

## Effect of using different types of *Origanum majarona* Extracts on Quality traits of thigh meat broiler in frozen storage

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### تأثير استخدام مستخلصات نبات البردقوش (*Origanum majarona*) في الصفات النوعية لأفخاذ فروج اللحم المخزونة بالتجميد

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#### المستخلص

هدفت التجربة الحالية الى دراسة تأثير استخدام انواع و تراكيز مختلفة من مستخلصات نبات البردقوش في بعض الصفات النوعية لأفخاذ ذبائح فروج اللحم المحفوظ بالتجميد, اجريت تجربة الحفظ على درجة حرارة (-18) م° ولفترة (3) اشهر استخدم فيها معاملة السيطرة بدون اي اضافة ومستخلصات نبات البردقوش المائي بتركيز (0.1 , 0.2) % والكحولي بتركيز (0.01 , 0.05) % على افخاذ ذبائح فروج اللحم. اجريت الاختبارات الكيميائية شملت كل من رقم البيروكسيد , نسبة الاحماض الدهنية الحرة , تركيز الكولسترول. الاختبارات الميكروبية شملت اعداد البكتيريا الكلي . اظهرت النتائج انخفاض معنوي في رقم البيروكسيد و النسبة المئوية للأحماض الدهنية الحرة , وتركيز الكولسترول للحم الفخذ في جميع فترات الخزن بالتجميد حيث سجلت عينات اللحم المضاف اليه المستخلص الكحولي لنبات البردقوش تركيزه (0.05 %) اقل القيم حيث بلغت (0.11 ملم مكافئ / غم لحم , 0.16 % , 64.42 ملغم / 100 غم لحم) على التوالي مقارنة بالمعاملات التجريبية الاخرى . كذلك انخفاض معنوي (  $p \leq 0.05$  ) للعدد الكلي للبكتيريا في لحم الفخذ المخزون بالتجميد سجلت معاملة اللحم المضاف اليه المستخلص الكحولي تركيزه (0.05%) اقل عدد كلي للبكتيريا ( $3.47 \times 10^6$  cfu/g) مقارنة بالمعاملات التجريبية الاخرى وادت زياده فتره الخزن الى ارتفاع معنوي (  $p \leq 0.05$  ) في العدد الكلي للبكتيريا في لحم المعاملات التجريبية المختلفة .

#### Abstract

The present Experiment aimed to study the effect of the use of different types and concentrations of *Origanum majarona* extracts on some qualitative traits of frozen broiler. The preservation experiment was carried out at a temperature of (-18) c° for a period of (3) months. The water extracts of *Origanum majarona* plant used concentrations (0.1% , 0.2%) And alcoholic extracts concentrations (0.01% , 0.05%) On the broiler. Chemical

tests included: the peroxide number, free fatty acids percent, cholesterol Level. Microbial tests, included: the total bacteria count. Results showed a significant decrease for the peroxide number, the free fatty acids percent and cholesterol Level in the thigh meat in all periods of freezing storage. The samples treatment the alcoholic extract of *Origanum majarona* had lowest values which are (0.11 meq/g meat, 0.16%, 64.42 mg/100 g meat) respectively compared with the other experimental treatments. A significant decrease for the total bacteria number in frozen thigh meat was recorded with alcohol extract treatment of the lowest total bacteria count ( $3.47 \times 10^6$ ) cfu/g compared with other experimental treatments. The longer storage period increased significantly the total bacteria count in the meat for different experimental treatments.

## Introduction

Meat is highly important because it is a major source for the essential amino acids needed by the human body to build its tissues. It is also a major source of the complex B vitamins and minerals, the most important of which is iron (1). The chemical and biological structure of meat and meat products, can be damaged by storage due to oxidation of fat and bacterial growth, which are the main factors influencing the quality of food and reducing its quality. Fat oxidation leads to deterioration of taste, flavor and texture of meat and meat products (2). Oxidative corrosion can causes damage to meat and its products and the resulting degradation of unsaturated fatty acids and oxidized cholesterol products can hare negative effects on consumer health (3). Bacterial contamination can also cause health risks, such as food

poisoning, meat damage and consequent economic loss (4). *Origanum majarona*, one of the herbal plants, has aroused the interest of many consumers because it is anti-bacterial and fungal (5). Water and alcohol extracts of *Origanum majarona* and antioxidant effect (6), And improving the quality traits of meat under cooling conditions (7). The aim of this experiment is to study the effect of *Origanum majarona* extract on some qualitative traits of frozen broiler thighs.

## Materials and Methods

Twenty-three birds were purchased from the poultry farm of the Faculty of Agriculture - University of Basrah, they were slaughtered. Extracts were prepared with the required concentrations (water extract 0.1%, 0.2%, and Alcoholic extract 0.01%, 0.05%) and in sufficient quantities In the metal by the type of

extract and concentration, where in each bowl (9) immersion in a random manner and leaving (9) thighs without any treatment to represent the control samples then stored in the refrigerator and at a temperature of (4) C° and for (24) hours, after the end of the prescribed period Extracted thighs from each pot And randomly distributed (3) concentrations of each concentration for each month of the three freeze months in polyethylene bags that were discharged from the air and closed well and kept frozen at (-18) C° for periods (90.60.30) days The treatments were as follows: T1 The first treatment of the control, T2 The second treatment Ingredients of the plants that were submerged in the water extract of the plant of the *Origanum majarona* concentration 0.1%, T3 The third treatment Ingredients of the thighs that were submerged in the water extract of the plant *Origanum majarona* concentration 0.2%, T4 The fourth treatment The pieces of the plants that were submerged in the plant extract *Origanum majarona* Concentrate 0.01%, T5 The fifth treatment of the thighs that were submerged in the vegetable extract of the *Origanum majarona* plant was 0.05%. The chemical and microbial tests of the samples were carried out according to the storage period as follows.

## Chemical tests

Free fatty acids (FFA) and peroxide number were estimated based on method (8). The concentration of cholesterol in the meat samples was estimated according to the method mentioned by (9).

## Microbial tests

Microbial tests were conducted for the meat samples, which included total bacterial count (TbC) according to the method described (10).

## Statistical analysis

The results were statistically analyzed using a complete randomized design (CRD) experiment and analyzed statistically using SPSS (11). The results were compared using the least significant difference (RLSD) at the probability level ( $p \leq 0.05$ ) (12).

## Results and Discussion

### The peroxide Number

Table (1) shows a significant effect for the type of extract and its concentration on the peroxide number of Meat samples treated with alcohol and water extracts of *Origanum majarona* showed a significant decrease in the values of peroxide compared to the control treatment. The table showed that the ratio of meat with the alcoholic extract of the *Origanum majarona* at

0.05% had the lowest value of the peroxide number (0.11) mm/g meat compared with control treatment, which recorded the highest peroxide value among the experimental treatments (0.42) meq/g meat. it is clear that the treatment of (0.05% , 0.01%) had the lowest value of the peroxide number compared with the two treatment water extract of *Origanum majorana* . The peroxide values (0.11, 0.17) alcoholic extract respectively (0.19, 0.24) meq/g meat in water extract, respectively. The results of this study were consistent with the results obtained (13), which indicated that the alcoholic extracts of the *Origanum majorana* recorded values for the peroxide number less than the water extracts of the plant of *Origanum majorana*, while storing the meat for periods (0, 30, 60) days, Peroxide of the

meat piece of the thigh in the treatment of the addition of alcoholic or water extracts of the plant *Origanum majorana* compared to the treatment of control to contain the plant on the active substances inhibiting fat oxidation such as Phenolic compounds, flavonoids, tannins and others (14) and (15). The results of this study were consistent with the results obtained by (16) and (14), Which showed a significant decrease in the values of the peroxide number of the samples of meat treated with alcoholic and water extracts of the plant *Origanum majorana* compared to control treatment. As for the effect of the freezing period at (-18) C° for meat samples in different experimental treatments, Table (1) indicates no significant effect of freezing period at (-18) C° on the peroxide values.

**Table (1) Effect of the type of extract and its concentration of *Origanum majorana* plants and freezing period at (-18) C° for broiler thigh on peroxide number (meq/g meat) (mean  $\pm$  standard error)**

Treatments	Storage period in months			The average effect of the treatments
	1	2	3	
<b>T1</b>	0.015 $\pm$ 0.37	0.020 $\pm$ 0.43	0.020 $\pm$ 0.49	0.42 a*
<b>T2</b>	0.011 $\pm$ 0.27	0.020 $\pm$ 0.25	0.015 $\pm$ 0.23	0.24 b
<b>T3</b>	0.011 $\pm$ 0.21	0.010 $\pm$ 0.20	0.010 $\pm$ 0.18	0.19 c
<b>T4</b>	0.015 $\pm$ 0.19	0.010 $\pm$ 0.17	0.005 $\pm$ 0.16	0.17 d
<b>T5</b>	0.005 $\pm$ 0.12	0.005 $\pm$ 0.11	0.005 $\pm$ 0.10	0.11 e
	0.232	0.232	0.231	<b>Average storage period effect</b>

\*The different spherical letters indicate significant differences ( $p \leq 0.05$ ) between the averages

### free fatty acids

Table (2) showed significant effect that the samples of meat treated with alcohol extract (0.05%) recorded the lowest percentage of free fatty acids compared with the other experimental treatments (0.16%) while the control treatment had the highest percentage of free fatty acids (0.37%). The percent of free fatty acids in meat samples treated with alcoholic or water extracts of *Origanum majorana* plant to contain the plant on active substances such as alkaloids, flavonoids, calcosides, tannins and

others which are antioxidants fat (17) These active substances have antioxidant and inhibitory effects for the lipid-free bacteria and have an anti-enzyme effect of lipase enzyme which helps to dissolve fat. (18) The table showed that the meat samples treated with the Alcohol extracts recorded the lowest percent of free fatty acids compared to those with extracts (0.16 and 0.23%) in the meat samples treated with alcoholic extracts (0.05% and 0.01%) respectively, while in the meat samples treated with water

extracts (0.2%, 0.1%) respectively, The results of this study were consistent with the results obtained (13), which indicated that the samples of meat treated with alcohol extracts of the *Origanum majorana* recorded a low percent of free fatty acids compared to water extracts of the *Origanum majorana*, there were differences in the percent of free fatty acids between the different periods of

freezing storage The reason for the absence of significant differences between freezing periods and the role of active antioxidant and inhibitory agents of the enzyme lipase, which has a role in the degradation and destruction of triglycerides, where free fatty acids are the products of the hydrolysis of lipase by lipase enzyme(19).

**Table (2) Effect of the type of extract and its concentration of *Origanum majorana* and freezing period at(-18) C° for broiler thigh on the free fatty acids (%) (mean  $\pm$  standard error)**

Treatments	Storage period in months			The average effect of the treatments
	1	2	3	
<b>T1</b>	0.011 $\pm$ 0.34	0.025 $\pm$ 0.39	0.015 $\pm$ 0.41	0.37 a*
<b>T2</b>	0.025 $\pm$ 0.28	0.015 $\pm$ 0.25	0.020 $\pm$ 0.23	0.25 b
<b>T3</b>	0.026 $\pm$ 0.26	0.011 $\pm$ 0.24	0.005 $\pm$ 0.22	0.24 bc
<b>T4</b>	0.026 $\pm$ 0.24	0.020 $\pm$ 0.23	0.010 $\pm$ 0.22	0.23 c
<b>T5</b>	0.015 $\pm$ 0.19	0.020 $\pm$ 0.16	0.015 $\pm$ 0.15	0.16 d
	0.260	0.254	0.245	<b>Average storage period effect</b>

\*The different spherical letters indicate significant differences ( $p \leq 0.05$ ) between the averages

### cholesterol

Table (3) showed Treatments with alcoholic or water plant extracts of

*Origanum majorana* significantly decreased cholesterol level compared to

control treatment It meat with the alcoholic extract of the *Origanum majarona* at 0.05% the lowest cholesterol level (64.42) mg/100g of meat, which did not differ significantly with the meat treatment with the alcohol extract (0.01% , 0.2%), which was to (64.91 , 65.25) mg/100 g meat, respectively, While the cholesterol level in control treatment (73.0) mg / 100g low cholesterol level in the samples of meat treated with alcoholic extracts of water extracts to *Origanum majarona* to contain *Origanum majarona* can be explained by the effect

of flavonoids and other substances with the ability to inhibit free radicals and reduce oxidation of fat by breaking the chain of oxidative reactions (20) The results of this study were consistent with the results obtained (21) and (22), which indicated low cholesterol level in meat samples Which are stored in a refrigerated or freezer with different plant extracts compared to the control treatment. there were no significant effect of the freezing period at (-18) C° on the cholesterol level of the thigh samples.

**Table (3) Effect of the type of extract and its concentration of *Origanum majarona* and freezing period at (-18) C° for broiler thigh meat on cholesterol level (mg / 100g meat) (mean  $\pm$  standard error)**

Treatments	Storage period in months			The average effect of the treatments
	1	2	3	
<b>T1</b>	1.527 $\pm$ 71.67	1.527 $\pm$ 72.67	2.516 $\pm$ 74.67	73 a*
<b>T2</b>	1.429 $\pm$ 68.73	2.647 $\pm$ 67.14	3.335 $\pm$ 66.03	67.3 b
<b>T3</b>	0.923 $\pm$ 65.84	1.999 $\pm$ 65.01	2.084 $\pm$ 64.91	65.25 c
<b>T4</b>	1.192 $\pm$ 65.34	2.011 $\pm$ 65.01	1.201 $\pm$ 64.39	64.91 c
<b>T5</b>	1.561 $\pm$ 65.09	1.468 $\pm$ 64.29	1.006 $\pm$ 63.89	64.42 c
	67.33	66.82	66.77	Average storage period effect

\*The different spherical letters indicate significant differences ( $p \leq 0.05$ ) between the averages

### Total count of bacteria

Table (4) significantly reduced in The total bacteria number compared to the control treatment was recorded in the samples of meat treated with alcohol extract (0.05%) the least total bacteria number ( $3.47 \times 10^6$ ) Cfu/g while meat samples in the control treatment the highest value of the total bacteria number ( $6.30 \times 10^6$ ) Cfu/g The reason for the decrease in the total bacteria number in the samples of meat treated with alcohol or water extracts of the *Origanum majorana* is that its contains active substances that inhibit the growth of bacteria such as Flavonoids (23). This result was consistent with the results obtained (24) and (15), which indicated the inhibitory potential of the active substances found in the *Origanum majorana* for different types of yeast, bacteria and fungi, such as flavonoids, resins, phenols, clicosides and others

which have a direct impact on microbial cell protein and cause damage The cellular membrane and then increase the permeability of the cell membrane of the microbial cell (25). The table showed that the meat samples treated with alcohol extracts at(0.05%, 0.01%) showed a lower total bacteria number than in the meat samples treated with water extracts of *Origanum majorana* (0.2% , 0.1%). Table (4) showed significant effect ( $p \leq 0.05$ ) for the period of freezing storage on the total count of bacteria for the thigh meat Where there is a significant increase ( $p \leq 0.05$ ) In the total bacteria number with a period of storage ( $4.26 \times 10^6$ ,  $4.67 \times 10^6$ ,  $5.55 \times 10^6$ ) Cfu/g for periods (1, 2, 3) months respectively, and this result is inconsistent with what indicated (26) Bacteria extend the storage period of frozen meat samples and plant extracts.



**Table (4) Effect of the type of the extract and its concentration of *Origanum majorana* and the freezing period at (-18) C° for total broiler thigh meat on the total count of the bacteria cfu / g10<sup>6</sup> (mean ± standard error)**

Treatments	Storage period in months			The average effect of the treatments
	1	2	3	
<b>T1</b>	0.513 ± 5.47	0.506 ± 6.21	0.096 ± 7.24	6.30 a*
<b>T2</b>	0.509 ± 4.93	0.219 ± 5.03	0.075 ± 6.60	5.52 b
<b>T3</b>	0.020 ± 4.31	0.062 ± 4.56	0.158 ± 5.07	4.64 c
<b>T4</b>	0.040 ± 3.50	0.185 ± 4.17	0.025 ± 4.90	4.19 d
<b>T5</b>	0.105 ± 3.09	0.035 ± 3.37	0.077 ± 3.96	3.47 e
	4.26 c	4.67 b	5.55 a	<b>Average storage period effect</b>

\*The different spherical letters indicate significant differences ( $p \leq 0.05$ ) between the averages

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