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# EFFECT OF MOLUKHYIA OR PARSLEY FEEDING ON CARCASS CHARACTERISTIC, GLUTATHIONE PEROXIDASE ENZYME ACTIVITY AND MEAT QUALITY OF TWO BROILER STRAINS

**By**

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**Abstract**:*Feed additives are important materials that can improve the efficiency of feed utilization and animals performance. This study was carried out to estimate the impacts of feeding different levels of molukhyia (jaw's mallow (J)) and parsley (P) as natural biological feed additives on body weight (BW), carcass characteristics, plasma glutathione peroxidase enzyme activity (GPX) and meat quality, and estimate the correlation coefficients among BW and GPX activity with each of carcass characteristics and meat quality of two commercial broiler strains (Cobb and Ross).*

***The experimental treatments were as follows:***

*1-Control diet free from J or P (diet1). 2-Diet1+0.5%J. 3-Diet1+1%J. 4-Diet1+0.5%P. 5- Diet1+1%P.*

***Results obtained could be summarized in the following:***

1. *No significant treatment, levels and type of J or P plant, were detected in BW and slaughter parameters% of Cobb broiler chicks. Also, treatments insignificantly affected BW and slaughter parameters% of Ross broiler chicks except carcass weight after evisceration and dressing%. Birds fed control+1%P diet had the significant highest carcass weight after evisceration and dressing%, while those fed control diet+1%J had the lowest values.*
2. *Treatments significantly affected moisture, ash and fat percentages of Cobb broiler meat. The highest moisture and ash% were observed in birds fed control diet+1%P, while, those fed control diet+1% J and 0.5% J had the lowest values. Birds fed control diet+0.5%J had the highest*

*fat%, while birds fed control diet had the lowest fat%. Chicks fed J had significant higher fat and lower ash%, while, chicks fed P had higher ash and lower fat%.*

3. *The treatments significantly affected moisture and ash% of Ross broiler meat. Highest moisture and ash% were observed in birds fed control diet +0.5%P, while, those fed control diet+0.5%J had the lowest moisture and ash%. Type of plant significantly affected moisture and ash%. Ross broiler fed P had significant higher moisture and ash% than those fed J diet.*
4. *Plasma GPX enzyme activities from both strains were significantly affected by treatments and type of addition. Birds from Cobb strain fed control diet+1%P, had significant highest enzyme activity, while, those fed control diet+1 %J had the lowest values. Birds fed P had significant higher enzyme activity than those fed J. Birds from Ross strain fed control diet+0.5%J had significant highest enzyme activity, while, those fed control diet had the lowest values. Birds fed J had significant higher enzyme activity than those fed parsley.*
5. *The results indicated that birds of both strains fed on J and P had significant decrease in fat oxidation. Treatment, level and type of addition significantly affected water holding capacity (WHC) of Cobb and Ross broiler meat. Treatment significantly affected cooking losses% and pH of meat for both strains. Treatment and level of addition significantly affected taste meat of Cobb broiler chicks. Level of addition significantly affected taste of Cobb chicken meat.*
6. *Correlation coefficients estimate between BW and blood plasma GPX activity, carcass characteristics and meat quality for Cobb, Ross and both strains showed considerable variations of the correlation values between strains. In Cobb strain, BW had positive correlations with moisture%, breast pH, breast and thigh WHC, breast odor, breast and thigh peroxide value (PV). Whereas significant negative correlations were found between BW and each of gizzard%, total giblet%, thigh pH, breast texture, liver%, thigh cooking looses% and breast taste. In Ross strain, BW had positive correlation with GPX activity, blood&feathers%, gizzard% and breast PV while, it was negatively correlated with each of thigh and breast WHC, thigh pH, head%, heart%, carcass%, dressing%, moisture %, ash% and thigh PV.*
7. *In Cobb strain, GPX activity was positively correlated with each of heart%, spleen%, thigh texture, moisture%, ash%, protein%, breast*

*general appearance, breast and thigh odor and negatively correlated with each of abdominal fat%, head and breast%. In Ross strain, GPX activity was positively correlated with blood&feathers%, gizzard%, breast PV. While, GPX activity was negatively correlated with moisture%, head%, heart%, thigh%, thigh meat%, breast and thigh WHC and thigh PV.*

*In conclusion, the two broiler strains differed in response of studied traits to different levels of J and P, however, effects on the resulting carcass appear to be distinct and largely independent. The results indicated that feeding on diets containing P and J increased GPX activity and improve the chemical composition and meat quality. Also, the highly correlation values obtained suggested that, GPX activity can be done as prediction indicators to increase and improve BW, carcass characteristics and meat quality in selection programs to improve these traits of broiler chickens.*

## 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 various diseases. Among many dietary factors, antioxidants have a special place being major players in the battle for animal survival, maintenance of animal health, productive and reproductive performance. Enhancement of antioxidant defenses through dietary supplementation would seem to provide a more reasonable and practical approach to reduce the level of oxidative stress and there is a wealth of evidence to support the effectiveness of such a strategy **(Finkel and Holbrook, 2000).** Glutathione peroxidase enzyme activity (GPX) assists in intracellular defence mechanisms against oxidative damage by preventing the production of active oxygen species **(Ursini and Bindoli, 1987)** and maintain low levels of $H_2O_2$ and others hydroperoxides in the cell to prevent tissues from peroxidation damages **(Kim and Mahan, 2003).**

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 unfavorable 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 depended upon the raw material of medicinal herbs and plant 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 plant to substitute or minimize the use of chemicals through the global trend to go back to nature **(Allam *et al.*, 1999).** In Egypt; about 48 thousands feddans were cultivated with medicinal and aromatic plants **(Agricultural Economics, 2005)**. In this respect, several investigators reported that using medicinal and aromatic plants in broiler and rabbits diets improved body weight, body weight gain and performance index (**Osman *et al.*, 2004; Ibrahim *et al.*, 2004 and Ibrahim, 2005)**. **Osman *et al.* (2004)** found that replacing soybean meal by radish, rocket or parsley cakes up to 15% had no deleterious effects on feed consumption of broilers during the whole growth period.

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 protein, mineral, vitamins, fiber 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 fiber 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. They also add flavors; variety, taste, color and aesthetic appeal to what would otherwise be a monotonous diet. They are in abundance shortly after the rainy season but become scarce during the dry season during which cultivated types are used **(Ashaye, 2010).**

Jew's mallow *(Corchorus olitorius*), belongs to the family, Tiliaceae. It was proposed that *Corchorus olitorius* originated from South China from where it was introduced to India and Pakistan. It was however found wild in many parts of India as well as China and many parts of Australia and Africa. It is one of the most popular vegetables in every home. Consequently, it is grown in nearly all home gardens, market gardens near the city and truck gardens around the world **(Olaniyi and Ajibola, 2008)**. Jew's mallow is a very popular vegetable in West Africa. The young shoot tips can be eaten raw or cooked and it contains high levels of protein and vitamin C **(Ashaye, 2010).** The leaves are rich, good and relatively cheap sources of ascorbic acid, and minerals and that the dietary ash constituents are calcium, phosphorus and iron **(Olaniyi and Ajibola, 2008)**.

Parsley (*Petroselinium crispum)* leaves, fresh, frozen or dried; roots dug in winter and dried; seeds when capsules are ripe could be used as feeding additives. The fresh leaves are rich source of manganese, vitamins and calcium. The leaves, roots and seeds are diuretic, reduce the release of histamines and scavenge skin aging free radicals. Grown near roses, parsley improves their health and scent **(Richmond and Mackley, 2000)**. Parsley's volatile oils - particularly myristicin - have been shown to inhibit tumor formation in animal studies, and particularly, tumor formation in the lungs. Myristicin has also been shown to activate the enzyme *glutathione-S-transferase*, which helps attach the molecule glutathione to oxidized molecules that would otherwise do damage in the body. The activity of parsley's volatile oils qualify it as a "chemoprotective" food that can help neutralize particular types of carcinogens. Parsley has carminative, tonic and aperient action, but is chiefly used for its diuretic properties, a strong decoction of the root being of great service in gravel, stone, congestion of the kidneys, dropsy and jaundice **(Duke *et al*., 2009)**. The dried leaves are also used for the same purpose. Apiol is the effective component that represent approximately 21-80% of parsley essential oil **(Tisserand and Balacs, 1995)**. Chlorocompounds in parsley often show significant biological activities, e.g. antibiotic, antitumour, antiviral and pesticidal activities **(Holst and Engvild, 2000)**. Parsley has an antioxidant activity, which has been used in phytotherapy **(Kery *et al.*, 2001).** Parsley showed a marked anti-calculi activity and also had diuretic effects in male rats **(Wong and Kitts, 2006 and Ahsan *et al*., 1990)**. It also exhibited significant antiinflammatory and antihepatotoxic activities, which merits further detailed investigations **(Al-Howiriny *et al.*, 2003)**. Parsley was identified as a promising source of antioxidants to retard lipid oxidation in fish oil-enriched food products **(Jimenez-Alvarez *et al.*, 2008).**

To the consumer, appearance is the major criterion for purchase selection and initial evaluation of meat quality. Other quality attributes, such as tenderness, juiciness, drip-loss, cook-loss, pH, and shelf-life are important to the consumer after purchasing the product, as well as to the processor when producing value-added meat products **(Barbut, 1993)**.

Commercial poultry breeding has amongst its objectives, the improvement of production potential and disease resistance. Over the years there has been much emphasis on growth improvement that is negatively associated with some aspects of immunological performance of poultry as reported by **Yunis *et al*. (2000) and Cheema *et al*. (2003)**. So, that existence of any significant relationship between blood biochemical features such as antioxidant enzymes activities with slaughter parameters and meat quality may are needed for the design of breeding programs aimed to improving the balance between production and health traits. Therefore, the objectives of the present study were to: (a) investigate the impacts of different levels of jaw's mallow and parsley as natural biological feed additives on BW, carcass characteristics, plasma GPX enzyme activity and meat quality, and (b) estimate the correlation coefficients among BW and GPX activity with each of carcass characteristics and meat quality in Cobb and Ross strains.

## MATERIALS AND METHODS

This study was carried out at the Poultry Research Station, Poultry Production Department, Faculty of Agriculture, Fayoum University. Chemical analyses were performed on both poultry production and food science & technology departments according to the procedures outlined by **AOAC (1990).**

Total numbers of 210 five-day old unsexed broiler chickens from two broiler strains (Ross and Cobb, 105 each cross) were initially fed a control diet for five days. Chicks were raised in electrically heated batteries with raised wire mesh floors and had a free access of feed and water. Batteries were placed into a room provided with a continuous light and fans for ventilation. The birds were reared under similar environmental conditions, and were fed starter diet from five to 11 day, grower diet from 12 to 23 day, and finisher diet from 24 day to the end of the experiment at 42 day of age.

**The experimental treatments were as follows:**

**1-** Control diet free from jaw's mallow (J) or parsley (P): (diet 1).

**2-** Diet 1+0.5%J. **3-** Diet 1+1%J.

**4-** Diet 1+0.5%P. **5-** Diet 1+1%P.

**Table (1):** Determined chemical composition of jaw's mallow and parsley used in the present study (On air dried basis) are as follows:

| Item | Jaw's mallow leaves | Parsley leaves |
|---|---|---|
| **Crude protein%** | 25.81 | 14.08 |
| **Ether extract %** | 4.59 | 2.86 |
| **Crude fiber%** | 9.01 | 10.50 |
| **Ash%** | 11.79 | 9.52 |
| **Nitrogen-free extract%*** | 48.80 | 63.04 |
| **ME/Kcal/Kg****| 3461 | 3483 |

* By difference

**Calculated according to **Carpenter and Clegg (1956)** by applying the equation: ME(Kcal/kg)=(35.3*CP%)+(79.5*EE%)+(40.6*NFE%)+199.

The experimental diets were supplemented with minerals and vitamins mixture and DL-methionine to cover the recommended requirements according to the strain catalog recommendations and were formulated to be iso-nitrogenous and iso-caloric. The composition of jaw's mallow and parsley leaves and calculated chemical analyses of the experimental diets are shown in Tables 1 and 2.

At the end of the growing period (42 days of age), slaughter tests were performed using (four males and four females) chicks around the average live body weight of each treatment. Birds were individually weighed to the nearest gram, and slaughtered by severing the jugular vein (islamic method). After four minutes bleeding time, each bird was dipped in a water bath for two minutes, and feathers were removed. After the removal of head, carcasses were manually eviscerated to determine some carcass traits, dressing% (eviscerated carcass without head, neck and thighs) and total giblets% (gizzard, liver and heart). The eviscerated weight included the front part with wing and rear part. The abdominal fat was removed from the parts around the viscera and gizzard, and was weighed to the nearest gram. The bone of front and rear were separated and weighed to calculate meat percentage. The meat from each part was weighed and blended using a kitchen blender.

**Glutathione peroxidase enzyme activity:**

Glutathione peroxidase enzyme activity (GPX) was determined in plasma by enzymatic methods, adjusted for poultry blood using available commercial kits SCLAVO INC., 5 Mansard Count., Wayne NJ 07470, USA.

**Water holding capacity (WHC) and plasticity:**

This was based on the percentage of free water in meat, according to the method of **Grau and Hamm (1953)**, as modified by **Pohja and Niinivaara (1957)**. Ground meat samples, 0.3g each (weighed accurately to 0.001g), placed on Whatman No.1 paper-filter, were exposed to two kg pressure between two glass plates for a period of five minuets. Thereafter, using a planimeter, the area of two spots created by extruded meat juice and meat, respectively, was determined (in $cm^2$). In order to determine the percentage of free water in meat, the infiltrate area expressed in $cm^2$ obtained from the difference in the areas of these two spots were divided by the weight of the sample.

**Peroxide value**:

Peroxide value was determined according to the method described by **Javamard *et al.* (2006).**

**pH and cooking loss:**

The procedure of **Zaika *et al.* (1976)** was used to estimate the pH and total acidity of raw chicken meat. This was done 24 hour after slaughter in a water extract (distilled water), with a 1:1meat to water ratio (w:v), after one hour of extraction. Cooking loss was determined and calculating as described by **Barbanti and Pasquini (2005)**.

**Sensory evaluation of cooked chicken meat:**

The organoleptic evaluation of chicken were carried out, using a taste panel, consisting of twelve trained staff members of Food Sci.&Tech. Dept., Fac. of Agric, Fayoum University according to **Sudha *et al.* (2007).** The panelists were asked to evaluate the chicken meat for color, texture, elasticity, flavor and overall acceptability.

**Statistical analysis:**

The data were analyzed according to Steel and Torrie (1980). Means were compared by Duncan's new multiple range test (Duncan's, 1955) when significant F values were obtained. Correlation analyses were performed using the procedure CORR of SPSS User's Guide, (SPSS, 1999).

## RESULTS AND DISCUSSION

**Body weight (BW) and slaughter parameters:**

Effect of feeding different levels of jaw's mallow and parsley as dried leaves (as natural biological feed additives) on BW and slaughter parameters% of Cobb broiler is illustrated in Table 3. Results indicate no significant treatment effect, levels and type of J or P plants, were detected on BW and slaughter parameters% of Cobb broiler chicks. However, birds fed control diet had the highest body weight and those fed control diet+0.5%P had the lowest values (2157.2 vs. 1968.2).

Results presented in Table 4 indicated that treatments insignificantly affected BW and slaughter parameters% of Ross broiler chicks except carcass weight after evisceration and dressing%. Birds fed control diet+1%P and control diet had higher carcass weight after evisceration and dressing% respectively. While birds fed control diet+1%J had lower carcass weight after evisceration and dressing%. However, birds fed control diet+1%J had the highest body weight and those fed control diet had the lowest values (2164.5 vs. 1965.8).

Regardless type of plant, level of addition insignificantly affected slaughter parameters% of Ross broiler chicks except head and spleen%.

Birds fed 0% level of addition had higher head and spleen%. While birds fed 0.5 and 1% level of addition had lower head and spleen respectively. Type of plant insignificantly affected slaughter parameters% of Ross broiler chicks except gizzard%. Birds fed jaw's mallow had higher gizzard%. While birds fed parsley had lower gizzard% (Table 4). In this respect **Ghazalah and Ibrahim (1996) and Abaza (2001)** reported that addition of medicinal plants had no negative impacts on carcass parameters. Moreover, **Azouz (2001); Abd El-Latif, *et al.* (2002); El-Husseiny, *et al.* (2002) and Hassan, *et al.* (2004)** found that addition of medicinal plants had significantly higher dressing% in Japanese quail and broilers than those fed the control diets. Also, **Ibrahim, *et al.* (2004)** demonstrated that rabbits received either dill or parsley at 1.0% dose showed a significant ($P \leq 0.05$) decrease in abdominal fat weight. Also, the study showed that two commercial broiler strains differed in response of BW and slaughter parameters to different levels of J and P as shown in Tables 3 and 4.

**Chemical composition of broiler meat:**

Table 5 reveals that treatments significantly affected moisture, ash and fat percentages of Cobb broiler meat. Higher moisture and ash% were observed for birds fed control diet+1%P, while, those fed control diet+1%J and 0.5J had lower moisture and ash% respectively. Birds fed control diet+0.5%J had higher fat, while birds fed control diet had lower fat%. However, insignificant differences were observed in protein% of meat. Results presented in Table 5 show that level of addition insignificantly affected chemical composition of Cobb broiler meat. Type of plant significantly affected ash and fat% (Table 5). It can be seen that Cobb broiler fed Jaw's mallow diet had higher fat and lower ash%, while, Cobb broiler fed parsley diet had higher ash and lower fat, and this is in accordance with results reported by **Al-Harthi (2004).**

Results presented in Table 6 show that the treatments significantly affected moisture and ash% of Ross broiler meat. Higher moisture and ash% were observed for birds fed control diet + 0.5%P, while, those fed control diet + 0.5%J had lower moisture and ash%. However, insignificant differences were observed in fat and protein% of meat for treatments. Results presented in Table 6 show that level of addition insignificantly affected moisture, ash and fat% of Ross broiler meat. While, significantly affected protein% of Ross broiler meat. Higher protein% were observed for birds fed 0.5% level of addition, while, those fed 1% level of addition had lower protein%. Type of plant significantly affected moisture and ash%. It can be seen that Ross broiler fed parsley diet had higher moisture and ash%, while, Ross broiler fed Jaw's mallow diet had lower moisture and ash% (Table 6).

**Plasma glutathione peroxidase (GPX) activity:**

The effects of treatments, level and type of addition on blood plasma GPX activity from Cobb and Ross strains are given in Table 7. GPX activity from both strains were significantly affected by treatments and type of addition, while it was not influenced by the level of addition.

Birds from Cobb strain fed control diet+1%P had significant highest enzyme activity, while, those fed control diet+1J had the lowest values. Regarding type of plant, birds fed parsley had significant higher enzyme activity than those fed jaw's mall plant (Table 7). These results support that parsley has an antioxidant activity **(Kery *et al.*2001; Ahsan *et al*.1990 and Jimenez-Alvarez *et al.*2008).**

Birds from Ross strain fed control diet+0.5%J had significant highest enzyme activity, while, those fed control diet had the lowest values. Regarding type of plant, birds fed J had significant higher enzyme activity than those fed parsley plant as shown in Table 7. These results suggested that feeding on parsley and jaw's mall plants enhanced antioxidant enzymes activities (Catalase and Superoxside dismutase) since there were significant correlation among these enzymes activities which has been reported by **Abdel Azim and Farahat (2009)**.

**Peroxide value:**

The change in the peroxide values (meq./kg fat) as a measure of lipid deterioration and loss of quality of Ross and Cobb broiler meat fed on J and P dried leaves during storage for four weeks at -18ºC was examined and the obtained results are illustrated graphically in figure 1. The illustrated data clearly indicated that the peroxide value of thigh and breast of two strains were affected by feeding J and P dried leaves compared with the control group. Generally, the groups fed diets containing J and P dried leaves have the lowest peroxide values compared to the group fed on diet free from J and P leaves. These lowest peroxide values may be attributed to leaves containing antioxidants component, which lead to reduction in the oxidation deterioration of poultry meat and fat.

Oxidative deterioration is a serious quality problem concretes the poultry industry because the large portion of high unsaturated fatty acids naturally presented facilitates to oxidation rancidity, which develop the off flavor. In addition products are unstable and tend to react with compounds with free amino groups (proteins, peptides and free amino acids) as a result of these finds of reactions, loss of essential nutrients have been observed during processing and storage **(Nielsen *et al.*, 1985 and Hidalgo *et al.*, 1992).** In the same time both of thigh and breast of two strains examined have the same trend.

**Cooking losses:**

The cooking losses% of Cobb breast chicken meat feed on control diet+1%J was lower than of control sample as shown in Table 8.

Results presented in Table 9 showed the cooking losses% of Ross chicken meat as affected by feeding on J and P. The data revealed that, treatment, level of addition and type of plants had insignificantly affected on cooking losses%. **Maountney (1981**) mentioned that the range of cooking yields of chicken cooked by boiling was 82.62 %.

**Water holding capacity (WHC):**

Water holding capacity is the ability of the meat to bind water as well as added water during the action of given mechanical force. WHC is an important physical property of meat and mainly affect the texture, tenderness and cooking loss of meat products. Data presented in Table 8 showed that treatment significantly affected WHC of Cobb broiler meat. Birds fed control diet had highest WHC than other treatment. Also, the data indicated that feeding J and P improved the WHC of meat; these results are in agreement with **(Lee *et al.*, 1976 and Dransfield and Sosnicki, 1999)** and in contrast to what have been described previously by **Young *et al.* (2003).**

The level of addition (regardless type of plant) significantly affected breast and thigh WHC of Cobb broiler meat. Birds fed 0% level of addition had higher breast and thigh WHC than other levels of addition. Type of plant significantly affected breast and thigh WHC (Table 8). It can be noticed that Cobb broiler fed jaw's mallow diet had the higher breast and thigh WHC than fed parsley diet.

Treatment significantly affected WHC of Ross broiler meat. Birds fed control diet had highest WHC than other treatment. The data indicated that feeding on J and P improves the water holding capacity of meat**.** The level of addition significantly affected breast and thigh WHC of Ross broiler meat. Birds fed 0% level of addition had higher breast and thigh WHC than other levels of addition. Type of plant significantly affected breast WHC. It can be seen that Ross broiler fed parsley diet had the higher breast WHC than fed jaw's mallow diet (Table 9).

**pH:** The pH value is one of the most important factors that affect protein solubility, water holding capacity, moisture retention, drip loss and cooking loss. The pH value of raw meat depends upon many factors, but it is normally in the range of 5.6 to 6.5 **(Ranken, 2000).** Data indicated that treatment significantly affected pH of thigh meat of Cobb broiler chicks. Birds fed control diet+0.5%P had higher pH than other treatments. While, level of addition and type of plant insignificantly affected breast and thigh pH values of Cobb broiler meat (Table 8). The pH is known to influence the structure of myofibrils and consequently the water holding capacity and the color of the meat. It is well established **(Warris, 2000)** that shrinkage of the contractile fibers caused by a lower pH reduces the water-binding ability and therefore increases light scattering. These relationships were confirmed in the present study where organic birds had muscles with lower water holding capacity and higher reflectance.

Data presented in Table 9 showed that treatment significantly affected pH of breast and thigh meat of Ross broiler chicks. Birds fed control diet + 1%P and control diet had higher pH values than other treatments. Level of addition significantly affected pH of Ross breast meat. Birds fed 1% level of addition had higher breast pH meat than other levels of addition. While, type of plant insignificantly affected breast and thigh pH values of Ross broiler meat. The lower pH value of the organic chickens could be due to the better welfare conditions that reduced the stress pre-slaughter and thus consumption of glycogen. In fact, the behavior observations of the organic birds showed a better response to the tonic immobility test **(Scott and Moran, 1993 and Castellini *et al.*, 2002).**

**Sensory evaluation:**

Sensory quality of color, texture, taste and odor are the major properties that contribute to the consumer acceptability of meat. Data in Tables 10 and 11 showed the effect of feeding on J and P on sensory properties of chicken meat. Treatment significantly affected taste of thigh meat of Cobb broiler chicks, birds fed control diet had lower taste value than other treatments. Level of addition significantly affected taste of Cobb chicken meat, birds fed 0.5 and 1% level of addition had higher taste meat than 0% level of addition. While, type of plant insignificantly affected breast and thigh taste values of Cobb broiler meat (Table 10). Treatment, level of addition and type of plant insignificantly affected sensory quality of Ross broiler meat except treatment breast texture. Birds fed control diet+1%J had lower breast texture value than other treatments (Table 11). Consumer concern about appearance is the major criterion for purchase selection and initial evaluation of meat quality. Other quality attributes, such as tenderness, juiciness, drip-loss, cook-loss, pH, and shelf-life are important to the consumer after purchasing the product, as well as to the processor when producing value-added meat products. Observed differences in the tenderness may be related to differences in myofiber size. Fast growing strains of birds have larger myofiber than slow growing strains **(Dransfield and Sosnicki, 1999)**.

**Correlation coefficients estimate between body weight (BW) and studied traits:**

Correlation coefficients estimate between BW and blood plasma glutathione peroxidase (GPX) activity, carcass characteristics and meat quality for Cobb, Ross and both strains are presented in Tables 12 and 13. Considerable variations of the correlations values between strains were found. Similar trend of genotype differences for correlation coefficients among some blood parameters were reported by **El-Safty *et al.* (2006) and Abdel Azim and Farahat (2009)**.

In Cobb strain, BW had positive correlation with moisture% and breast pH (0.90 and 0.85 at P≤0.01), breast WHC, thigh WHC, breast odor, breast and thigh PV (0.74, 0.72, 0.62,0.70 and 0.73 at P≤0.05, respectively). Whereas significant negative correlations were found between BW and each of gizzard, total giblet%, thigh pH and breast texture (-0.93, -0.82, -0.97 and -0.84 at P≤0.01, respectively), liver, thigh cooking looses% and breast taste (-0.56, -0.71 and -0.66 at P≤0.05, respectively) as shown in Tables 12 and 13.

In Ross strain, BW had positive correlation with GPX activity and blood&feathers% (0.91 and 0.92 at P≤0.01), gizzard% and breast PV (0.60 and 0.71 at P≤0.05). However, BW was negatively correlated with each of thigh%, breast WHC and thigh pH (-0.84, -0.77 and -0.81 at P≤0.01, respectively), head%, heart%, carcass%, dressing%, moisture%, ash% and thigh PV (-0.69, -0.76, -0.74,-0.73, -0.64, - and -0.66 at P≤0.05, respectively) as illustration in Tables 12 and 13.

Regardless of the strain, BW was positively correlated with blood&feathers% (0.75 at P≤0.01), while the correlation was negative for dressing% (-0.53 at P≤0.05) and thigh pH (-0.78 at P≤0.01).

**Correlation coefficients estimate between plasma GPX activity and studied traits:**

Correlation coefficients estimate between GPX activity and carcass characteristics and meat quality for Cobb, Ross and both strains are given in Tables 12 and 13.

In Cobb strain, GPX activity was positively correlated with each of heart%, spleen% and thigh texture (0.91,0.86 and 0.80 at P≤0.01), mos%, ash%, protein%, breast general appearance, breast and thigh odor (0.65, 0.62, 0.68,0.64, 0.62 and 0.68 at P≤0.05, respectively). However, significant negative correlations were found between GPX activity and each of abdominal fat% (-0.83 at P≤0.01), head and breast% (-0.66 and -0.62 at P≤0.05, respectively) as illustration in Tables 12 and 13.

In Ross strain, GPX activity was positively correlated with blood&feathers%, gizzard% and breast PV (0.74, 0.68 and 0.68 at P≤0.05). While, GPX activity was negatively correlated with mos% (-0.92 at P≤0.01), head%, heart%, thigh%, thigh meat%, breast and thigh WHC and thigh PV (-0.65, -0.63, -0.75,-0.60, -0.71,-0.66 and -0.60 at P≤0.05, respectively) as shown in Tables 12 and 13.

Regardless of the strain, GPX activity was positively correlated with thigh% and thigh PV (P≤0.01), while the correlation was negative for head%, abdominal fat% and thigh WHC (P≤0.01) and liver% and breast WHC (P≤0.05) as illustration in Tables 12 and 13.

Our study concluded that the two commercial broiler strains differed in response of studied traits to different levels of J and P. Although computers can manipulate feedstuffs and optimize nutrient cost to attain requirement levels, other factors must also be considered like feed additive to improve the composition and quality meat. Strain-crosses respond differently to nutrition when response is expressed as live performance; however, effects on the resulting carcass appear to be distinct and largely independent. The results indicated that feeding on diets containing parsley and jaw's mallow increased GPX activity and improve the composition and quality of chicken meat. Correlation among previous parameters and GPX activity indicated that, estimate of GPX activity could be used as a good indicator to the other parameters based on the high correlation values which obtained in our results. Also, this highly correlation values may be attributed to the pleiotropic effects and consequently performing selection in any of the two traits may lead to an improvement in the other trait, but further research is needed to prove that hypothesis.

**Table** (2)**:** Composition and analyses of the control diets.

| Item % | Cobb | | | Ross | | |
|---|---|---|---|---|---|---|
| | Starter | Grower | Finisher | Starter | Grower | Finisher |
| Yellow corn, ground | 61.00 | 64.80 | 67.00 | 54.82 | 57.20 | 62.70 |
| Soybean meal (44%CP) | 25.50 | 25.10 | 20.00 | 31.00 | 27.40 | 22.48 |
| Broiler concentrate(48%CP[1]) | 10.00 | 5.00 | 7.50 | 10.00 | 10.00 | 10.00 |
| Calcium carbonate | 0.50 | 0.60 | 0.50 | 0.61 | 0.38 | 0.10 |
| Sodium chloride | 0.05 | 0.18 | 0.13 | 0.05 | 0.05 | 0.05 |
| Vit. and Min. premix[2] | 0.30 | 0.30 | 0.30 | 0.30 | 0.30 | 0.30 |
| Dicalcium phosphate | 0.89 | 1.30 | 0.94 | 0.46 | 0.30 | 0.30 |
| Vegetable oil[3] | 1.60 | 2.50 | 3.40 | 2.50 | 4.15 | 4.00 |
| DL–Methionine | 0.10 | 0.12 | 0.11 | 0.12 | 0.11 | 0.05 |
| L-Lysine | 0.06 | 0.10 | 0.12 | 0.14 | 0.11 | 0.02 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| Calculated analysis%[4] | | | | | | |
| Crude protein | 21.32 | 19.12 | 18.27 | 23.30 | 21.88 | 20.07 |
| Ether extract | 4.60 | 5.40 | 6.46 | 5.31 | 7.02 | 7.04 |
| Crude fiber | 3.28 | 3.26 | 2.99 | 3.53 | 3.33 | 3.10 |
| Calcium | 1.18 | 0.98 | 1.01 | 1.13 | 1.00 | 0.88 |
| Available phosphorus | 0.58 | 0.50 | 0.50 | 0.51 | 0.47 | 0.46 |
| Methionine | 0.49 | 0.45 | 0.44 | 0.53 | 0.50 | 0.42 |
| Methionine+Cystine | 0.82 | 0.76 | 0.74 | 0.89 | 0.84 | 0.74 |
| Lysine | 1.14 | 1.06 | 1.01 | 1.35 | 1.23 | 1.03 |
| ME, kcal./Kg | 3003 | 3084 | 3186 | 3004 | 3150 | 3206 |

[1] **Broiler concentrate manufactured by AlpHa Feed for Premix Production Company and contains:**

48% Crude protein, 1.5% crude fiber, 4.75% ether extract, 6.85% calcium, 3% available phosphorus, 1.2% methionine, 1.8% methionine + cystine, 2.4% lysine, 0.96% Sodium, 2415 K cal ME/kg.

[2] **Each 3.0 Kg of the Vit. and Min. premix manufactured by Vetgreen Company and contains:**

Vit. A, 10000000 IU; Vit. $D_3$ 2000000 IU; Vit. E, 1000 mg; Vit. $K_3$, 1000 mg; Vit. B1, 1000 mg; Vit. B2, 500 mg; Vit. B6, 1500 mg; Vit. B12, 10 mg; biotin, 50 mg; folic acid, 1 mg; niacin , 3000 mg; Ca pantothenate, 1000 mg; Zn, 50 g; Cu,4 g; Fe, 30 g; Co, 0.1 g; Se, 0.1 g; I, 0.3 g; Mn, 60 g and anti-oxidant, 10 g, and complete to 3.0 Kg by calcium carbonate.

[3] Mixture from 75% soybean oil and 25% sunflower oil.

[4] According to **NRC, 1994**

**Table (3):** Effect of feeding jew's mallow (J) and parsley (P) on body weight and slaughter parameters% of Cobb broiler chicks.

| Item | Body weight | Blood &feather | leg | Head | Neck | Heart | Liver | Gizzard | Spleen |
|---|---|---|---|---|---|---|---|---|---|
| **Treatments**: | | | | | | | | | |
| **Control** | 2157.2±93.81 | 8.67±0.32 | 3.92±0.20 | 2.17±0.09 | 4.73±0.22 | 0.52±0.04 | 1.65±0.12 | 1.16±0.10 | 0.18±0.04 |
| **Control + 0.5%J** | 2088.5±93.8 | 8.30±0.32 | 3.62±0.20 | 2.10±0.09 | 4.63±0.22 | 0.53±0.04 | 1.87±0.12 | 1.26±0.10 | 0.16±0.04 |
| **Control + 1.0%J** | 2008.3±93.8 | 8.57±0.32 | 3.43±0.20 | 2.11±0.09 | 4.38±0.22 | 0.52±0.04 | 1.89±0.12 | 1.48±0.10 | 0.15±0.04 |
| **Control + 0.5%P** | 1968.2±93.8 | 8.53±0.32 | 3.82±0.20 | 2.09±0.09 | 4.89±0.22 | 0.55±0.04 | 1.90±0.12 | 1.42±0.10 | 0.19±0.04 |
| **Control + 1.0%P** | 2125.7±93.8 | 8.82±0.32 | 3.90±0.20 | 2.05±0.09 | 4.80±0.22 | 0.60±0.04 | 1.89±0.12 | 1.25±0.10 | 0.22±0.04 |
| **Overall mean** | 2069.6±42.0 | 8.58±0.14 | 3.74±0.09 | 2.10±0.04 | 4.69±0.10 | 0.55±0.02 | 1.84±0.06 | 1.31±0.04 | 0.18±0.02 |
| **Level of addition%:** | | | | | | | | | |
| **0.0** | 2157.2±92.7 | 8.67±0.30 | 3.92±0.21 | 2.17±0.09 | 4.73±0.23 | 0.52±0.04 | 1.65±0.12 | 1.16±0.10 | 0.18±0.04 |
| **0.5** | 2028.4±65.6 | 8.42±0.21 | 3.72±0.15 | 2.10±0.06 | 4.76±0.16 | 0.54±0.03 | 1.88±0.08 | 1.34±0.07 | 0.17±0.03 |
| **1.0** | 2067.0±65.6 | 8.70±0.21 | 3.66±0.15 | 2.08±0.06 | 4.59±0.16 | 0.56±0.03 | 1.89±0.08 | 1.36±0.07 | 0.19±0.03 |
| **Type of plant:** | | | | | | | | | |
| **Jew's mallow** | 2048.4±70.5 | 8.44±0.22 | 3.53±0.15 | 2.11±0.05 | 4.51±0.13 | 0.53±0.02 | 1.88±0.08 | 1.37±0.08 | 0.16±0.03 |
| **Parsley** | 2047.0±70.5 | 8.67±0.22 | 3.86±0.15 | 2.07±0.05 | 4.85±0.13 | 0.58±0.02 | 1.90±0.08 | 1.33±0.08 | 0.21±0.03 |

[1] Mean ± standard error of the mean.

**Table (3):** (Cont.) Effect of feeding jew's mallow (J) and parsley (P) on slaughter parameters% of Cobb broiler chicks.

| Item | Total giblets | Abdominal fat | Breast weight | Thigh weight | Breast meat | Thigh meat | Carcass weight after evisceration | Dressing |
|---|---|---|---|---|---|---|---|---|
| **Treatments**: | | | | | | | | |
| **Control** | 3.51±0.16[1] | 1.91±0.25 | 18.30±0.74 | 14.15±0.45 | 88.80±0.83 | 86.99±0.82 | 63.88±1.06 | 68.33±1.01 |
| **Control + 0.5% J** | 3.81±0.16 | 2.04±0.25 | 17.51±0.74 | 14.33±0.45 | 87.12±0.83 | 85.40±0.82 | 63.96±1.06 | 68.82±1.01 |
| **Control + 1.0% J** | 4.04±0.16 | 2.27±0.25 | 18.06±0.74 | 14.78±0.45 | 87.39±0.83 | 87.59±0.82 | 63.68±1.06 | 68.81±1.01 |
| **Control + 0.5% P** | 4.06±0.16 | 1.85±0.25 | 17.06±0.74 | 13.70±0.45 | 87.54±0.83 | 86.85±0.82 | 62.71±1.06 | 67.90±1.01 |
| **Control + 1.0% P** | 3.97±0.16 | 1.57±0.25 | 16.97±0.74 | 13.97±0.45 | 86.91±0.83 | 87.81±0.82 | 62.96±1.06 | 68.04±1.01 |
| **Overall mean** | 3.88±0.07 | 1.93±0.11 | 17.58±0.33 | 14.18±0.20 | 87.55±0.37 | 86.93±0.37 | 63.44±0.47 | 68.38±0.45 |
| **Level of addition%:** | | | | | | | | |
| **0.0** | 3.51±0.16 | 1.91±0.26 | 18.30±0.73 | 14.15±0.46 | 88.80±0.79 | 86.99±0.81 | 63.88±1.02 | 68.33±0.97 |
| **0.5** | 3.94±0.11 | 1.95±0.19 | 17.29±0.51 | 14.01±0.32 | 87.33±0.56 | 86.13±0.58 | 63.33±0.72 | 68.36±0.68 |
| **1.0** | 4.00±0.11 | 1.92±0.19 | 17.52±0.51 | 14.37±0.32 | 87.15±0.56 | 87.70±0.58 | 63.31±0.72 | 68.43±0.68 |
| **Type of plant:** | | | | | | | | |
| **Jew's mallow** | 3.92±0.12 | 2.15±0.18 | 17.79±0.49 | 14.55±0.30 | 87.26±0.59 | 86.50±0.61 | 63.82±0.77 | 68.81±0.73 |
| **Parsley** | 4.01±0.12 | 1.71±0.18 | 17.02±0.49 | 13.83±0.30 | 87.22±0.59 | 87.33±0.61 | 62.84±0.77 | 67.79±0.73 |

[1] Mean ± standard error of the mean.

**Table (4):** Effect of feeding jew's mallow (J) and parsley (P) on body weight (BW) and slaughter parameters% of Ross broiler chicks.

| Item | Body weight | Blood &feather | Leg | Head | Neck | Heart | Liver | Gizzard | Spleen |
|---|---|---|---|---|---|---|---|---|---|
| **Treatments**: | | | | | | | | | |
| **Control** | 1965.8±102.7 | 7.83±0.54[1] | 3.65±0.21 | 2.14±0.08 | 4.18±0.36 | 0.64±0.04 | 1.83±0.10 | 1.38±0.10 | 0.20±0.02 |
| **Control + 0.5% J** | 2144.7±102.7 | 8.62±0.54 | 3.92±0.21 | 1.89±0.08 | 4.90±0.36 | 0.57±0.04 | 1.67±0.10 | 1.53±0.10 | 0.21±0.02 |
| **Control + 1.0% J** | 2164.5±102.7 | 9.11±0.54 | 3.83±0.21 | 1.90±0.08 | 4.67±0.36 | 0.54±0.04 | 1.67±0.10 | 1.41±0.10 | 0.16±0.02 |
| **Control + 0.5% P** | 2022.5±102.7 | 8.38±0.54 | 3.81±0.21 | 1.90±0.08 | 5.04±0.36 | 0.58±0.04 | 1.64±0.10 | 1.25±0.10 | 0.19±0.02 |
| **Control + 1.0% P** | 2014.5±102.7 | 8.36±0.54 | 4.01±0.21 | 1.90±0.08 | 4.75±0.36 | 0.56±0.04 | 1.52±0.10 | 1.23±0.10 | 0.14±0.02 |
| **Overall mean** | 2062.4±45.9 | 8.46±0.24 | 3.84±0.10 | 1.94±0.04 | 4.71±0.16 | 0.58±0.02 | 1.67±0.04 | 1.36±0.04 | 0.18±0.01 |
| **Level of addition%:** | | | | | | | | | |
| **0.0** | 1965.8±102.0 | 7.83±0.53 | 3.65±0.20 | 2.14±0.08[a] | 4.18±0.34 | 0.64±0.03 | 1.83±0.09 | 1.38±0.11 | 0.20±0.02[a] |
| **0.5** | 2083.6±72.1 | 8.50±0.37 | 3.86±0.14 | 1.89±0.06[b] | 4.97±0.24 | 0.58±0.02 | 1.66±0.07 | 1.39±0.07 | 0.20±0.01[a] |
| **1.0** | 2089.5±72.1 | 8.73±0.37 | 3.92±0.14 | 1.90±0.06[b] | 4.71±0.24 | 0.55±0.02 | 1.60±0.07 | 1.32±0.07 | 0.15±0.01[b] |
| **Type of plant:** | | | | | | | | | |
| **Jew's mallow** | 2154.6±68.6 | 8.86±0.20 | 3.87±0.14 | 1.89±0.06 | 4.78±0.26 | 0.56±0.02 | 1.67±0.07 | 1.47±0.06[a] | 0.18±0.02 |
| **Parsley** | 2018.5±68.6 | 8.37±0.20 | 3.91±0.14 | 1.90±0.06 | 4.90±0.26 | 0.57±0.02 | 1.58±0.07 | 1.24±0.06[b] | 0.16±0.02 |

[1] Mean ± standard error of the mean.
[a, …b,] values in the same column within the same item followed by different superscripts are significantly different ($P \leq 0.05$ ).

**Table (4):** (Cont.) Effect of feeding jew's mallow (J) and parsley (P) on slaughter parameters% of Ross broiler chicks.

| Item | Total giblets | Abdominal fat | Breast weight | Thigh weight | Breast meat | Thigh meat | Carcass weight after evisceration | Dressing |
|---|---|---|---|---|---|---|---|---|
| **Treatments**: | | | | | | | | |
| **Control** | 4.06±0.15[1] | 1.51±0.30 | 17.36±0.58 | 14.34±0.54 | 87.73±0.79 | 86.79±1.20 | 64.72±1.0[a] | 69.77±1.0[a] |
| **Control + 0.5% J** | 3.98±0.15 | 1.68±0.30 | 18.41±0.58 | 13.89±0.54 | 87.49±0.79 | 84.99±1.20 | 64.19±1.0[a] | 69.09±1.0[a] |
| **Control + 1.0% J** | 3.77±0.15 | 1.70±0.30 | 16.50±0.58 | 13.93±0.54 | 87.88±0.79 | 86.64±1.20 | 60.38±1.0[b] | 65.24±1.0[b] |
| **Control + 0.5% P** | 3.66±0.15 | 1.93±0.30 | 17.05±0.58 | 14.04±0.54 | 87.41±0.79 | 85.76±1.20 | 63.16±1.0[ab] | 67.78±1.0[ab] |
| **Control + 1.0% P** | 3.46±0.15 | 1.86±0.30 | 17.13±0.58 | 14.47±0.54 | 87.19±0.79 | 85.49±1.20 | 65.02±1.0[a] | 69.31±1.0[a] |
| **Overall mean** | 3.79±0.07 | 1.74±0.14 | 17.29±0.26 | 14.14±0.24 | 87.54±0.35 | 85.93±0.54 | 63.49±0.45 | 68.24±0.46 |
| **Level of addition%:** | | | | | | | | |
| **0.0** | 4.06±0.16 | 1.51±0.29 | 17.36±0.60 | 14.34±0.52 | 87.73±0.75 | 86.79±1.15 | 64.72±1.25 | 69.77±1.22 |
| **0.5** | 3.82±0.11 | 1.80±0.21 | 17.73±0.42 | 13.97±0.37 | 87.45±0.53 | 85.37±0.82 | 63.68±0.88 | 68.44±0.86 |
| **1.0** | 3.62±0.11 | 1.78±0.21 | 16.82±0.42 | 14.20±0.37 | 87.54±0.53 | 86.07±0.82 | 62.70±0.88 | 67.27±0.86 |
| **Type of plant:** | | | | | | | | |
| **Jew's mallow** | 3.87±0.11 | 1.69±0.20 | 17.46±0.45 | 13.91±0.38 | 87.69±0.52 | 85.81±0.80 | 62.28±0.83 | 67.17±0.86 |
| **Parsley** | 3.56±0.11 | 1.90±0.20 | 17.09±0.45 | 14.26±0.38 | 87.30±0.52 | 85.62±0.80 | 64.09±0.83 | 68.54±0.86 |

[1] Mean ± standard error of the mean.

[a, …b,] values in the same column within the same item followed by different superscripts are significantly different ($P \leq 0.05$).

**Table (5):** Effect of feeding jew's mallow (J) and parsley (P) on chemical composition of Cobb broiler meat.

| Item | Moisture% | Ash% | Fat% | Protein% |
|---|---|---|---|---|
| **Treatments:** | | | | |
| Control | 72.81±0.16[1A] | 1.92±0.12[a] | 5.97±0.22[C] | 21.94±0.49 |
| Control + 0.5%J | 72.58±0.16[A] | 1.48±0.12[b] | 8.09±0.22[A] | 23.07±0.49 |
| Control + 1.0%J | 71.86±0.16[B] | 1.70±0.12[ab] | 7.46±0.22[AB] | 22.66±0.49 |
| Control + 0.5%P | 71.98±0.16[B] | 1.87±0.12[ab] | 6.46±0.22[C] | 22.00±0.49 |
| Control + 1.0%P | 73.07±0.16[A] | 2.10±0.12[a] | 6.66±0.22[BC] | 23.60±0.49 |
| Overall mean | 72.46±0.07 | 1.81±0.06 | 6.93±0.10 | 22.65±0.22 |
| **Level of addition%:** | | | | |
| 0.0 | 72.81±0.31 | 1.92±0.16 | 5.97±0.52 | 21.94±0.56 |
| 0.5 | 72.28±0.22 | 1.67±0.11 | 7.27±0.37 | 22.53±0.40 |
| 1.0 | 72.47±0.22 | 1.90±0.11 | 7.06±0.37 | 23.13±0.40 |
| **Type of plant:** | | | | |
| Jew's mallow | 72.22±0.23 | 1.59±0.10[b] | 7.78±0.20[A] | 22.87±0.46 |
| Parsley | 72.53±0.23 | 1.99±0.10[a] | 6.56±0.20[B] | 22.80±0.46 |

[1] Mean ± standard error of the mean
[a, …b,] and [A,.. C,] values in the same column within the same item followed by different superscripts are significantly different (at $P \leq 0.05$ for a to b ; $P \leq 0.01$ for A to C).

**Table (6):** Effect of feeding jew's mallow (J) and parsley (P) on chemical composition of Ross broiler meat.

| Item | Moisture% | Ash% | Fat% | Protein% |
|---|---|---|---|---|
| **Treatments:** | | | | |
| Control | 74.11±0.22[1AB] | 1.68±0.06[BC] | 7.16±0.29 | 23.06±0.25 |
| Control + 0.5%J | 71.87±0.22[C] | 1.55±0.06[C] | 6.55±0.29 | 23.07±0.25 |
| Control + 1.0%J | 73.70±0.22[B] | 1.34±0.06[D] | 7.16±0.29 | 22.28±0.25 |
| Control + 0.5%P | 74.59±0.22[A] | 2.11±0.06[A] | 6.11±0.29 | 23.46±0.25 |
| Control + 1.0%P | 73.52±0.22[B] | 1.78±0.06[B] | 6.57±0.29 | 22.24±0.25 |
| Overall mean | 73.56±0.10 | 1.69±0.03 | 6.71±0.13 | 22.82±0.11 |
| **Level of addition%:** | | | | |
| 0.0 | 74.11±0.59 | 1.68±0.16 | 7.16±0.31 | 23.06±0.24[A] |
| 0.5 | 73.23±0.42 | 1.83±0.11 | 6.33±0.22 | 23.27±0.17[A] |
| 1.0 | 73.61±0.42 | 1.56±0.11 | 6.86±0.22 | 22.26±0.17[B] |
| **Type of plant:** | | | | |
| Jew's mallow | 72.78±0.37 [b] | 1.44±0.07[B] | 6.86±0.24 | 22.67±0.34 |
| Parsley | 74.05±0.37 [a] | 1.95±0.07[A] | 6.34±0.24 | 22.85±0.34 |

[1] Mean ± standard error of the mean
[a, …b,] and [A,.. C,] values in the same column within the same item followed by different superscripts are significantly different (at $P \leq 0.05$ for a to b ; $P \leq 0.01$ for A to C).

**Table (7):** Effect of feeding jew's mallow (J) and parsley (P) on glutathione peroxidase enzyme activity of Cobb and Ross strains.

| Item | Glutathione Peroxidase Activity | |
|---|---|---|
| | Cobb | Ross |
| **Treatments:** | | |
| **Control** | **928.95±36.13[1ab]** | **981.00±44.53[b]** |
| **Control + 0.5%J** | **948.20±26.75[ab]** | **1128.00±11.73[a]** |
| **Control + 1.0%J** | **896.50±17.10[b]** | **1062.25±45.31[ab]** |
| **Control + 0.5%P** | **931.70±30.89[ab]** | **996.75±20.74[b]** |
| **Control + 1.0%P** | **1036.75±62.29[a]** | **1027.50±54.89[ab]** |
| **Level of addition%:** | | |
| **0.0** | **928.95±36.13** | **981.00±44.53** |
| **0.5** | **922.35±17.65** | **1062.38±27.15** |
| **1.0** | **984.23±37.81** | **1044.88±33.60** |
| **Type of plant:** | | |
| **Jew's mallow** | **922.35±17.65[b]** | **1095.13±24.98[a]** |
| **Parsley** | **984.23±37.81[a]** | **1012.13±27.78[b]** |

[1] Mean ± standard error of the mean.
[a, …b,] values in the same column within the same item followed by different superscripts are significantly different (at P ≤ 0.05).

**Table (8):** Effect of feeding jew's mallow (J) and parsley (P) on cooking losses%, pH and water holding capacity (WHC) of Cobb chicken meat.

| Item | Cooking losses% | | WHC ($cm^2$) | | pH | |
|---|---|---|---|---|---|---|
| | Breast | Thigh | Breast | Thigh | Breast | Thigh |
| **Treatments:** | | | | | | |
| Control | 17.44±0.22[1a] | 16.28±0.25 | 3.77±0.07[A] | 3.67±0.12[A] | 5.88±0.07 | 5.58±0.03[B] |
| Control + 0.5%J | 17.27±0.22[a] | 16.91±0.25 | 2.57±0.07[B] | 2.52±0.12[B] | 5.87±0.07 | 5.63±0.03[B] |
| Control + 1.0%J | 16.45±0.22[b] | 16.40±0.25 | 2.38±0.07[B] | 2.47±0.12[B] | 5.73±0.07 | 5.78±0.03[A] |
| Control + 0.5%P | 17.90±0.22[a] | 17.45±0.25 | 2.06±0.07[C] | 1.79±0.12[C] | 5.75±0.07 | 5.84±0.03[A] |
| Control + 1.0%P | 17.15±0.22[ab] | 16.06±0.25 | 2.11±0.07[C] | 1.95±0.12[C] | 5.82±0.07 | 5.65±0.03[B] |
| Overall mean | 17.24±0.10 | 16.62±0.11 | 2.57±0.03 | 2.48±0.05 | 5.81±0.03 | 5.70±0.01 |
| **Level of addition%:** | | | | | | |
| 0.0 | 17.44±0.31 | 16.28±0.27[b] | 3.77±0.16[A] | 3.67±0.26[A] | 5.88±0.07 | 5.58±0.07 |
| 0.5 | 17.59±0.22 | 17.18±0.19[a] | 2.32±0.12[B] | 2.15±0.18[B] | 5.81±0.05 | 5.73±0.05 |
| 1.0 | 16.80±0.22 | 16.23±0.19[b] | 2.24±0.12[B] | 2.21±0.18[B] | 5.77±0.05 | 5.72±0.05 |
| **Type of plant:** | | | | | | |
| Jew's mallow | 16.86±0.23 | 16.65±0.34 | 2.47±0.06[A] | 2.49±0.07[A] | 5.80±0.05 | 5.71±0.05 |
| Parsley | 17.53±0.23 | 16.76±0.34 | 2.08±0.06[B] | 1.87±0.07[B] | 5.78±0.05 | 5.74±0.05 |

[1] Mean ± standard error of the mean

[a, …b,] and [A,.. C,] values in the same column within the same item followed by different superscripts are significantly different (at $P \leq 0.05$ for a to b ; $P \leq 0.01$ for A to C).

**Table (9):** Effect of feeding jew's mallow (J) and parsley (P) on cooking losses%, pH and water holding capacity (WHC) of Ross chicken meat.

| Item | Cooking losses% | | WHC ($cm^2$) | | pH | |
|---|---|---|---|---|---|---|
| | Breast | Thigh | Breast | Thigh | Breast | |
| **Treatments:** | | | | | | |
| Control | 18.37±0.37[1] | 16.66±0.38 | 3.57±0.07$^{A}$ | 3.37±0.13$^{A}$ | 5.73±0.05$^{b}$ | 5.94±0.04$^{A}$ |
| Control+0.5%J | 17.56±0.37 | 17.20±0.38 | 1.94±0.07$^{BC}$ | 1.34±0.13$^{C}$ | 5.63±0.05$^{b}$ | 5.84±0.04$^{AB}$ |
| Control+1.0%J | 17.26±0.37 | 17.11±0.38 | 1.86±0.07$^{C}$ | 2.21±0.13$^{B}$ | 5.92±0.05$^{a}$ | 5.56±0.04$^{C}$ |
| Control+0.5%P | 16.81±0.37 | 16.76±0.38 | 2.09±0.07$^{BC}$ | 1.74±0.13$^{C}$ | 5.69±0.05$^{b}$ | 5.77±0.04$^{B}$ |
| Control+1.0%P | 18.23±0.37 | 18.37±0.38 | 2.16±0.07$^{B}$ | 1.63±0.13$^{C}$ | 5.94±0.05$^{a}$ | 5.93±0.04$^{A}$ |
| Overall mean | 17.65±0.17 | 17.22±0.17 | 2.32±0.03 | 2.06±0.06 | 5.78±0.02 | 5.80±0.02 |
| **Level of addition%** | | | | | | |
| 0.0 | 18.37±0.45 | 16.66±0.48 | 3.57±0.11$^{A}$ | 3.37±0.22$^{A}$ | 5.73±0.04$^{B}$ | 5.94±0.11 |
| 0.5 | 17.19±0.32 | 16.98±0.34 | 2.01±0.08$^{B}$ | 1.54±0.15$^{B}$ | 5.66±0.03$^{B}$ | 5.80±0.08 |
| 1.0 | 17.75±0.32 | 17.74±0.34 | 2.01±0.08$^{B}$ | 1.92±0.15$^{B}$ | 5.93±0.03$^{A}$ | 5.74±0.08 |
| **Type of plant:** | | | | | | |
| Jew's mallow | 17.41±0.37 | 17.16±0.36 | 1.90±0.05$^{b}$ | 1.78±0.20 | 5.78±0.08 | 5.70±0.07 |
| Parsley | 17.52±0.37 | 17.56±0.36 | 2.12±0.05$^{a}$ | 1.68±0.20 | 5.82±0.08 | 5.85±0.07 |

[1] Mean ± standard error of the mean

$^{a,\ldots b}$ and $^{A,..C,}$ values in the same column within the same item followed by different superscripts are significantly different (at $P \leq 0.05$ for a to b; $P \leq 0.01$ for A to C).

**Table (10):** Sensory evaluation of cooked Cobb chicken meat fed jew's mallow (J) and parsley (P).

| Item | General appearance | | Color | | Texture | | Taste | | Odor | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Breast | Thigh | Breast | Thigh | Breast | Thigh | Breast | Thigh | Breast | Thigh |
| **Treatments:** | | | | | | | | | | |
| **Control** | 8.44±0.37[1] | 8.56±0.33 | 18.11±0.29 | 18.00±0.28 | 7.67±0.26 | 7.89±0.34 | 16.78±0.30 | 16.56±0.33[b] | 18.22±0.43 | 18.11±0.48 |
| **Control + 0.5% J[2]** | 8.00±0.37 | 8.33±0.33 | 17.33±0.29 | 17.67±0.28 | 7.78±0.26 | 8.11±0.34 | 17.67±0.30 | 17.89±0.33[a] | 18.44±0.43 | 18.33±0.48 |
| **Control + 1.0% J** | 8.44±0.37 | 8.89±0.33 | 18.44±0.29 | 18.33±0.28 | 8.22±0.26 | 7.78±0.34 | 17.56±0.30 | 17.11±0.33[ab] | 17.78±0.43 | 17.89±0.48 |
| **Control + 0.5% P[3]** | 8.44±0.37 | 8.56±0.33 | 17.78±0.29 | 18.00±0.28 | 8.44±0.26 | 8.33±0.34 | 17.78±0.30 | 17.67±0.33[a] | 18.00±0.43 | 18.33±0.48 |
| **Control + 1.0% P** | 8.78±0.37 | 8.78±0.33 | 18.00±0.29 | 18.00±0.28 | 8.11±0.26 | 8.56±0.34 | 17.89±0.30 | 17.89±0.33[a] | 18.44±0.43 | 18.44±0.48 |
| **Overall mean** | 8.42±0.16 | 8.62±0.15 | 17.93±0.13 | 18.00±0.13 | 8.04±0.12 | 8.13±0.15 | 17.53±0.13 | 17.42±0.15 | 18.18±0.19 | 18.22±0.22 |
| **Level of addition%:** | | | | | | | | | | |
| **0.0** | 8.44±0.36 | 8.56±0.32 | 18.11±0.29 | 18.00±0.28 | 7.67±0.26 | 7.89±0.34 | 16.78±0.29[b] | 16.56±0.33[b] | 18.22±0.43 | 18.11±0.48 |
| **0.5** | 8.22±0.26 | 8.44±0.23 | 17.56±0.21 | 17.83±0.20 | 8.11±0.19 | 8.22±0.24 | 17.72±0.21[a] | 17.79±0.24[a] | 18.22±0.31 | 18.33±0.34 |
| **1.0** | 8.61±0.26 | 8.83±0.23 | 18.22±0.21 | 18.17±0.20 | 8.17±0.19 | 8.17±0.24 | 17.72±0.21[a] | 17.50±0.24[a] | 18.11±0.31 | 18.17±0.34 |
| **Type of plant:** | | | | | | | | | | |
| **Jew's mallow** | 8.22±0.25 | 8.61±0.22 | 17.89±0.21 | 18.00±0.19 | 8.00±0.17 | 7.94±0.21 | 17.61±0.19 | 17.50±0.21 | 18.11±0.29 | 18.11±0.28 |
| **Parsley** | 8.61±0.25 | 8.67±0.22 | 17.89±0.21 | 18.00±0.19 | 8.28±0.17 | 8.44±0.21 | 17.83±0.19 | 17.78±0.21 | 18.22±0.29 | 18.39±0.28 |

[1] Mean ± standard error of the mean.

[a, …b,] values in the same column within the same item followed by different superscripts are significantly different ($P \leq 0.05$).

**Table (11):** Sensory evaluation of cooked Ross chicken meat fed jew's mallow (J) and parsley (P).

| Item | General appearance | | Color | | Texture | | Taste | | Odor | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Breast | Thigh | Breast | Thigh | Breast | Thigh | Breast | Thigh | Breast | Thigh |
| **Treatments:** | | | | | | | | | | |
| **Control** | 7.89±0.41[1] | 8.22±0.35 | 18.00±0.35 | 18.11±0.39 | 8.00±0.22[ab] | 8.56±0.27 | 17.44±0.37 | 17.44±0.38 | 18.11±0.47 | 18.11±0.47 |
| **Control + 0.5%J** | 8.33±0.41 | 8.78±0.35 | 18.00±0.35 | 18.11±0.39 | 8.56±0.22[a] | 8.67±0.27 | 18.00±0.37 | 18.11±0.38 | 18.44±0.47 | 18.67±0.47 |
| **Control + 1.0%J** | 8.22±0.41 | 8.33±0.35 | 17.89±0.35 | 17.57±0.39 | 7.67±0.22[b] | 7.67±0.27 | 17.11±0.37 | 16.78±0.38 | 17.67±0.47 | 17.67±0.47 |
| **Control + 0.5%P** | 8.33±0.41 | 8.33±0.35 | 17.67±0.35 | 17.78±0.39 | 8.11±0.22[ab] | 8.22±0.27 | 17.44±0.37 | 17.44±0.38 | 17.78±0.47 | 17.67±0.47 |
| **Control + 1.0%P** | 8.11±0.41 | 8.11±0.35 | 17.33±0.35 | 17.44±0.39 | 8.44±0.22[a] | 8.44±0.27 | 18.11±0.37 | 18.33±0.38 | 18.11±0.47 | 18.22±0.47 |
| **Overall mean** | 8.18±0.18 | 8.36±0.16 | 17.78±0.16 | 17.80±0.18 | 8.16±0.10 | 8.31±0.12 | 17.62±0.16 | 17.62±0.17 | 18.02±0.21 | 18.07±0.21 |
| **Level of addition%:** | | | | | | | | | | |
| **0.0** | 7.89±0.40 | 8.22±0.35 | 18.00±0.35 | 18.11±0.39 | 8.00±0.24 | 8.56±0.28 | 17.44±0.38 | 17.44±0.42 | 18.11±0.47 | 18.11±0.49 |
| **0.5** | 8.33±0.28 | 8.56±0.24 | 17.83±0.25 | 17.94±0.27 | 8.33±0.17 | 8.44±0.20 | 17.72±0.27 | 17.78±0.30 | 18.11±0.33 | 18.17±0.34 |
| **1.0** | 8.17±0.28 | 8.22±0.24 | 17.61±0.25 | 17.50±0.27 | 8.06±0.17 | 8.06±0.20 | 17.61±0.27 | 17.56±0.30 | 17.89±0.33 | 17.94±0.34 |
| **Type of plant:** | | | | | | | | | | |
| **Jew's mallow** | 8.28±0.28 | 8.56±0.25 | 17.94±0.24 | 17.83±0.28 | 8.11±0.17 | 8.17±0.22 | 17.56±0.29 | 17.44±0.30 | 18.06±0.34 | 18.17±0.35 |
| **Parsley** | 8.22±0.28 | 8.22±0.25 | 17.50±0.24 | 17.61±0.28 | 8.28±0.17 | 8.33±0.22 | 17.78±0.29 | 17.89±0.30 | 17.94±0.34 | 17.94±0.35 |

[1] Mean ± standard error of the mean.

[a, …b,] values in the same column within the same item followed by different superscripts are significantly different ($P \leq 0.05$).

**Table (12):** Correlation coefficients between body weight (BW), glutathione peroxidase activity (GPX) and each of carcass characteristics and chemical composition of meat traits of Cobb and Ross strains.

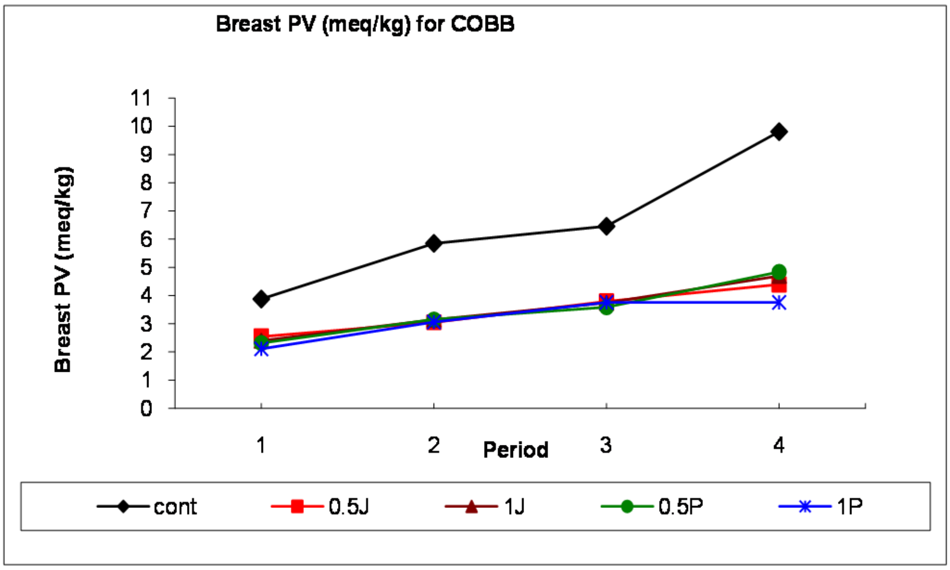
| Item | BW | | | GPX | | |
|---|---|---|---|---|---|---|
| | **Cobb** | **Ross** | **OM** | **Cobb** | **Ross** | **OM** |
| **BW** | 1 | 1 | 1 | 0.31 | 0.91** | 0.41 |
| **GPX** | 0.31 | 0.91** | 0.41 | 1 | 1 | 1 |
| **Blood&feather%** | 0.41 | 0.92** | 0.75** | 0.59* | 0.74* | 0.30 |
| **Leg%** | 0.53 | 0.49 | 0.44 | 0.45 | 0.58 | 0.57** |
| **Head%** | 0.47 | -0.69* | -0.22 | -0.66* | -0.65* | -0.82** |
| **Neck%** | 0.10 | 0.50 | 0.36 | 0.44 | 0.51 | 0.36 |
| **Heart%** | -0.06 | -0.76* | -0.44 | 0.91** | -0.63* | 0.36 |
| **Liver%** | -0.56* | -0.31 | -0.34 | 0.27 | -0.32 | -0.51* |
| **Gizzard%** | -0.93** | 0.60* | -0.12 | -0.25 | 0.68* | 0.33 |
| **Spleen%** | 0.22 | -0.09 | 0.05 | 0.86** | 0.07 | 0.25 |
| **Total giblets%** | -0.82** | -0.01 | -0.34 | 0.23 | 0.06 | -0.08 |
| **Abdominal fat%** | -0.31 | 0.13 | -0.06 | -0.83** | 0.09 | -0.60** |
| **Breast%** | 0.46 | 0.10 | 0.27 | -0.62* | 0.47 | -0.22 |
| **Thigh%** | 0.02 | -0.84** | -0.33 | -0.42 | -0.75* | -0.43 |
| **Breast meat%** | -0.43 | 0.26 | 0.40 | -0.43 | 0.04 | -0.19 |
| **Thigh meat%** | -0.48 | -0.35 | -0.34 | 0.22 | -0.60* | 0.14 |
| **Carcass weight%** | 0.49 | -0.74* | -0.44 | -0.53 | -0.39 | -0.25 |
| **Dressing%** | 0.04 | -0.73* | -0.53* | -0.52 | -0.38 | -0.30 |
| **Moisture %** | 0.90** | -0.70* | -0.26 | 0.65* | -0.92** | 0.27 |
| **Ash %** | 0.33 | -0.64* | -0.22 | 0.62* | -0.55 | -0.25 |
| **Fat %** | -0.41 | 0.01 | -0.22 | -0.17 | -0.11 | -0.23 |
| **Protein %** | -0.01 | -0.33 | -0.17 | 0.68* | -0.21 | 0.29 |

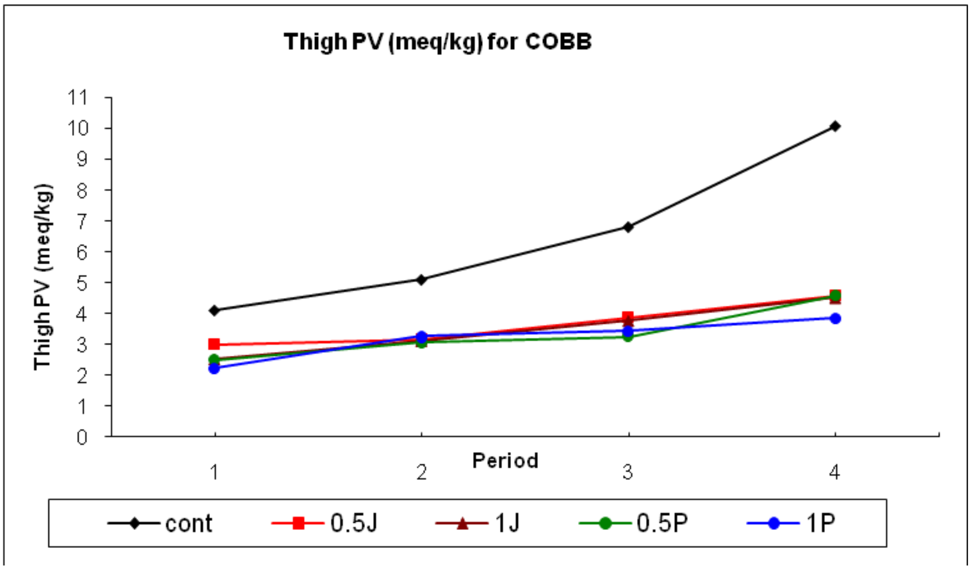
** Correlation is significant at $P \leq 0.01$ level.
*Correlation is significant at $P \leq 0.05$ level.
OM: regardless of strain effect.

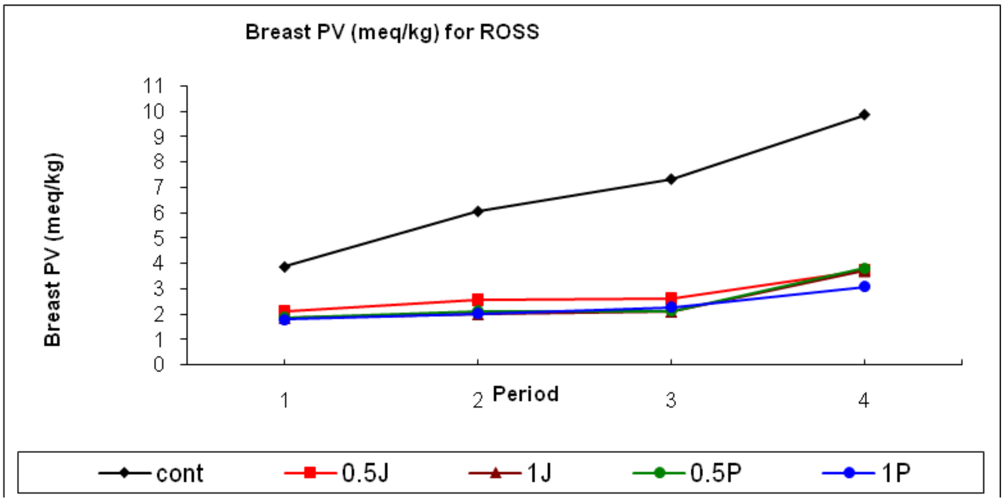
**Table (13):** Correlation coefficients between body weight (BW), glutathione peroxidase activity (GPX) and each of meat quality traits of Cobb and Ross strains.

| Item | LBW | | | GPX | | |
|---|---|---|---|---|---|---|
| | Cobb | Ross | OM | Cobb | Ross | OM |
| **Cooking losses% of breast** | 0.01 | -0.57 | -0.33 | 0.06 | -0.39 | 0.16 |
| **Cooking losses% of thigh** | -0.71* | 0.13 | -0.21 | -0.37 | 0.22 | 0.37 |
| **Breast water holding capacity** | 0.74* | -0.77** | -0.08 | -0.37 | -0.71* | -0.52* |
| **Thigh water holding capacity** | 0.72* | -0.58* | 0.01 | -0.41 | -0.66* | -0.58** |
| **Breast pH** | 0.85** | 0.09 | 0.30 | 0.05 | -0.11 | -0.15 |
| **Thigh pH** | -0.97** | -0.81** | -0.78** | -0.16 | -0.48 | -0.14 |
| **General appearance of breast** | 0.16 | -0.39 | -0.10 | 0.64* | -0.39 | 0.24 |
| **General appearance of thigh** | 0.12 | 0.07 | -0.02 | 0.27 | -0.22 | 0.01 |
| **Breast color** | 0.13 | -0.14 | -0.07 | -0.04 | -0.46 | -0.18 |
| **Thigh color** | 0.20 | 0.06 | -0.06 | -0.10 | -0.32 | -0.15 |
| **Breast texture** | -0.84** | 0.22 | -0.26 | -0.18 | 0.11 | 0.06 |
| **Thigh texture** | -0.16 | -0.27 | -0.22 | 0.80** | -0.11 | 0.21 |
| **Breast taste** | -0.66* | 0.49 | -0.03 | 0.43 | 0.49 | 0.32 |
| **Thigh taste** | -0.51 | 0.41 | -0.01 | 0.48 | 0.54 | 0.35 |
| **Breast odor** | 0.62* | -0.31 | 0.11 | 0.62* | 0.11 | 0.23 |
| **Thigh odor** | -0.02 | -0.30 | -0.17 | 0.68* | -0.01 | 0.21 |
| **Peroxide value of breast** | 0.70* | 0.71* | 0.27 | -0.30 | 0.68* | 0.80** |
| **Peroxide value of thigh** | 0.73* | -0.66* | -0.33 | -0.29 | -0.60* | 0.42 |

** Correlation is significant at $P \leq 0.01$ level.
*Correlation is significant at $P \leq 0.05$ level.
OM: regardless of strain.


Breast PV (meq/kg) for COBB
Breast PV (meq/kg)
11
10
9
8
7
6
5
4
3
2
1
0
1
2
Period
3
4
cont
0.5J
1J
0.5P
1P


Thigh PV (meq/kg) for COBB
Thigh PV (meq/kg)
11
10
9
8
7
6
5
4
3
2
1
0
1
2
Period
3
4
cont
0.5J
1J
0.5P
1P



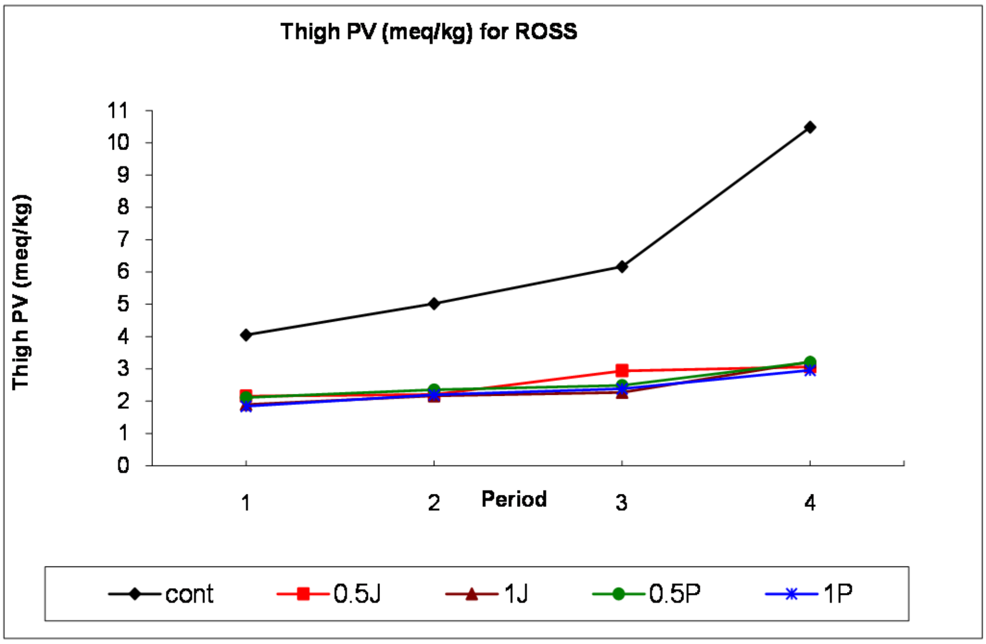




**Fig. (1): Effect of feeding jew's mallow (J) and parsley (P) on peroxide value (PV) of Cobb and Ross broiler meat.**

Jaw's mallow, parsley, slaughter, meat, sensory, broiler, glutathione,.

## REFERENCES

**Abaza, I. M. (2001).** *The use of some medicinal plants as feed additives in broiler diets. PH. D. Thesis, Faculty of Agriculture, Alexandria University, Egypt.*

**Abdel Azim, M. and Farahat, G. S. (2009).** *Breed differences and phenotypic correlations of antioxidant enzymes activities, some physiological parameters and productive traits of chicken. 2. Phenotypic correlations. Egypt. Poult. Sci., 29 : 645-666.*

**Abd El-Latif, S. A.; Ahmed, F. A. and El-Kaiaty, A. M. (2002).** *Effect of feeding dietary thyme, black cumin, dianthus and fennel on productive and some metabolic responses of growing Japanese quail. Egypt. Poult. Sci., 22:109-125.*

**Abdou, M. M. (2001).** *Effect of some medicinal plants in the ration on productive performance of lactating animals. PH.D. Thesis, Fac. of Agric. Ain Shams Univ.*

**Agricultural Economics (2005).** *Central administration, Agricultural Economics. Area, yield and production of Medical, Aromatic and flower plant. Economics Affairs sector, Ministry of Agric., ARE.*

**Ahsan, S. K.; Shah, A. H.; Tanira, M. O. M; Ahmad, M. S.; Tariq, M. and Ageel, A. M. (1990).** *Studies on some herbal drugs used against kidney stones in Saudi folk medicine. Fitoterapia. 61: 435-438.*

**Al-Harthi, M. A. (2004).** *Efficiency of utilizing some spices and herbs with or without antibiotic supplementation on growth performance and carcass characteristics of broiler chicks. Egypt. Poult. Sci., 24 : 869-899.*

**Al-Howiriny, T. A.; Al-Sohaibani, M. O.; El-Tahir, K. H. and Rafatullah, S. (2003).** *Preliminary evaluation of the anti-inflammatory and anti-hepatotoxic activities of parsley (Petroselinum crispum) in rats. J. of Natural-Remedies. 3: 54-62.*

**Allam. S. M.; El -Hosseiny, H. M.; Abdel Gawad, A. M.; El –Saadany, S. A. and Zeid A. M. M. (1999).** *Medicinal herbs and plants as feed additives for ruminant. 1- effect of using some medicinal herbs and plants as feed additives on Zaraibi goat performance. Egypt. J. Nutrition and feeds (special Issue):349-365.*

**Ashaye, O. A. (2010).** *Effect of processing methods on chemical and consumer acceptability of kenaf and corchorus vegetables. Marsland Press Journal of American Science, 6 (2):165-170, http://www.americanscience.org.*

**Association of Official Analytical Chemists, AOAC, (1990).** *Official Methods of Analysis. 15th Edition, Washington, D.C, USA.*

**Azouz, H. M. M. (2001).** *Effect of hot pepper and fenugreek seeds supplementation on broiler diets. PH. D. Thesis, Faculty of Agric., Cairo Univ. Egypt.*

**Barbanti, D. and Pasquini, M. (2005).** *Influence of cooking condition on cooking loss and tenderness of raw and marinated chicken breast meat. LWT 38: 895- 901.*

**Barbut, S. (1993).** *Color measurements for evaluating the pale soft exudative (PSE) occurrence in turkey meat. Food Res. Intl. 26:39–43.*

**Carpenter, K. J. and Clegg, K. M.(1956).** The metabolizable energy of poultry feeding stuffs in relation to their chemical composition. *J. Sci. Food Agri.*, 7: 45-51.

**Castellini, C.; Mugnai C. and Dal Bosco, A. (2002).** *Effect of organic production system on broiler carcass and meat quality. Meat Science ,60:219–225.*

**Cheema, M. A.; Qureshi, M. A. and Havenstein, G. B. (2003).** *A comparison of the immune response of a 2001 commercial broiler with a 1957 randombred broiler strain when fed representative 1957 and 2001 broiler diets. Poult. Sci. 82:1519-1529.*

**Dransfield, E. and Sosnicki, A. A. (1999).** *Relationship between muscle growth and poultry meat quality. Poult. Sci. 78:743–746.*

**Duke, J. A.; Godwin, M. J. B. and Ottesen, A. R. (2009).** *Medicinal Plants of Latin America. Taylor & Francis Group, LLC.*

**Duncan, D. B. (1955).** *Multiple range and multiple F tests. Biometrics, 11:1-42.*

**El-Husseiny, O.; Shalash, S. M. and Azouz, H. M. (2002).** Response of broiler performance to diets containing hot pepper and /or fenugreek at different metabolizable energy levels. *Egypt. Poult. Sci.*22: 387-406.

**El-Safty, S. A. (2004).** *Stepwise regression analysis for ultrstructural measurements of eggshell quality in two local breeds of chicken. Egypt. Poult. Sci. 24:189-203.*

**Finkel, T. and Holbrook, J. (2000).** *Oxidants, oxidative stress and the biology of aging. Nature., 408, 9:239-247.*

**Ghazalah, A. A. and Ibrahim, A. A. (1996).** *The possibility of using some edible and aromatic oils in the nutrition of Muscovi ducks. Egypt. Poult. Sci., 16:305-328.*

**Grau, R. and Hamm, R. (1953).** *Eine einfache Methode zur Bestimmung der Wasserbindung im Muskel. Naturwissenschaften, 40:29–30.*

**Hassan, I. I.; Askar, A. A. and El-Shourbagy, G. A. (2004).** *Influence of some medicinal plants on performance ; physiological and meat quality traits of broiler chicks. Egypt. Poult. Sci. 24:247-266.*

**Holst, P. B. and Engvild, K. C. (2000).** *Natural chlorinated compounds.17th Danish plant protection conference Overview \ environment \ weeds. DJF-Rapport, Markbrug. No. 23, 87-95.*

**Ibrahim, Sh. A. M. (2005).** *Effect of some medicinal plants as feed additives on growth and some metabolic changes in rabbits. Egypt. J. Nutr. and Feeds, 8:207-219.*

**Ibrahim, Sh. A. M.; El-Yamany, A. T. and Zeid, A. M. M. (2004).** *Dill and parsley as growth promoters in White New Zealand growing rabbits. Egypt. Poult. Sci. 24:917-927.*

**Javamard, M.; Rokni, N.; Bokau, S. and Shahhosseini, G. (2006).** *Effect of gamma irradiation and frozen storage on microbial , chemical and sensory quality of chicken* meat in Iran . Food control 17:469-473.

**Jimenez-Alvarez D.; Giuffrida, F.; Golay, P. A.; Cotting C.; Lardeau, A. and Brendan J. K. (2008).** *Antioxidant Activity of Oregano, Parsley, and Olive Mill Wastewaters in Bulk Oils and Oil-in-Water Emulsions Enriched in Fish Oil .J. Agric. Food Chem.16:7151–7159.*

**Kery, A.; Blazovics, A.; Fejes, S.; Nagy, E.; Lugasi, A.; Kursinszki, L.; Czinner, E.; Kristo, T. S.; Apati, P.; Balazs, A. and Szoke, E. (2001).** *Antioxidant activity of medicinal plants used in phototherapy. Intern. J. Hortic. Sci.7:28-35.*

**Kim, Y.Y. and Mahan, D. C. (2003).** *Biological aspects of selenium in farm animals. Asian-Aust. J. Anim. Sci.16:435-444.*

**Lee, Y. B.; Hargus, G. L.; Hagburg, E. C. and Forsythe, R. H. (1976)**. *Effect of antemortem environmental temperature on postmortem glycolysis and tenderness in excised broiler breast muscle. J. Food Sci. 41:1466–1469.*

**Maountney, G. J. (1981).** *Poultry products Technology, second edition, The AVI puplishing Company, INC. Westport, Connecticut.*

**National Research Council, NRC (1994).** *Nutrient Requirements of Poultry. 9th revised edition. National Academy Press. Washington, D.C.,USA*

**Nielsen, H.; Finot, K. and Hurrel, R. F. (1985).** *Reaction of proteins with oxidizing lipids.1- Analytical measurements of lipid oxidation and amino acid losses in a whey protein- methyl linolenate model system . Br. J. Nutr.53: 75*

**Olaniyi, J. O. and Ajibola, A. T. (2008).** *Growth and Yield Performance of Corchorus olitorius Varieties as Affected by Nitrogen and PHospHorus Fertilizers Application. American-Eurasian Journal of Sustainable Agriculture, 2 (3):234-241.*

**Osman, M.; Amber, Kh. and Mahmoud, M. A. (2004).** *Response of broiler chick's performance to partial dietary inclusion of radish, rocket and parsley cakes. Egypt. Poult. Sci.24:429-446.*

**Pohja, N. S. and Niinivaara, F. P. (1957).** *Die Bestimmung der Wasserbindung des Fleisches mittels der Konstantdruckmethode. Fleischwirtschaft, 9:193–195.*

**Ranken, M. D. (2000).** *Hand book of meat product technology .Blackwell science. Led London.*

**Richmond, A. C. K. and Mackley, S. M. L. (2000).** *Herbs and Spices, 2nd Ed . Lorenz Books Anness Publishing Inc., London, UK.*

**Scott, G. B. and Moran, P. (1993).** *Fear levels in laying hens carried by hand and by mechanical conveyors. Applied Animal Behavior Science, 36:337–346.*

**Solanke, O. f. and Awonorin, S. O. (2002).** *Kinetics of vitamin C degradation in some tropical green leafy vegetables during blanching. Nigerian Food Journal 24-32.*

**SPSS (1999).** *User's Guide: Statistics. Version 10. SPSS Inc. Chicago, IL,USA.*

**Steel, R. G. D. and Torrie, J. H. (1980).** *Principles and Procedures of Statistics: A Biometrical Approach 2nd ed. McGraw-Hill Book Co., Inc., New York, USA.*

**Tisserand, R. and Balacs, T. (1995).** *Essential Oil Safety. A Guide for Health Care Professionals.Cherchill Publishers Livingston, USA. Wasserbindung im Muskel. Naturwissenschaften, 40:29–30.*

**Ursini, F. and Bindoli, A. (1987).** *The role of selenium peroxidases in the protection against oxidative damage of membranes. Chem. Phys. Lipids. 44:255-276.*

**Warris, P. D. (2000).** *Meat science. An introductory text. New York: CABI Pub. Inc.*

**Wong, P. Y. Y. and Kitts, D. D. (2006).** *Studies on the dual antioxidant and antibacterial properties of parsley (Petroselinum crispum) and cilantro (Coriandrum sativum) extracts. Food Chemistry 97:505–515.*

**Young, J. F.; Stagsted, J.; Jensen, S. K.; Karlsson, A. H. and Henckel, P. (2003).** *Ascorbic Acid, α-Tocopherol, and oregano supplements reduce stress-induced deterioration of chicken meat quality. Poult. Sci. 82:1343–1351***.**

**Yunis, R.; Ben-David, A.; Heller, E. D. and Cahaner, A. (2000).** *Immunocompetence and viability under commercial conditions of broiler groups differing in growth rate and in antibody response to Eschirichia coil. Poult. Sci. 79:810-816.*

**Zaika, l. l.; Zell, T. E.; Smith, Z. L.; Palumbo, S. A. and Kissinger, J. C. (1976).** *The role of nitrite and nitrate in Lebanon Bologna, a fermented sausage. J. Food sci. 6:1457-1460.*

## الملخص العربي

## تأثير التغذية علي الملوخية أو البقدونس على مقاييس الذبيحة ونشاط إنزيم الجلوتاثيون بيروكسيديز وصفات جودة اللحم لسلالتين من بداري التسمين

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[1]قسم إنتاج الدواجن-كلية الزراعة بالفيوم-جامعة الفيوم

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تم إجراء هذه الدراسة لقياس تأثير التغذية على أوراق نباتات الملوخية و البقدونس الجافة كإضافات طبيعية على وزن الجسم ومقاييس الذبيحة ونشاط إنزيم الجلوتاثيون بيروكسيديز وصفات جودة اللحم لسلالتين من بداري التسمين (سلالة الكب والروس) وأيضا قياس معاملات الارتباط لنشاط إنزيم الجلوتاثيون بيرواوكسيديز ووزن الجسم مع الصفات تحت الدراسة.

**<u>وتم استخدام المعاملات الآتية:</u>**

1- عليقة الكنترول بدون إضافة الملوخية أو البقدونس.

2- عليقة الكنترول+0.5%ملوخية.

3- عليقة الكنترول+1%ملوخية.

4- عليقة الكنترول+0.5%بقدونس.

5- عليقة الكنترول+1% بقدونس.

**<u>وتتلخص أهم النتائج المتحصل عليها فيما يلي:</u>**

١. كان تأثير المعاملة ومستوى ونوع الإضافة غير معنوي على وزن الجسم وصفات الذبيحة بالنسبة للسلالتين فيما عدا صفتي وزن الذبيحة بعد التجويف ونسبة التشافى في سلالة الروس، حيث أظهرت الطيور المغذاة على 1% بقدونس أعلى قيم في حين كانت الطيور المغذاة على 1% ملوخية اقل قيم معنوية.

٢. في سلالة الكب كان تأثير المعاملة معنوي على نسبة الرطوبة والرماد والدهن، حيث أظهرت الطيور المغذاة على 1% بقدونس أعلى قيم في حين كانت الطيور المغذاة على 1,0.5% ملوخية اقل قيم معنوية لنسبتي الرطوبة والرماد. كانت نسبة الدهن أعلى معنويا في الطيور المغذاة على 0.5% ملوخية واقل معنويا في عليقة الكنترول- الطيور المغذاة على الملوخية كانت أعلى معنويا في نسبة الدهن واقل في نسبة الرماد بينما المغذاة على البقدونس كانت أعلى في نسبة الرماد واقل في نسبة الدهن.

٣. في سلالة الروس كان تأثير المعاملة معنوي على نسبتي الرطوبة والرماد، حيث أظهرت الطيور المغذاة على 0.5% بقدونس أعلى قيم في حين 0.5% ملوخية اقل قيم، بينما لم يكن للمعاملة تأثير معنوي على نسبتي الدهن والبروتين- الطيور المغذاة على البقدونس كانت أعلى معنويا في نسبتي الرطوبة والرماد مقارنة بالطيور المغذاة على الملوخية.

٤. كان تأثير المعاملة ونوع الإضافة معنوي على نشاط إنزيم الجلوتاثيون بيروكسيديز في السلالتين، حيث أظهرت الطيور من سلالة الكب المغذاة على1% بقدونس أعلى قيم في حين 1% ملوخية اقل قيم - الطيور المغذاة على البقدونس كانت أعلى معنويه في نشاط إنزيم الجلوتاثيون بيروكسيديز مقارنة بالطيور المغذاة على الملوخية. بينما في سلالة الروس 0.5%

Jaw's mallow, parsley, slaughter, meat, sensory, broiler, glutathione,.

ملوخية قيم أعلى في حين خط المقارنة اقل قيم - الطيور المغذاة على الملوخية كانت أعلى معنويا في نشاط إنزيم الجلوتاثيون بيروكسيديز مقارنة بالطيور المغذاة على البقدونس.

٥. أكدت النتائج أيضا أن التغذية على النباتات أدى إلى انخفاض معدل الأكسدة في الدهن في كلا من السلالتين. وكذلك كان هناك تحسن في مقدرة اللحم على الاحتفاظ بالماء حيث كان هناك تأثير معنوي للمعاملة.

٦. أظهرت قيم معاملات الارتباط لنشاط إنزيم الجلوتاثيون بيروكسيديز ووزن الجسم ومقاييس الذبيحة وصفات جودة اللحم قيم معنويا ومدى واسع من التباين بين السلالتين. في سلالة الكب ارتبط وزن الجسم ارتباط موجب و معنويا مع نسبة الرطوبة والـــ pH للحم الصدر ومقدرة اللحم على الاحتفاظ بالماء ونكهة اللحم ومعدل الأكسدة للدهن- بينما كان الارتباط سالب مع كلا من نسبة القونصة والكبد والأحشاء الكلية والـــ pH للحم الفخذ وقوام ومذاق ولون اللحم. وفى في سلالة الروس ارتبط وزن الجسم ارتباط موجب و معنويا مع نشاط إنزيم الجلوتاثيون بيروكسيديز و نسبة الدم والريش والقونصة ومعدل الأكسدة للدهن في لحم الصدر - بينما كان الارتباط سالبا مع كلا من مقدرة اللحم على الاحتفاظ بالماء و الـــ pH للحم الفخذ و نسبة الرأس والقلب والذبيحة و التشافى والرطوبة والرماد ومعدل الأكسدة للدهن في لحم الفخذ.

٧. في سلالة الكب ارتبط نشاط إنزيم الجلوتاثيون بيروكسيديز ارتباط موجب و معنويا مع نسبة القلب والطحال و قوام و تركيب لحم الفخذ والصفات الحسية للحم ونسبة الرطوبة والرماد والبروتين- بينما كان الارتباط سالب مع كلا من و نسبة دهن البطن ووزن الرأس والصدر. وفى سلالة الروس نشاط إنزيم الجلوتاثيون بيروكسيديز ارتباط موجب و معنويا مع نسبة الدم والريش و القونصة ومعدل الأكسدة للدهن في لحم الصدر - بينما كان الارتباط سالب مع كلا من نسبة الرطوبة والرأس والفخذ والقلب و مقدرة اللحم على الاحتفاظ بالماء ومعدل الأكسدة للدهن في لحم الفخذ.

والخلاصة أن إضافة أوراق نباتات الملوخية و البقدونس الجافة كإضافات طبيعية رخيصة الثمن أدى إلى ارتفاع نشاط إنزيم الجلوتاثيون بيروكسيديز وتحسين بعض الصفات الهامة لدجاج إنتاج اللحم. هناك ارتباط معنوي بين نشاط إنزيم الجلوتاثيون بيروكسيديز ومعظم الصفات تحت الدراسة وهذا الارتباط يعتمد على التركيب الوراثي و انه يمكن توظيف هذا الارتباط في برامج التربية المختلفة لإنتاج سلالات مقاومه لمخاطر الأكسدة مع تحسين وزن الجسم ومقاييس الذبيحة وصفات جودة اللحم.