The effect of utilization of parsley (*Petroselinum crispum*) in local Iraqi geese diets on blood biochemistry

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Abstract: This experiment was conducted to study the effect of feeding diets containing different levels of parsley on blood biochemical characteristics of local Iraqi geese. A total of twenty four local geese, one year old were used in this experiment during the period from beginning of October to the end of December. The birds were allocated for four treatment groups consisted of six geese each. Treatment groups were as following: Control diet (T1) (free from parsley), T2: Control diet + 80 g / d parsley, T3: Control diet + 160 g / d parsley; T4: Control diet + 240 g / d parsley. At the end of experiment blood samples were obtained from all geese by venipuncture from brachial vein and blood plasma samples were prepared. Blood biochemical traits included in this study were blood plasma concentrations of glucose, total protein, albumen, globulin, uric acid, total cholesterol, triglycerides, high density lipoprotein (HDL), low density lipoprotein (LDL), very low density lipoprotein (VLDL), calcium, phosphorus and creatinine and blood plasma activities of aspartate aminotransferase (AST), alanine aminotransferase (ALT) and alkaline phosphatase (ALP) enzymes. Results revealed that supplementing the diet of geese with different levels of parsley (T2, T3 and T4) resulted in significant ($p< 0.05$) increase in blood plasma glucose, total protein, albumen, globulin, HDL, calcium, phosphorus and ALP and significant ($p< 0.05$) decrease in uric acid, total cholesterol, triglycerides, LDL, VLDL and creatinine in comparison to control group (T1). Whereas, there were no significant ($p> 0.05$) differences between all experimental groups with respect to blood plasma AST and ALT. However, T3 group (160 g parsley / day) and T4 group (240 g parsley / day) recorded the best results concerning the most of blood biochemical traits included in this study as compared with T1 (control group) and T2 (80 g parsley / day). In conclusion supplementing the ration of geese with parsley resulted in significant improvement in most of blood plasma traits involved in this study. So, parsley can be used as an effective feed additive for enhancing general physiological status of birds.

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1. Introduction

Animal health depends on many factors and recently it has been appreciated that diet plays a pivotal role in health maintenance and prevention of many diseases (Finkel et al., 2000). Feed additives are important materials that can improve the efficiency of feed utilization and animal performance. However, the use of chemical products especially those of antibiotics and hormones may cause unfavourable effects. Many attempts in the field of animal nutrition are being done to achieve an increase in animal production and thereby profit (Abdou, 2001). Old drugs industry depends upon the raw material of medicinal herbs and plants and their extracts, which always proved safe. Inversely, many synthesized chemicals caused many hazards to animals, plants and human. The world health organization encourages using medicinal herbs and plants to substitute or minimize the use of chemicals through the global trend to go back to nature (Allam et al., 1999). Leafy vegetables play crucial roles in alleviating hunger and food security and that is why they are very important in the diet of many people. They are valuable sources of nutrients where they contribute substantially to proteins, minerals, vitamins, fibres, and other nutrients which are usually in short supply in daily diets (Solanke and Awonorin, 2002). In addition to their high concentration of micronutrients, vegetables provide little dietary energy, making them valuable in energy limited diets. The fibre content has been reported to have beneficial effects on blood cholesterol and aids in the prevention of large bowel diseases, while in diabetic subjects, they improve glucose tolerance (Ashaye, 2010). Parsley (*Petroselinum crispum*) is an important culinary herb native to the Miditerranean area. Parsley is a member of the Umbelliferae family that has been employed in the food, pharmaceutical, perfume, and cosmetic industries. However, parsley has small and dark seeds with a volatile oil content of the fruits of glycoside called apiin (Lopez et al., 1999). Parsley has been reported to have a number of possible medicinal attributes including, antimicrobial (Wong and Kitts, 2006), antianemic, menorrhagic (Baytop, 1984), anticoagulant, antihyperlipidemic, antihepatotoxic (Ozturk et al., 1991), antioxidant (Nielsen et al., 1999) and laxative (Kerydiyyeh et al., 2001). It has been used to treat lumbago, as a blood pressure regulator, to

treat eczema, knee, ache, impotence and nose bleed (Manderfeld et al., 1997). Parsley seeds are also used as a diuretic and the hypoglycaemic activity of parsley has been shown by Ozsoy et al. (Ozsy-Sacan et al., 2006). The constituents of parsley which include ascorbic acid, carotenoids, flavonoids, coumarins, apiole, various terpenoic compounds, phenyl propanoids, phathalides, furano coumarins, and tocopherol, have been chemically investigated (Tunali et al., 1999). Components of freshly parsley scavenge superoxide anion in vitro (Campanella et al., 2003), and the methanol extracts of parsley scavenge hydroxyl radical in addition to protecting against ascorbic acid induced membrane oxidation (Fejes et al., 2000). Supplementation of the diets with fresh parsley leaf can significantly increase antioxidant capacity (Hempel et al., 1999). Ragab et al. (2005) have demonstrated that it is possible to replace 16% of yellow corn with aromatic plants (parsley, mint etc.) in quail diets. The present study was conducted to determine the effect of dietary supplementation with parsley on certain blood plasma traits of local Iraqi geese.

2. Material and Methods

A total of twenty four local geese, one year old were used in this study. The birds included in this study were housed on four separated floor pens under artificial lighting program of 12 L: 12 D from the period from beginning of October to the end of December. For three months of experiments all geese were fed 200 g / d, a commercial ration for geese breeding which containing 2919 Kcal metabolisable energy and 17% crude protein (Table 1). Parsley was offered to geese in the form of fresh leaves. Fresh parsley leaves were cut into pieces and put on separated trays inside the pens of geese. The birds were separated into four treatment groups consisted of six geese each. Treatments were as following:

Control diet (free from parsley; T1)
T2: Control diet + 80 g / d parsley
T3: Control diet + 160 g / d parsley
T4: Control diet + 240 g / d parsley

At the end of end of experiment blood samples were obtained from all geese by venipuncture from the brachial vein, using disposable needles (25 G) and plastic syringe, and was carefully transferred to collecting tubes containing potassium EDTA (1.5 g / ml). Plasma and cells were separated as soon as possible by centrifuging at 3000 g for 5 minutes and plasma was stored at – 20ºC until processing. All biochemical parameters were assayed with the commercial kits SPINREACT (Bio Analiticia S. L., Madrid). Blood biochemical traits included in this study were concentrations of glucose, total protein, albumin, globulin, uric acid, total cholesterol, triglycerides, high density lipoprotein (HDL), low density lipoprotein (LDL), very low density lipoprotein (VLDL), calcium, phosphorus and creatinine and activities of aspartate aminotransferase (AST), alanine aminotransferase (ALT) and alkaline phosphatase (ALP). These blood plasma traits were evaluated according the procedures reported by Al-Daraji et al. (2008). The data was assessed by analysis of variance using the General Linear Model method (SAS, 2000). Test of significance for the difference between different treatments was done by Duncan multiple range test (Duncan, 1955).

3. Results

Results revealed that treat local Iraqi geese with different levels of parsley (T2, T3 and T4) resulted in significant ($p < 0.05$) increase as regards concentrations of blood plasma glucose, total protein, albumen and globulin and significant ($p < 0.05$) decrease respecting concentration of blood plasma uric acid in comparison with control group (T1). However, T4 surpasses other treatment groups (T1, T2 and T3) concerning blood plasma total protein, while there were no significant differences between T3 and T4 with relation to blood plasma glucose, albumen and globulin. Moreover, T3 and T4 recorded the lowest values of blood plasma uric acid as compared with other two treatments (T1 and T2) (Table 2). Results from Table 2 also denoted that there were no significant differences ($p > 0.05$) between treatment groups respecting blood plasma activities of AST and ALT enzymes, whereas dietary parsley supplementation (T2, T3 and T4) resulted in significant ($p < 0.05$) increase as concerns blood plasma activity of ALP in comparison with control group (T1). However, there was no significant difference between T3 and T4 with respect to this trait.

As shown from Table 3 feeding Iraqi local geese with diets containing different levels of parsley (T2, T3 and T4) resulted in significant ($p < 0.05$) decrease in relation to blood plasma total cholesterol, triglycerides, LDL, VLDL and creatinine. However, T3 and T4 recorded the lowest means of these traits in comparison with T1 and T2. Resulted from Table 3 also illustrate that the supplementation of Iraqi local geese ration with different levels of parsley (T2, T3 and T4) resulted in significant ($p < 0.05$) increase in regard to blood plasma HDL, calcium and phosphorus as compared with control group (T1). Furthermore, there were no significant differences between T3 and T4 as concerns these traits.

Table 1. Ingredients and chemical composition of the diet fed to geese

Ingredients	Percentage composition (%)
Wheat	34.5
Yellow corn	38
Soybean meal (44%)	13
Protein concentrate*	5
Oil	2
Limestone	6
Dicalcium phosphate	1
Vitamins + minerals**	0.2
Sodium chloride	0.3
Calculated content***	
Crude protein (%)	15.78
Metabolisable energy (Kcal / Kg)	2919
Total calcium	2.7
Available phosphorus	0.41
Methionine	0.38
Lysine	0.73
Cystine	0.24

* Wafi protein concentrate provided per kg: : 2150 ME / kg; 40% crude protein; 5% crude fat; 2% crude fiber; 5.6% calcium; 2.6% available phosphorus; 3.85% lysine; 1.25 methionine; 4.10% methionine + cystine; 220000 IU Vit. A; 60 mg Vit. B1; 700 mg Vit. B12; 50 mg Vit. K3; 200 mg copper; 1600 mg manganese; 5 mg selenium; 600 mg vit E; 2 mg biotin; 20 mg folic acid; 800 mg niacin; 320 mg pantothenic acid; 20 mg iodine; 60000IU Vit. D3; 1000 mg iron; 10 mg cobalt; 1200 mg zinc; 7 mg vit B6.

** Vitamins and minerals mixture provided per kg: 8,000,000 I.U. Vit. A; 1,500,000 I.U. Vit. D3; 1000 I. U. Vit E; 2000 mg Vit. K3; 500 mg Vit. B1; 500 MG Vit. B2; 200 mg Vit. B6; 8 mg Vit. B12; 4000 mg Ca Pantothenate; 6000 mg Nicotinmide; 50 mg Folic acid; 0.40 gm Mn sulphate; 0.15 gm Zinc sulphate; 0.50 gm Iron sulphate; 0.04 gm Copper sulphate; 0.01 gm cobalt chloride.

*** Calculated composition was according to NRC (22).

4. Discussions

In general, adding fresh parsley leaves to the diet of geese resulted in significant improvement with respect to most haematological traits involved in this study. This improvement in haematological traits as a result of treatment the geese with parsley may be explained by that parsley is a good source of iron, needs for making RBC and enhance metabolism of nutrients, vitamin C, useful for enhance general health status and fight infections and beta carotene, which is converted to vitamin A which maintain cell membrane status of all tissues (Ragab et al., 2010). Duke et al. (2009) reported that parsley build up the blood because it is high in iron and it's high level of vitamin C content assist the absorption of iron. Parsley is an excellent digestion restorative remedy. It improves the digestion of proteins and fats therefore promoting intestinal absorption, liver assimilation and storage. Because of its high enzyme content, parsley benefits digestive activity and elimination (Bahnas et al., 2009). Osman et al. (2004) indicated that the high vitamin C, beta carotene, B12, chlorophyll and essential fatty acid content render parsley an extraordinary immunity enhancing food. Parsley is an immune – enhancing multi – vitamin and mineral complex in green plant form and one of the most important herbs for providing vitamins to the body (Hassan et al., 2004). However, it was known that parsley alleviate stress by its role in enhancing general health status and immunity (Richmond and Mackley, 2000). Hassan et al. (2006) found that treatment the mice with Zearalenone (non – steroidal esterogenic mycotoxin present in corn) induces sever stress on the testis and on the endocrine function including the testis itself and indirectly on the pituitary gland. However, these authors found that treatment these mice with parsley resulted in significant improvement in all the tested parameters. Zheng et al. (Zheng et al., 1992) reported that parsley is rich in myristicin which showed a high activity as an inducer of the detoxifying enzyme glutathione S – transferase (GST) in the liver and small intestine mucosa of mice. Fejes et al. (1998) indicated that parsley contain flavonoids (apiin, luteolin -, pigenin - glycosides), essential oil (apiol, miriszticin), cumarines (bergapten and imperatorin) and vitamin C. The protective role of parsley may be attributed to its higher content of these flavonoids which either scavenge free radicals or increase the production of GST. Ozsoy-Sacan et al. (2006) concluded that, parsley extract probably, due its antioxidant property, has protective effects against hepatotoxicity caused by diabetes and have free radical scavenging and membrane protective effects (Fejes et al. 2000). In the same regards, Nielsen et al. (1999) reported that treatment human with parsley oil resulted in increased levels of glutathione reductase and superoxide dismutase (SOD) and total antioxidant activity. Chlorocompound in parsley often show significant biological activities, e.g. antibiotic, antitumour, antiviral, antibacterial, anti-inflammatory, antihepatotoxic, pesticidal, antioxidant activities and dissolves cholesterol within the veins which all reflected in enhancing the general health condition of body (Holst and Engvild, 2000; Kery et al., 2001; Al-Howiriny et al., 2003]. Parsley helps bladder, kidney, liver, lung, stomach, and thyroid function; it helps clear uric acid from the urinary tract, contains a

substance that prevents the multiplication of tumor cells, expels worms, relieves gas and stimulates normal activity of the digestive system. It used to treat urinary tract infections, helps dissolve and expel gall stones and gravel, it used to prevent kidney stone formation, acts as diuretic, increase urine volume, and it used to treat digestive weakness and bronchial and lung congestion. It may also be used to treat edema and high blood pressure and cholesterol (Tipu et al., 2006). Abbas (2010) found that dietary parsley resulted in significant improvement in live body weight, feed efficiency and feed intake in broiler chickens. Tahan and Bayram (2011) reported that use of dry parsley and black cumin as together in the layer quail ration as feed additives have a synergetic effect on blood weight gain, egg production and hatchability. Their usage in combination could be profitable to improvement of performance of laying quail as the natural way.

Table 2. Effect of feeding diets containing parsley on certain blood plasma traits (Mean ± SE) of local Iraqi geese

Traits	Treatments			
	T1	T2	T3	T4
Glucose (mg / dl)	c 210.7 ± 11.3	b 215.1 ± 10.5	a 248.6 ± 17.0	a 263.7 ± 13.9
Total protein (g / dl)	d 3.21 ± 0.1	c 3.97 ± 0.2	b 5.67 ± 0.8	a 6.11 ± 0.3
Albumin (mg / dl)	c 2.10 ± 0.1	b 2.62 ± 0.3	a 3.11 ± 0.2	a 3.17 ± 0.4
Globulin (mg / dl)	c 1.11 ± 0.6	b 1.35 ± 0.5	a 2.56 ± 0.1	a 2.94 ± 0.4
Uric acid (mg / dl)	a 12.3 ± 1.2	b 11.1 ± 0.9	c 8.07 ± 1.3	c 7.99 ± 1.55
AST (U / L)	a 215.2 ± 15.3	a 211.7 ± 12.8	a 210.8 ± 10.9	a 212.3 ± 14.0
ALT (U / L)	a 8.2 ± 0.9	a 8.7 ± 1.1	a 8.4 ± 0.5	a 8.1 ± 0.8
ALP (U / L)	c 2135.7 ± 55.8	b 2296.8 ± 43.6	a 2405.2 ± 72.3	a 2425.6 ± 81.9

T1: Control group; T2, T3 and T4: Diets supplemented with 80, 160 and 240 g / day of parsley.
[a-d] Values within rows followed by different letters differ significantly ($p < 0.05$).

Table 3. Effect of feeding diets containing parsley on some blood biochemical characteristics (Mean ± SE) of local Iraqi geese

Traits	Treatments			
	T1	T2	T3	T4
Total cholesterol (mg / dl)	a 183.5 ± 6.9	b 170.2 ± 8.2	c 156.7 ± 5.9	c 158.9 ± 6.2
Triglycerides (g / dl)	a 172.2 ± 9.8	b 151.3 ± 11.9	c 130.5 ± 7.8	c 125.2 ± 14.9
HDL (mg / dl)	c 65.9 ± 7.3	b 74.2 ± 8.6	a 99.9 ± 5.9	a 100.1 ± 10.4
LDL (mg / dl)	a 83.16 ± 3.6	b 65.74 ± 2.7	c 30.7 ± 4.8	c 32.76 ± 5.1
VLDL (mg / dl)	a 34.44 ± 2.9	b 30.26 ± 1.6	c 26.1 ± 2.1	c 25.04 ± 2.5
Calcium (mg / dl)	c 6.18 ± 0.9	b 7.23 ± 0.8	a 9.01 ± 0.9	a 9.15 ± 0.4
Phosphorus (mg / dl)	c 4.1 ± 0.2	b 5.2 ± 0.1	a 7.3 ± 0.3	a 7.4 ± 0.1
Creatinine (mg / dl)	a 0.95 ± 0.01	b 0.83 ± 0.05	c 0.64 ± 0.03	c 0.63 ± 0.02

T1: Control group; T2, T3 and T4: Diets supplemented with 80, 160 and 240 g / day of parsley.
[a-c] Values within rows followed by different letters differ significantly ($p < 0.05$).

Conclusion

In conclusion it was found that supplementing the diet of geese with different levels of fresh parsley leaves (80, 160 or 240 g / d) resulted in significant improvement in most blood biochemical traits included in this study. Therefore, parsley could be used as an efficient feed additive for enhancement general physiological status of birds. **Corresponding Author:**

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