protein, calcium, phosphorus and crude fiber with Association of Official Analytical Chemists (AOAC, 2000) methods.

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
Canola oil	1.50	2.00	2.00
DCP	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
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/Kgr)	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, 2000IU vitamin D3, 30 Mg vitamin E, 1.5 µg vitamin B12, 2Mg B6, 5 Mg Vitamin K, 5 Mg vitamin B2, 1 Mg vitamin B1, 40 Mg nicotinic acide, 160µg vitamin Biothine, 12 Mg Calcium pantothenate, 1MgFolic acid 20 Mg Fe, 71 Mg Mn, 100µg Se, 37Mg Zn, 6 Mg Cu, 1.14 Mg I, 400 µg Cu.

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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 extract had bought from local market and they were supplemented into the broilers diet. The treatments were divided as basal diet with no purslane kept as control, 20 ppm of purslane extract and virginiamycine were used, respectively. The compositions of basal diet are shown in Table 1. Diets and fresh water were provided adlibitum during this experiment. The body weight gains and feed consumption of chicks were measured individually, feed conversion efficiency were calculated weekly. At the end of experimental period, 4 female birds from each replicates (totally 48 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 spectrophotometrically by using commercial kits (Pars Azmoon Co., Teheran, Iran).

Determination of Some Immune Response

To determine of some immune response at 28 days of age some blood samples were collected and antibody titers against New Castle Vaccine were measured by Haemagglutination inhibition test (HI). Also at 25 days 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 $1,500 \times g$ 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 AND DISCUSSION

Result

Changes of Growth Performance

Table 2 data showed that use of Purslane extract and virginiamycine increased feed intake (g/d) none significantly in comparison to other groups. Also, body weight gain (g/d) were higher significantly were birds feed by fed by Purslane extract and virginiamycine antibiotic. Feed conversion ratio (g/g) was decreased in experimental groups compared to the control ($p \leq 0.05$). Although the feed efficiency ratio (g/g) was higher for purslane and virginiamycine groups, but also here was no significant effect for feed efficiency ratio between treatments in this study.

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

Treatments*	FI(g/d)	BW(g/d)	FCR(g/g)	FER(g/g)
Control	76.29 ^c	48.14 ^c	1.58 ^a	0.63
Purslane	78.94 ^b	51.20 ^b	1.54 ^{ab}	0.66
Virginiamycine	80.20 ^a	52.11 ^a	1.52 ^b	0.65
P value	0.020	0.001	0.021	0.010

*Feed intake (FI), body weight (BW), feed coefficient (FCR), feed efficiency (FER)

**Means within row with no common on letter are significantly different ($p < 0.05$).

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Changes of Carcass Traits

Data from Table 3 showed that abdominal fat was increased ($p \leq 0.05$) were chicks fed by Purslane extract. Also the heart percentage was higher compared to control. Carcass weight was at the lowest on control and at the highest on purslane group. There were no significant differences ($p \geq 0.05$) between treatments about liver, heart and spleen percentage.

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

Treatments*	Abdominal fat (%)	Liver (%)	Heart (%)	Spleen (%)	Bursa Fabricius (%)	Carcass (%)
Control	1.99 ^a	2.00	0.56	0.15	0.11 ^b	69.24 ^c
Purslane	1.78 ^b	2.20	0.61	0.14	0.16 ^c	72.77 ^a
Virginiamycine	1.40 ^c	2.21	0.57	0.14	0.18 ^a	71.20 ^b
P value	0.10	0.001	0.120	0.11	0.030	0.041

**Means within row with no common on letter are significantly different ($p < 0.05$).

Changes of Some Blood Chemical Levels in Broilers Serum

The serum biochemical constituents of the birds are shown in table 4. purslane extract tended to decrease the blood cholesterol level of the birds. As result relevant from table 4, There were significant differences ($p < 0.05$) for cholesterol level between treatments. Data showed that LDL was at the highest on control and at lowest on virginiamycine group. Data from this study indicated that HDL was increased by feeding purslane extract and virginiamycine antibiotic.

Table 4: The effect of tomato pulp powder supplementation on some blood parameters (42 days old)

Treatments*	Triglyceride (Mg/dl)	Cholesterol (Mg/dl)	LDL (Mg/dl)	HDL (Mg/dl)
Control	129.7 ^a	119.4 ^b	122.2 ^a	38.1 ^b
Purslane	126.1 ^a	111.5 ^a	120.8 ^a	40.2 ^a
Virginiamycine	122.1 ^b	110.4 ^a	119.0 ^b	41.4 ^a
P value	0.030	0.016	0.021	0.014

**Means within row with no common on letter are significantly different ($p < 0.05$).

Immune Response

Table 5 shows that supplementing broiler chickens with Purslane extract and virginiamycine increased HI and SRBC significantly ($p < 0.05$).

Table 5: The effects of Purslane extract supplementation on immune response

Treatments*	HI (28 days old) (\log^2)	SRBC(30 days old) (HA)
Control	2.5 ^c	7.6 ^c
Purslane	2.9 ^b	8.9 ^b
Virginiamycine	3.4 ^a	9.7 ^a
P value	0.014	0.021

**Means within row with no common on letter are significantly different ($p < 0.05$).

Discussion

In the present study, Purslane and virginiamycine supplementation had significant effects on the measured values in growing broiler chicks.

The usage of the purslane extract was significant influences on FI, BW and FCR but it was significant influences on FER.

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Our findings suggest that supplementing diets with Purslane extract and virginiamycine improved overall weight gain and FCR. These results are in disagreement with Ghorbani *et al.*, (2014) who showed that the usage of Purslane extract couldn't be beneficial on weight gain and FCR and in agreement with Zhao *et al.*, (2013) who showed that supplemented broiler diets with 2 and 4 g kg⁻¹ of Purslane extract and showed significant improvement in daily gain of broilers at both dosages. Improvement in broiler performance in grower period when feeding Purslane has been reported by other scientists. Ghorbani *et al.*, (2013b) showed that broiler FI and BWG were increased with inclusion of 1% and 2% Purslane powder in broilers diet in grower and overall periods.

The current study revealed that additive dosages of purslane extract and virginiamycine in broiler ration would bring different effects on carcass traits. The results of current study showed that by using purslane additive in broiler diets abdominal fat percentage was at the highest. 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 fabrius 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 effects of purslane extract and virginiamycine on some blood parameters concentration in the blood plasma of broiler was observed. Rasha and Lamiaa (2011) had reported the efficiency of purslane on hyperlipidemia, kidney function and as immunomodulators in rats fed high cholesterol diets. Kim *et al.*, (2010) has been shown the 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 reduced 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 hypocholesterolemic effect (Ezekwe *et al.*, 2011). Similar results were reported by (Ghorbani *et al.*, 2013) in broiler chicks who demonstrated that use of Purslane could increase triglyceride and cholesterol on broiler chicks. Zhao *et al.*, (2013) investigated the effects of Purslane extracts on growth performance and microbial populations in the ceca of broilers. Simopoulos *et al.*, (2005) reported that purslane is an excellent source of melatonin.

Melatonin has a variety of important functions including direct free radical scavenging and indirect antioxidative actions via its stimulation of antioxidant enzymes via its stimulation of antioxidant enzymes (Rodriguez *et al.*, 2004). Many natural products are reported to influence the antioxidant systems and are good cyto protective agents (Dragsted *et al.*, 1997). Faghani *et al.*, (2014) showed that the use of virginiamycine on broilers diet could increase feed intake and body weight gain and decreased the level of cholesterol and triglyceride in their serum.

Ghaedi *et al.*, (2014) showed that serum cholesterol profile and antibody titer against (NDV) improved in groups that they used herbal and virginiamycine (P<0.05).

Ahamdi (2011) suggested that virginiamycine controls microbial growth by acting on the mircoflora's biochemical processes such as protein synthesis or inhibiting the elongation of Methono bacterium and E. coli , or by reducing lactic acid producing bacteria in the stomach. Hanan *et al.*, (2014) demonstrated that the purslane extracts (ethanolic and aqueous) may exert antioxidant activities and protect the tissues from lipid peroxidation.

Scientists reported that inclusion of Purslane in diet has hypolepidemic properties and it can improve antioxidant status of broiler chicken (Ghorbani *et al.*, 2013a). Ghorbani *et al.*, (2014) showed that there were no significant differences in primary and secondary antibody titer against SRBC. Results of this study are in agreement with (Ghorbani *et al.*, 2014) that showed that Purslane had no effect on immune response of broiler chickens.

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Conclusion

The usage of purslane extract and virginiamycine antibiotic on boilers rations from 1 to 42 days may increase weight gain and lead to better feed conversion. In this study a positive effect of purslane extract on cholesterol and triglyceride concentration in the blood plasma of broilers was observed. Purslane extract may be used as ingredient in chicks ration up to level of 20 ppm without harming weight gain and feed conversion ratio of birds. However further studies are needed for more explanations.

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