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The Influence of Parsley (*Petroselinum crispum*) as Feed Additive on Hematological Traits of Local Iraqi Geese

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ABSTRACT

This study was conducted to investigate the effect of feeding diets containing different levels of parsley on hematological traits of local Iraqi geese. A total of twenty four local geese, one year old, were used in this experiment. The birds were allocated for four treatment groups consisted of six geese each. Treatment groups were: Control diet (C) (free from parsley), T1: Control diet + 80 g/d parsley, T2: Control diet + 160 g/d parsley; T3: Control diet + 240 g/d parsley. At the end of experiment, blood samples were obtained from all geese from brachial vein by venipuncture. Hematological traits included in this study were red blood cells count (RBC), hemoglobin concentration (Hb), packed cell volume (PCV), mean cell volume (MCV), mean corpuscular hemoglobin (MCH), mean corpuscular hemoglobin concentration (MCHC), thrombocytes count, white blood cells count (WBC) and percentages of heterophils, lymphocytes, monocytes, basophils and eosinophils and heterophils/lymphocytes (H/L) ratio. Results revealed that supplementing the diet of geese with different levels of parsley (T1, T2 and T3) resulted in significant ($P < 0.05$) increase in Hb, PCV, MCV, MCH, MCHC, thrombocytes, WBC and lymphocytes and significant ($P < 0.05$) decrease in H / L ratio and eosinophils in comparison to C group. Whereas, there were no significant ($P > 0.05$) differences among all experimental groups as regards heterophils, monocytes and basophils. However, T3 group surpass other treatment groups (C, T1 and T2) concerning RBC count, while there were no significant differences among C, T1, T2 groups with respect to RBC count. In conclusion, supplementing the ration of geese with parsley resulted in significant improvement in most of blood traits involved in this study.

Keywords: Parsley, Hematological Traits, Geese

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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 and Holbrooke, 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 Awonrin, 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 Mediterranean area. Parsley is a member of the Umbelliferae family that has been employed in the food, pharmaceutical, perfume, and cosmetic industries (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 (Kreydiyyeh *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.* (2006). The constituents of parsley which include ascorbic acid, carotenoids, flavonoids, coumarins, apiole, various terpenoid compounds, phenyl propanoids, phthalides, 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).

The present study was conducted to determine the effect of dietary parsley supplementation on certain haematological characteristics of local Iraqi geese.

MATERIALS AND METHODS

A total of twenty four local geese, one year old, were used in this study. The birds were housed on four separate floor pens under artificial lighting program of 12L:12D. 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; C)

T1: Control diet + 80 g/d parsley

T2: Control diet + 160 g/d parsley

T3: Control diet + 240 g/d parsley

At the end of end of experiment, blood samples were obtained from each geese by venipuncture from the brachial vein, using disposable needles (25 G) fitted with plastic syringe, and was carefully transferred to collecting tubes containing potassium EDTA (1.5 g/ml). The blood collection tubes were kept cool on ice and transported to the laboratory where cell counting and haematological analyses were performed. In the laboratory, aliquots were diluted 200 times for red blood cell (RBC) and white blood cell (WBC) counts in haematological pipette with Natt-Herrick solution (Natt and Herrick, 1952). Total RBC and WBC counts were determined in a Neabur chamber (Al-Daraji *et al.*, 2008). Haemoglobin concentration (Hb) was determined by a cyanomethaemoglobin method following lysate centrifugation (Zinkl, 1986). Packed cell volume (PCV) was determined by microhematocrit centrifugation. Mean cell volume (MCV), mean corpuscular haemoglobin (MCH) and mean corpuscular haemoglobin concentration (MCHC) were calculated using standard formulae as reported by Al-Daraji *et al.* (2008). Blood smears were fixed in methanol and stained with commercial Giemsa stain diluted 1: 4 (v/v) in phosphate buffer, pH 6.80, for 1 hour. Identification and counting of leucocytes and thrombocytes was done under a light microscope using an oil immersion lens ($\times 100$). At least 200 leucocytes were counted in each sample to establish cell ratio (Leonard, 1982). The number of thrombocytes was obtained by an estimation method which consists of counting the number of thrombocytes in

five fields submerged and applying the following formula (Al-Daraji *et al.*, 2008)

Estimated number of thrombocytes (thrombocytes/ μ l) = (mean number of thrombocytes in five fields \times 3,500,000) $\times 10^{-3}$.

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).

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 **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 Nicotinamide; 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 (1994)

RESULTS

Data presented in Table 2 showed that geese fed different levels of parsley as fresh leaves (T1, T2 and T3) recorded the highest ($P < 0.05$) values of Hb, PCV, MCV, MCH, MCHC and thrombocytes in comparison with C group. However, T3 group surpassed other groups (C, T1 and T2) concerning RBC count, while there were no significant differences among C, T1 and T2 with relation to RBC count in spite of that there was increasing trend in T1 and T2 groups than C group. Furthermore, there were no significant differences between T2 and T3 groups in the mean values of Hb, PCV, MCV, MCH, MCHC and thrombocytes (Table 2). The current results clearly revealed that dietary supplementation with different levels of parsley (T1, T2 and T3) resulted in significant ($P < 0.05$) increase in WBC count and percentage of lymphocytes in comparison with C group (Table 3). Moreover, it was noticed from Table 2 that control group (C) recorded the highest means of H/L ratio and percentage of eosinophils as compared with parsley treated groups (T1, T2 and T3). Results also indicated no significant ($P > 0.05$) effect on percentages of heterophils, monocytes and basophils.

Table 2: Effect of dietary parsley supplementation on some blood traits of local geese

Traits	Treatments			
	C	T1	T2	T3
RBC ($\times 10^6 / \mu\text{l}$)	3.60 \pm 0.27 ^b	3.67 \pm 0.31 ^b	3.79 \pm 0.15 ^b	4.25 \pm 0.39 ^a
Hb (g / dL)	8.32 \pm 0.99 ^c	9.23 \pm 0.79 ^b	11.07 \pm 0.82 ^a	11.37 \pm 0.90 ^a
PCV (%)	37.85 \pm 1.03 ^c	39.11 \pm 0.89 ^b	41.23 \pm 1.11 ^a	44.02 \pm 0.26 ^a
MCV (fL)	105.1 \pm 1.03 ^c	106.5 \pm 2.18 ^b	108.7 \pm 1.33 ^a	108.6 \pm 2.03 ^a
MCH (Pg)	23.11 \pm 0.92 ^c	25.14 \pm 0.83 ^b	29.20 \pm 0.80 ^a	26.75 \pm 0.79 ^b
MCHC (g / dL)	21.98 \pm 0.26 ^c	23.60 \pm 0.29 ^b	26.84 \pm 0.41 ^a	25.82 \pm 0.30 ^a
Thrombocytes ($\times 10^3 / \mu\text{l}$)	19.11 \pm 0.76 ^c	20.25 \pm 0.95 ^b	21.34 \pm 0.35 ^a	21.55 \pm 0.51 ^a

C: Control group; T1, T2 and T3: Diet supplemented with 80, 160, 240 g / d parsley, respectively; ^{a-c}Values within rows followed by different letters differ significantly (P < 0.05)

Table 3: Effect of dietary parsley supplementation on certain blood characteristics of local geese

Traits	Treatments			
	C	T1	T2	T3
WBC ($\times 10^3 / \mu\text{l}$)	9.35 \pm 0.77 ^c	10.22 \pm 0.91 ^b	11.33 \pm 0.85 ^a	11.56 \pm 0.99 ^a
Heterophils (%)	27.40 \pm 1.92	27.20 \pm 1.63	27.35 \pm 1.55	27.49 \pm 1.92
Lymphocytes (%)	57.17 \pm 0.95 ^c	58.99 \pm 0.89 ^b	60.11 \pm 0.73 ^a	60.33 \pm 0.87 ^a
H/L ratio	0.47 \pm 0.09 ^a	0.46 \pm 0.05 ^b	0.45 \pm 0.01 ^c	0.45 \pm 0.03 ^c
Monocytes (%)	8.11 \pm 0.89	8.15 \pm 0.71	8.00 \pm 0.95	8.00 \pm 0.99
Basophils (%)	4.23 \pm 0.81	4.25 \pm 0.69	4.27 \pm 0.51	4.20 \pm 0.62
Eosinophils (%)	3.09 \pm 0.15 ^a	1.41 \pm 0.15 ^b	0.27 \pm 0.08 ^c	0.31 \pm 0.02 ^c

C: Control group; T1, T2 and T3: Diet supplemented with 80, 160, 240 g / d parsley, respectively

^{a-c} Values within rows followed by different letters differ significantly (P < 0.05)

However, Table 3 also denoted that there were no significant (P > 0.05) differences between T2 and T3 regarding WBC count, H/L ratio and percentages of lymphocytes and eosinophils.

DISCUSSION

In general, adding fresh parsley leaves to the diet of geese resulted in significant improvement in most haematological traits involved in this study. This improvement in haematological traits as a result of the treatments may be explained by the way that parsley is a good source of iron, beta carotene and vitamin C, useful for enhancement of general health status (Ragab *et al.*, 2010). Duke *et al.* (2009) reported that parsley builds up the blood because it is high in iron and its 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 of parsley enhance immunity. 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). This result is in agreement with the results of the present study that parsley treated groups (T1, T2 and T3) recorded the highest means of WBC count and percentage of lymphocytes in comparison to C group (Table 3). In the current study, it was noticed that H/L ratio was significantly higher in C group as compared with parsley treated groups (T1, T2 and T3) as shown in Table 3. Al-Daraji *et al.* (2010) reported that bird under greater stress have high H/L ratio, partly due to the release of corticosterone and the corresponding effect of enhancing heterophils and decreasing lymphocytes. However, it was

known that parsley alleviate stress by its role in enhancing general health status and immunity (Richmond *et al.*, 2000).

Hassan *et al.* (2006) found that treated mice with Zearalenone (non-steroidal estrogenic 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.* (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 way, Nielsen *et al.* (1999) reported that treated human with parsley oil resulted in increased levels of glutathione reductase and superoxide dismutase and total antioxidant activity. Chlorocompound in parsley often show significant biological activities, e.g. antibiotic, antitumour, antiviral, antibacterial, anti-inflammatory, antihepatotoxic, pesticidal antioxidant activities which all reflect enhanced the general health condition of body (Holst and Engvild, 2000; Kery *et al.*, 2001; Al-Howiriny *et al.*, 2003). Abbas (2010) found that dietary parsley resulted in significant improvement in live body weight, feed efficiency and feed intake in broiler chickens.

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 haematological characteristics included in this study. Therefore, parsley could be used as an efficient feed additive for enhancement general physiological status of birds.

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