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Utilization of Parsley (*Petroselinum crispum*) as Feed Additive for Broiler Chickens Performance

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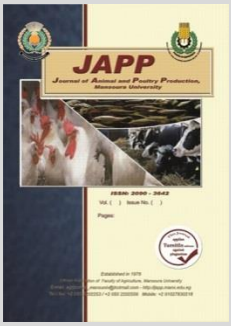

ABSTRACT

The present study aims to assess different levels of parsley on the performance of broilers. The number of commercial broiler chicks (Ross 308) was 120 day old, randomly divided into 5 treatments with 3 replicates, meaning that each treatment had 24 chicks over a 6 week period. T1 was a control group whose diet level was lack of supplements (core diet). However, other T2, T3, T4 and T5 treatments included supplementing parsley at the level of 3, 6, 9 and 12 g/kg respectively. As part of the growth performance parameter at the end of the experiment, 4 chickens were slaughtered to estimate carcass and muscle characteristics. Therefore, the use of parsley at the rate of 9 g/kg had a significant influence on body weight and body weight gain. Efficiency of feed conversion and feed intake improved numerically compared to the control group throughout the study period. The highest thigh and carcass weights were obtained at a parsley feed level of 9 g/kg and there was no difference between treatments for animal weight, percent dressing. and the wing. In addition, there was no significant difference ($P<0.05$) in organ weights between the different treatments.

Keywords: Parsley, broiler, fed, growth, weight

INTRODUCTION

Feed additives are essential which enhance the efficiency of utilizing feed and performance of animals. Many Research have suggested that herbal plants have significant impact on pancreatic secretions as a digestive enzyme that help to absorb and digest more amino acids from digestive tract (Kery *et al*., 2001). Over the last several decades medicinal herbs have been used by humans, and also industries of drugs depend on the raw materials of medical herbs and their extracts Murray. However, manufactured chemicals have dramatic risk on the health of plants, animals and humans (Guo *et al*., 2004). Nowadays, generally all health organizations have shown their support to use medicinal herbs to minimize the consumption of chemicals and going back to nature (Hernandez *et al*., 2004).

Parsley is one of the plants which has antioxidant activity, that is used in phytotherapy. Hence, many researchers figured out that utilizing aromatic and medicinal plants by broiler chickens had significantly enhanced body weight, body weight gain and also performance index (Osman *et al*.,2004). In general, parsley has an excellent level of minerals for instance, iron, calcium, potassium. And also, vitamins as A, C, Niacin, Riboflavin and thiamin. In addition, it has a good level of ascorbic acid so that is count as a unique blood cleanser and it can prompt the discharge of urine and relives flatulence (Ibrahim, 2005).

Parsley contains high level of Flavone and vitamin C equivalent to 4 times of the lemon, so it is antagonist to oxidize cells which develop immune system then protect from cancer. Moreover, it contains apigenin which reduce the division and spread of cancer cells. Parsley has effect of productivity of broiler chicken and also other poultry birds such as quail (Kery *et al*., 2001). Consequently, the current study aimed to determine the influence of adding various levels of parsley as feed additives on the broiler growth performance (Lee *et al*., 2004).

MATERIALS AND METHODS

This experiment was carried out at the Faculty of Agricultural Engineering Sciences of the Poultry Research Farm, Sulaimani University from the period of September 6, 2018 to October 18, 2018. A total of 120 broilers were removed of a day without sex (Ross 308) from the incubator (Kosha). The chicks were divided into 5 groups when they were eight days old, the individual group included 3 repetitions (8 chicks / group). The treatments were the following: (T1) means that the basal diel was used. In the treatments (T2, T3, T4 and T5) a basal diet was used with (3, 6, 9 and 12 g of parsley / Kg respectively).

Table (1, 2, 3 and 4) illustrates the composition of the diets and analyzes the nutrient content. In this study all chickens had been fed the same commercial diet until 7 days of age, during that day all chickens had been weighed and separated into experimental groups, there were no significant differences between all groups. As a result, the average weights were the same. Diets were prepared to cover rations or surpluses, as demonstrated by the National Research Council (NRC, 1994) for broilers of this age. Throughout the experiment, water and feed were supplied ad libitum. Three stages of the feeding program were included in the provision: The starter diets (22% CP) are shown in Table (1). During the 1st to 7th day of age, they were subsequently modified to

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growth diets (21% CP) from 8 to 21 days of age as illustrated in Table (2), finally; as shown in Table (3) from 22 to 42 days of age finishing diets (19% CP) were used.

Data were statistically analyzed using XL Stat (XlSTAT, 2004). Significant differences between the means of the characteristics were calculated using Duncan's multiple range tests (Duncan, D. B.1955). Low probability P <0.05.

Table 1.Compositions of the starter diets from 1st to 7th days of age

Feed Ingredients	T1 (Control)
Protein concentrate	6.00
yellow Corn	51.70
Soybean Meal	29.00
Wheat	10.00
Sunflower Seed Oil	3.00
Salt	0.30
Parsley	0.00
Total	100

Table 2. Compositions of the grower diets from the days of age 8 to 21.

Feed Ingredients	T1 (Control)	T2	T3	T4	T5
Protein concentrate	5.00	5.00	5.00	5.00	5.00
Yellow corn	56.90	56.90	56.60	56.30	56.10
Soybean meal	24.80	24.50	24.60	24.50	24.40
Wheat	10.00	10.00	10.00	10.00	10.00
Sun flower seed oil	3.00	3.00	3.00	3.00	3.00
Salt	0.30	0.30	0.30	0.30	0.30
Parsley	0.00	0.30	0.60	0.90	1.20
Total	100	100	100	100	100

Table 3. Compositions of the finisher diet from the days of age 22 to 42.

Feed Ingredients	T1 (Control)	T2	T3	T4	T5
protein concentrate	5.00	5.00	5.00	5.00	5.00
Yellow corn	59.50	59.40	59.10	58.90	58.70
Soybean meal	22.20	22.00	22.00	21.90	21.80
Wheat	10.00	10.00	10.00	10.00	10.00
Sun flower seed oil	3.00	3.00	3.00	3.00	3.00
Salt	0.30	0.30	0.30	0.30	0.30
Parsley	0.00	0.30	0.60	0.90	1.20
Total	100	100	100	100	100

Table 4. Composition of protein concentrate

Nutrients	Inclusion %	Nutrients	Inclusion rate:
Crude protein	40.00	Lysine	3.85
Crude fat	5.00	Methionine	3.70
Crude fiber	2.00	Meth+cyst	4.10
Moisture	7,60	Tryptophane	0.40
Crude ash	28.30	Threonine	1.29
Calcium	5.60	Metabolizable Energy	2150.00
Phosphorus	2.60	Sodium	2.30
Phosphorus (avail.)	4.65	Chloride	4.00
Vitamins, Minerals, trace elements and additives per kg:			
Vitamin A	220.00 IU	d-pantothenic acid	320 mg
Vitamin D_3	60.00 IU	Choline chloride	5.00 mg
Vitamin E	600 mg	Cu (Copper sulphate)	200 mg
Vitamin B1	60 mg	Mn (Manganese oxide)	1.60 mg
Vitamin B2	140 mg	Zn (zinc oxide)	1.20 mg
Vitamin B6	80 mg	Fe (iron sulphate)	1.00 mg
Vitamin B12	700 mg	I (calcium iodate)	20 mg
Vitamin H (Biotin)	2.00 mg	Se (sodium selenite)	5 mg
Niacin	800 mg	Antioxidants	100 mg
Vitamin BC (folic acid)	20 mg	6-phytaseEC3.1.3.26 (46)	30.00 Fyt
Vitamin K_3	50 mg	Salinomycine-Sodium	1.00 mg

Brocon-5 Special W (WAFI- HOLLAND)

RESULTS AND DISCUSSION

Body weight

Table (5) showed that chicks fed diets supplemented with (9 g of parsley / kg of diet) obtained the highest values ($p<0.05$) of body weight at 14, 21, 28, 35 and 42 days compared to (3 and 6 g of parsley / kg of diet) and control groups. However, at 14, 21, 35 and 42 years, there were no significant differences between T4 and T5, but numerically, T4 represented the greater body weight than T5. While at 28, T4 gives the best body weight compared to T5. Furthermore, no significant differences were observed between T5 and T1 (control group) at 14 and 42 days. However, T5 significantly higher than T1 (control group) on days 21, 28 and 35 in body weight. Furthermore, there were no significant differences between T2, T3 and T1 (control group) in all age periods. The improvement in body weight may be due to the existence of unknown fat-soluble aspects and essential fatty acids in medicinal and aromatic plants or to a stimulating effect on the digestive system of broilers (Hernandez *et al*., 2004). Furthermore, Abbas (2010) and Rabia (2010) found that dietary parsley caused a significant improvement in live weight of broilers.

Table 5. Effect of different levels of parsley on body weight (g) (Means ±SE) of broiler.

Treatment*	Age (days)					
	7	14	21	28	35	42
T1 (Control)	131.250±1.301^{a}	305.625±12.990^{b}	519.583±10.423^{c}	795.833±14.111^{c}	1082.500±16.536^{c}	1433.899±46.092^{b}
T2	131.042±2.939^{a}	307.917±4.873^{b}	543.125±6.856^{bc}	872.917±12.444^{bc}	1211.250±46.553^{bc}	1506.131±57.560^{b}
T3	135.208±0.208^{a}	303.125±3.083^{b}	531.875±13.175^{bc}	836.250±30.337^{bc}	1161.458±80.739^{bc}	1489.345±127.936^{b}
T4	135.417±0.833^{a}	341.458±12.366^{a}	623.333±25.157^{a}	1003.333±34.098^{a}	1455.625±52.000^{a}	1925.833±96.297^{a}
T5	132.750±4.125^{a}	323.958±4.213^{ab}	580.417±20.793^{ab}	899.167±46.689^{b}	1286.667±75.581^{ab}	1730.317±99.435^{ab}

*** Means with different superscript within factor differ significantly (p<0.05).**

T1=control, T2, T3, T4 and T5Adding 3,6,9 and 12gm parsley/kg feed respectively.

Weight gain

Table (6) shows the influence of different parsley contents on the weight gain of broilers, from the results it can be seen that the animals fed (9 g parsley / kg feed) had significantly higher values) of weight gain compared to birds when fed (0, 3 and 6 g parsley / kg feed) at 14, 21 and 35 days of age. This conclusion is in agreement with Tahan and Bayram (2011), who found that the use of dried parsley in rations of laying quails as a feed additive had a synergistic effect on body weight gain. However, the differences between T4 and T5 over the same period were not significant.

At 28 days, the chicks fed a diet supplemented with (9 g parsley / kg) showed significantly higher weight gain (p 0.05) compared to the other treatment groups except T2. This result is in agreement with Jaffer (2013) who found that chickens fed mixtures of 0.4%, 0.8%, 1.2% thyme and parsley had a significant impact ($P<0.05$) on body weight gain compared to the control group. At 14, 28 and 35 days, there are no significant differences between T1, T2, T3 and T5. In addition, at 21 days, there are no significant differences between T1, T2 and T3. In addition, there were no signifiers between T4 and T5 during the same period. In addition, at 42 days of age, there was no significant difference between the control diet and the diet containing parsley in terms of body weight gain.

Feed intake

Table (7) shows the results of the statistical analysis of the effect of adding four proportions of parsley to the diet of broilers on food consumption between the experimental

treatments. There were no significant influences (P <0.05) on food intake between T1, T2 and T3 during the total rearing periods. And also, there were no significant differences between T4 and T5 throughout the total rearing periods, except at 28 days of age, as T4 was significantly higher than T5. At 14 days of age, T4 and T5 were significantly higher than T1, T2, and T3. This result is similar to that of Abbas (2010) when he found that parsley in the diet resulted in a significant improvement in feed intake in broilers.

Table 6. Effect of different levels of parsley on weight gain (g) (Means ±SE) of broiler.

Treatment*	Age (days)				
	14	21	28	35	42
T1 (Control)	174.375±11.732^{b}	213.958±6.191^{c}	276.250±5.340^{b}	286.667±20.695^{b}	351.399±30.740^{ab}
T2	176.875±5.316^{b}	235.208±1.987^{bc}	329.792±11.937^{ab}	338.333±39.937^{b}	294.881±31.338^{b}
T3	167.917±3.254^{b}	228.750±10.897^{bc}	304.375±20.409^{b}	325.208±51.741^{b}	327.887±50.770^{ab}
T4	206.042±11.560^{a}	281.875±13.204^{a}	380.000±9.567^{a}	452.292±18.507^{a}	470.208±44.945^{a}
T5	191.208±2.851^{ab}	256.458±17.049^{ab}	318.750±25.938^{b}	387.500±29.295^{ab}	443.651±53.177^{a}

*** Means with different superscript within factor differ significantly (p<0.05).**
T1=control, T2, T3, T4 and T5Adding 3,6,9 and 12gm parsley/kg feed respectively.

Table 7. Impact of various levels of parsley on feed intake (g) (Means ±SE) of broiler.

Treatment*	Age (days)				
	14	21	28	35	42
T1 (Control)	236.250±13.302^{b}	329.167±9.287^{c}	446.042±6.792^{b}	508.750±7.404^{c}	564.525±23.447^{b}
T2	245.000±4.390^{b}	359.167±1.627^{bc}	507.083±12.276^{b}	593.333±35.210^{bc}	600.057±42.160^{b}
T3	231.458±4.410^{b}	340.417±12.142^{bc}	489.167±20.189^{b}	576.875±61.250^{bc}	649.732±80.183^{ab}
T4	273.333±9.016^{a}	422.083±23.542^{a}	594.375±17.865^{a}	745.000±21.762^{a}	808.125±33.706^{a}
T5	271.458±5.133^{a}	383.750±10.327^{ab}	510.208±32.617^{b}	664.792±49.096^{ab}	725.147±55.704^{ab}

*** Means with different superscript within factor differ significantly (p<0.05).**
T1=control, T2, T3, T4 and T5Adding 3,6,9 and 12gm parsley/kg feed respectively.

At 21 and 35 days, only T4 was significantly higher in food intake compared to T2, T3 and the control group. Regarding, the T5s were significantly higher compared to the control group. In addition, there were no significant differences between T2, T3 and T5 during the same period.

In contrast, there was a significant difference (P <0.05) in food consumption between T4 compared to T2, T3, T5 and the control group at 28 days of age, but no significant impact on consumption was was observed. birds between T2, T3, T5 and control group. Tahan and Bayram (2011) concluded that the use of dried parsley in rations of laying quails has a synergistic effect on feed consumption. But at the age of 42 days, there were significant differences (P <0.05) between T4 in food intake compared to control and T2. Previous studies have shown that herbs, spices and various plant extracts have appetite and digestion stimulating characteristics and antimicrobial influences Kamel (2001). On the contrary, there were no significant differences between T1, T2, T3 and T5 in food intake at the same age.

Feed conversion ratio (FCR)

Table (8) showed that there were no significant effects of parsley (P<0.05) on the feed conversion rate between treatments during the rearing period, even the average total periods. it was shown between the parsley and control groups at the age of 21 days. Furthermore, these results were not in agreement with Jaffer (2013); Abbas (2010) found that dietary parsley resulted in a significant improvement in feed efficiency in broilers. In addition, Tahan and Bayram (2011) observed different results, they concluded that the use of dried parsley only in laying quail rations had a synergistic effect on feed efficiency compared to the control group.

Carcass weight and Carcass cuts

Data on carcass weight and carcass cuts are summarized in Table (9). T4 was significantly higher in carcass weight and thigh weight compared to the T1 control group. However, there were no significant differences between T2, T3, T5 and T1 in carcass weight and thigh weight.

Table 8. Effect of different levels of Parsley on feed conversion ratio (FCR) (Means ±SE) of broiler.

Treatment*	Age (days)				
	14	21	28	35	42
T1 (control)	1.357±0.030^{a}	1.541±0.066^{a}	1.616±0.033^{a}	1.790±0.107^{a}	1.630±0.147^{a}
T2	1.387±0.039^{a}	1.527±0.018^{a}	1.539±0.022^{a}	1.781±0.116^{a}	2.059±0.169^{a}
T3	1.378±0.007^{a}	1.490±0.018^{a}	1.613±0.049^{a}	1.811±0.119^{a}	2.018±0.195^{a}
T4	1.330±0.033^{a}	1.496±0.016^{a}	1.564±0.012^{a}	1.649±0.028^{a}	1.738±0.102^{a}
T5	1.419±0.006^{a}	1.505±0.070^{a}	1.605±0.029^{a}	1.717±0.047^{a}	1.658±0.114^{a}

*** Means with different superscript within factor differ significantly (p<0.05).**
T1=control, T2, T3, T4 and T5Adding 3,6,9 and 12gm parsley/kg feed respectively.

Table 9. Effect of different levels of parsley on Carcass weight, dressing percentage, Breast, Thigh and Wing weights (g) (Means ±SE) of broiler at 42 days of age.

Treatments*	Carcass weight and Carcass cuts weights (g) at 42 days of age				
	Carcass weight	Dressing percentage	Breast weight	Thigh weight	Wing weight
T1 (control)	1076.25±108.135^{b}	78.965±6.935^{a}	378.750±33.996^{a}	330.000±46.143^{b}	142.5±15.877^{a}
T2	1290.000±77.460^{ab}	90.431±5.718^{a}	452.500±30.035^{a}	420.000±29.439^{ab}	166.250±7.739^{a}
T3	1223.750±121.730^{ab}	90.039±14.568^{a}	417.500±54.486^{a}	385.000±39.264^{ab}	160.000±19.685^{a}
T4	1400.000±63.672^{a}	77.086±6.147^{a}	476.250±26.329^{a}	451.250±20.451^{a}	177.500±5.951^{a}
T5	1371.250±74.509^{ab}	84.571±7.384^{a}	466.250±20.143^{a}	431.250±28.312^{ab}	162.500±8.780^{a}

*** Means with different superscript within factor differ significantly (p<0.05).**
T1=control, T2, T3, T4 and T5Adding 3,6,9 and 12gm parsley/kg feed respectively.

In addition, the T2, T3, T4 and T5 differences were not significant in carcass weight and thigh weight. Although no significant difference was shown between the treatments in the percentage of dressing, the weight of the chest and the weight of the wings, these results are in agreement with the finding of Abbas (2010), who reported that feeding with 3 g /

kg parsley had a negligible effect on all slaughter parameters. Moreover, these results are in agreement with the conclusions of Abaza (2001) and Guo *et al*., (2004) who reported that the addition of medicinal and aromatic plants (MAP) had no effect on the characteristics of the carcass.

Liver, Heart and Gizzard weights

Table (10) presented the means ± SE of liver weight, gizzard weight and heart weight of broiler chicks fed different levels of parsley rations at 42 days of age. There were no significant differences between treatments in liver weight, gizzard weight and heart weight.

Table 10. Effect of different levels of parsley on liver, gizzard and heart weights (g) (Means±SE) of broiler at 42 days of age.

Treatments*	Organ weights (g) at 42 days of age		
	Liver weight	Gizzard weight	Heart weight
T1 (control)	30.000±2.041[a]	20.000±0.000[a]	7.500±1.443[a]
T2	35.000±3.536[a]	25.000±3.536[a]	8.750±1.250[a]
T3	41.250±8.509[a]	27.500±4.330[a]	12.500±2.500[a]
T4	40.000±3.536[a]	23.750±2.394[a]	8.750±1.250[a]
T5	43.750±3.750[a]	25.000±2.041[a]	8.750±1.250[a]

*** Means with different superscript within factor differ significantly (p<0.05).**

T1=control, T2, T3, T4 and T5Adding 3,6,9 and 12gm parsley/kg feed respectively.

CONCLUSION

From the results of these study, it can be concluded that the best productive performance parameters were obtained by the chickens fed the diet supplemented with (9 g of parsley / Kg of diet), the lowest yields were obtained by the chickens fed the diet. % level. From the results, it can be observed that the fed birds (9 g of parsley / kg of diet) had significantly higher values (P <0.05) of weight gain compared to the fed birds (0, 3 and 6 g parsley / kg of diet).) to 14. Chicks fed diets enriched in (9 g of parsley / kg of diet) obtained the highest values (p<0.05) of live weight at 14, 21, 28, 35 and 42 days compared to (3 and 6 g of parsley / Kg of diet) and control groups. There were no significant influences (P<0.05) on feed intake between T1, T2 and T3 during the total rearing periods. And also, there were no significant differences between T4 and T5 throughout the total reproductive periods except at 28 days of age that T4 significantly higher than T5

The use of parsley as a feed additive at a level of (9 g parsley / kg diet) can be recommended to improve the overall performance of broilers.

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إستخدام البقدونس (*Petroselinum crispum*) كإضافات غذائية على الأداء الإنتاجي لفروج اللحم

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تهدف هذه الدراسة تقييم مستويات مختلفة من البقدونس على الاداء الانتاجي لفروج اللحم. عدد الافراخ المستخدمة من نوع (روز 308) كانت 120 فرخة بعمر يوم واحد، حيث وزعت الافراخ عشوائيا على 5 معاملات بواقع ثلاثة مكررات لكل معاملة، اي كل معاملة تحتوي على 24 فرخة وتم تربيته لمدة 6 اسابيع. المعاملة الاولى (معاملة السيطرة) اي عليقة هذه المعاملة خالية من الاضافة، اما المعاملات الاخرى والتي تشمل المعاملة الثانية والثالثة والرابعة والخامسة فهي تحتوي على اضافة البقدونس بمستويات 3، 6، 9 و12 غم/كغم علف على التوالي. وفي نهاية التجربة تم ذبح 4 فروج من كل معاملة لتقدير خصائص الذبيحة والعضلات. بناءا على ذلك فإن استخدام البقدونس بمستوى 9 غم / كغم علف له تأثير معنوي على وزن الجسم وزيادة وزن الجسم، كان هناك تحسن ملحوظ في كفاءة تحويل العلف وكمية العلف المستهلك لمعاملات الاضافة مقارنة مع معاملة السيطرة خلال فترة الدراسة. تم الحصول على أعلى وزن للفخذ والذبيحة عند مستوى تغذية البقدونس 9 غم / كغم علف في حين لم يكن هناك اختلاف بين المعاملات لوزن الصدر والاجنحة ونسبة التصافي. علاوة على ذلك ، لم يكن هناك فرق معنوي (P> 0.05) في أوزان الأعضاء بين المعاملات المختلفة.