

## A study of the effect of spices on oxidative, color and bacterial changes in refrigerated luncheon meat

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**Abstract :** Emulsified meat products such as mortadella, luncheon meat, hot dog sausage, bologna, frankfurter and others are very popular and widespread in various countries of the world. These products belong to the family of high-moisture coated meats with a short shelf life and some to the family of canned meats with a long shelf life (luncheon, canned hot dog sausages), and these products are considered foodstuffs with high nutritional value, as they contain all the essential amino acids necessary for growth, sustainability and building cellular tissues (Ayyashet *et al.*, 2018).

Herbal plants (spices and herbs) have been used since ancient times to give various flavors and colors for more than 2000 years, in addition to their content of nutrients such as carbohydrates, vitamins, minerals and organic acids, and due to the fact that their parts contain effective compounds such as phenols, terpene compounds and alkaloids with strong effectiveness as antioxidants that have the ability to hold and restrict free radicals and as inhibitory agents for microorganisms that prevent the growth of microorganisms, especially pathogenic ones (Embuscado, 2015) Therefore, it was used as a natural food additive used in food preservation, especially meat and its products, and therefore it plays a role in reducing the incidence of many diseases such as cancer, diabetes, heart and blood pressure. and other diseases (Zhou *et al.*, 2004; Ismail *et al.*, 2004; Caiet *et al.*, 2004).

**Keywords:** luncheon; spices; Herbal plants; oxidative changes ; color changes; bacterial changes; refrigerated luncheon

### 1. Introduction:

Processed meat nowadays plays a great importance in the life of the consumer because it provides products that are easy to prepare and have nutritional value. On the other hand, these products are distinguished by their long preservation period, as well as their flavors and grainy texture. However, these products have a high content of fats, salts and preservatives such as nitrates, which They are often unhealthy and cause disease (de Barcelloset *et al.*, 2011).

According to the Food and Agriculture Organization of the United Nations, processed meat (bacon, luncheon meat, hot dog, salami, pastrami, burger, sausage, sausage) and all kinds of packaged, frozen and pre-prepared meat are subjected to processes such as: chopping, mixing, heat treatment, drying, salting etc., as well as chemical treatment such as curing With nitrate and nitrite ions to improve the taste, texture and prolong the preservation period. Antioxidants such as ButylatedHydroxy Toluene (BHT), ButylatedHydroxyAnisol (BHA), ButylatedHydroxyAnisol (BHA), and Tertia Butyl Hydroxydro Quinone (TBHQ) are usually added to these processed meats. Corruption and the preservation of its natural nutritional components, and processed meat products contain large amounts of sodium nitrate, artificial flavors and preservatives to preserve them for longer periods of their normal storage life (Lee and Williams, 1997), as the addition of nitrate and nitrite ions to meat products plays a role in stabilizing The red color and the prevention of bacterial growth also delay the process of fat oxidation, but there are concerns about it due to the interaction of nitrite with secondary amines and the formation of a carcinogen called nitrosamine (Kdouset *et al.*, 2016), and therefore the use of oilseeds, spices and other plant materials such as natural extracts of fruits And vegetables such as red pepper, tea and thyme as natural antioxidants to replace synthetic antioxidants, can be a safe alternative that extends the shelf life of meat products (Moawadet *et al.*, 2012), and natural antioxidants have proven tangible protection in preserving cooked meat and were very effective in delaying fat oxidation (Mansour and Khalil, 2000).

## 2. luncheon product:

Luncheon-meat can be defined as a food product cooked from red meat or finely chopped poultry meat, which is treated with sodium nitrite and ascorbate to increase the stability of the color of the product. Starch and salt are added to it. It is cooked or it may be smoked. It is very small pieces pressed into a mold. The luncheon is packed in the form of long sausages or meat-loaf cylinders, it is cut into thin slices upon consumption and served cold and used to prepare sandwiches with cheese as a snack, or it may be used separately as appetizers or salads (EL- Hadidiet *al.*, 2017; Guerreo-Legarreta, 2010; Abdullah, 2007).

Luncheon products are among the most popular meat products that are consumed by millions of people from all over the world, and they are common and favorite foods for adults and children.

The word luncheon is usually abbreviated to lunch, which means in English a meal, and from it the word luncheon-meat means the meat of a lunch meal or the meat of snacks, and the word luncheon-meat is used in the West to express many types of cold meat, but the word luncheon is used in the countries of the Middle East to refer to the beef luncheon specifically, and the luncheon with its different flavors of meat or chicken is one of the processed meats, which is often bought ready-made, and is considered fast food (AL-Bachir, 2005).

Meat products can be divided into four main categories:

**-Raw products:** These products are cooked before eating, and examples of them are British sausage and Burker.

**-Dry fermented products:** These products are eaten without cooking, and examples of them are salami.

**-Cooked minced meat products:** they are usually cooked before consumption, and examples of them are luncheon meats and frankfurters.

**-Uncooked minced meat products:** Examples include canned bacon and Pate (Al-Taie, 1987).

## 3. The importance of the plant

One of the factors that led to the interest in plants is the finding that the efficiency of plants in their functional effect was more than the materials that are prepared in the laboratory, as it was found that more than 327 species of plants in Iraq have antimicrobial activity (Al-Shasima, and Mitscher, 1979). Plants and herbs are still an important factor in industry and agriculture and a source of important active substances that inhibit microorganisms, especially after microorganisms have developed resistance to antibiotics such as penicillin (Al-Mayali, 2018), and among these additives are many compounds, colors and flavors such as multiple phenols, amino acids, vitamins and other compounds. Natural foods that are abundant in many grains, seeds, fruits, and vegetables (Brannan and Mah, 2007).

Oregano was also called marjoram or douche and its scientific name is *Oreganum vulgare* L. It belongs to the Lamiaceae Family. It is an aromatic perennial herbaceous plant with creeping woody roots and branching and hairy leaves. Its leaves contain small glands that contain volatile oils, which are a source of aromas and flavors (Abdet *al.*, 2017). Its chemical composition also contains minerals, oils, vitamins, flavonoids, hydroquinone glycosides, soluble sugars, and triterpenes. It was a natural preservative and antioxidant (Oraibi, 2017).

It has been used as a treatment for many diseases such as diarrhea, indigestion, and asthma, and its leaves have been used to treat ulcers, as an antiseptic for wounds, and as a sedative for muscle pain, as well as its infusion is used to treat stomach disorders and colds, as the active substances of the plant usually work synergistically with the immune system as it enhances its work and has the ability to improve digestion and liver functions (Tahaet *al.*, 2011; Singletary, 2010).



**Figure (1): Oregano (Marjoram)**

The Maui rose was called the tongue of the borage, and it is also known as the flower of the star. It has other names such as scale and lava, and its scientific name is *Borago officinalis* L. It belongs to the Boraginaceae family. It was a herbaceous plant that grows throughout the year. Its homeland is Syria, but it abounds in the Mediterranean region as well as in Asia. It is used for cooking and medical purposes (Gupta and Singh, 2010), and it contains many fatty acids such as linoleic acid, oleic acid, palmitic acid, romarnic acid, erucic acid, malic acid, lactic acid, and tannic acid. Solid plaque, diabetes, and heart disease (Asadi- Samaniet *al.*, 2014; Al-Alojiet *al.*, 2009). It was also noted that this plant is useful for treating colds, treating respiratory infections, rheumatism, and some skin diseases. It was used in metabolic regulation and hormonal system regulation, as it was found to be a diuretic and milk. as a laxative and an antipyretic, and in general the rose was considered an anti-inflammatory (Gupta and Singh, 2010; Kaskooset *al.*, 2012) it was also used in foods such as preparing soups and salads and in vegetable and meat dishes because it's leaves contain phenols and flavonoids, which act as antioxidants, as the Many natural antioxidants are extracted from it's leaves, roots, and seeds, as well as containing mineral elements such as iron, manganese, and magnesium (Borwyet *al.*, 2017).



**Figure (2): Maui rose plant (borage)**

### 3.The antioxidant activity of spice

Khanumet *al.* (2011) pointed out to the antioxidant activity of extracts of oregano, purple, and maui rose using the free radical scavenger method 2,2 Diphenyl,1-2-picrylhydrazyl DPPH, noting that the extracts had very strong effectiveness at a concentration of 200 ppm, and the extract showed The aqueous and alcoholic extract of oregano had the maximum antioxidant activity (88.1, 88.5)%, while the aqueous and alcoholic extract of the purple had antioxidant activity (85.2, 88.4)%, while the aqueous and alcoholic extract of Mao rose had antioxidant activity (54.4, 71.2) % respectively.

Antioxidants are defined as chemicals that, if found in the diet at low concentrations, can delay the appearance of oxidation in biomolecules that are easily oxidizable by multiple mechanisms such as fats and proteins in meat and its products, and thus improve and increase the storage period of foods by protecting them from damage resulting from this oxidation. (Karreet *et al.*, 2013), and the use of multiple types of antioxidants in food was determined by a set of conditions, namely, not adding unwanted color, odor, or flavor to the products. The use levels for antioxidants were also determined, which was 200 ppm or 0.02% based on weight of fat or oil (Allamet *et al.*, 2002).

The antioxidants that are added to food can be divided into:

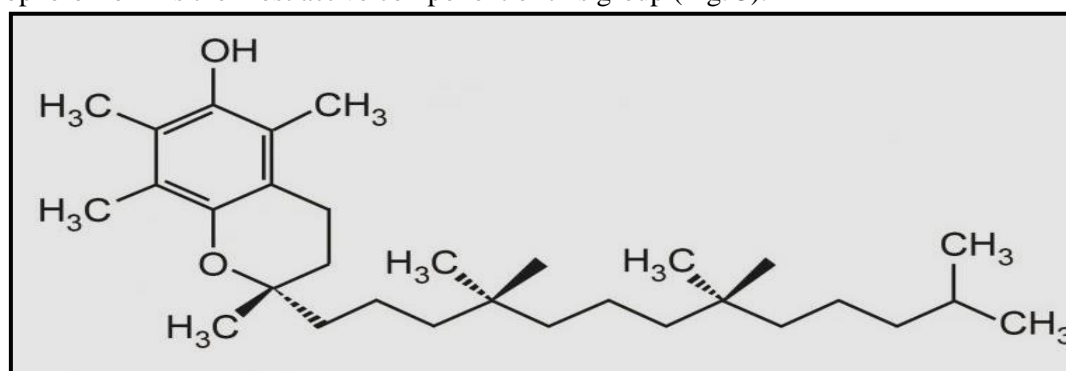
### 3.1. Natural antioxidants

Recently, there has been increased interest in biologically active natural active compounds, including phenols, vitamins, and volatile compounds that are abundant in spices, herbs, and fruits (Ahmad *et al.*, 2015).

Natural antioxidants are present either naturally in foods or formed during their processing (Shahidi, 1997),

As many of them have been diagnosed in plants such as spices and herbs, which have been proven to reduce the risk of many diseases due to their effectiveness as antioxidants and inhibitors of microorganisms, as they have the ability to capture free radicals resulting from oxidation, and a search has been made for natural additives of plant origin that have both Of the two activities (antioxidant and antimicrobial activity) that prevent the economic loss of food (Mielniket *et al.*, 2008) ; (Yin and Cheng, 2003), attention was directed towards natural sources represented by plants, especially edible ones. The most prominent natural antioxidants that include flavonoids, tannins, carotenoids, natural phenolic acids, vitamins and other natural components that are abundant in all plant parts such as leaves, flowers, fruits, stems, roots, bark and seeds that can be used as natural additives in food preservation and that are accepted by the consumer because they are natural and included in the human diet (Brewer , 2007), in addition to their action as antioxidants, many studies have demonstrated the role of phenolic compounds as antibacterial, antiviral, and antifungal.

Among the natural antioxidants are tocopherols that have vitamin E activity and contribute to the stability of most vegetable oils. Tocopherols are monophenolic compounds and consist of eight different compounds belonging to two families: tocots and tocotrienols, depending on the number and locations of methyl groups attached to the chromanol ring. The tocopherol group is characterized by that its side chains are saturated, while the side chains of the tocotrienol group are unsaturated, and the  $\alpha$ -tocopherol form is the most active component of this group (Fig. 3).



**Figure (3): The chemical structure of  $\alpha$ -tocopherol**

Plant foods contain large amounts of tocopherols and tocotrienols that differ from each other in the fatty part. Cereals and their products, oil seeds, nuts and vegetables are rich sources of tocopherols. In addition, tocopherols are found in very small quantities in the animal kingdom.

These compounds are biologically important, especially  $\alpha$ -tocopherol or vitamin E, as they prevent the oxidation of body fats, including unsaturated fatty acids and film-forming fats. Tocopherols are produced commercially and used in food as antioxidants. The activity of tocopherols as antioxidants is mainly based on a system Tocopherol oxidation - tocopherylquinone (Yang *et al.*, 2020).

Many phenols are natural antioxidants and are known as aromatic organic compounds that contain one or more benzene rings linked to a hydroxyl or methoxyl group. There are more than 8,000 types of phenols present, including more than 4,000 types of flavonoids (Cheynier, 2005). The many natural phenolic compounds Poly Phenol have been used as inhibitors of rancidity, and the many phenols are the most present among the rest of the antioxidants in our diet, as these compounds are spread in a wide range of foodstuffs such as fruits, vegetables, grains, olives, legumes, and drinks such as tea and coffee, and is the main factor in the delay in studying them from Before researchers is the complexity of their chemical composition (Tsao, 2010), and the many phenols are divided into several sections according to the source, vital function, and chemical structure, and here we will depend on dividing the many phenols according to the chemical structure, that was, according to the degree of their unsaturation and oxidation (the presence of oxygen) in the middle ring to Three sections: phenolic acids, tannic acid, terpenes, and flavonoids, as flavonoids represent the bulk of them (Boukri, 2014).

- **Phenolic acids:** was numerous phenols and it can be divided into three types:  
Simple phenolic acids: was include (Acids derived from benzoic acid, Phenolic acids derived from cinnamic acid).

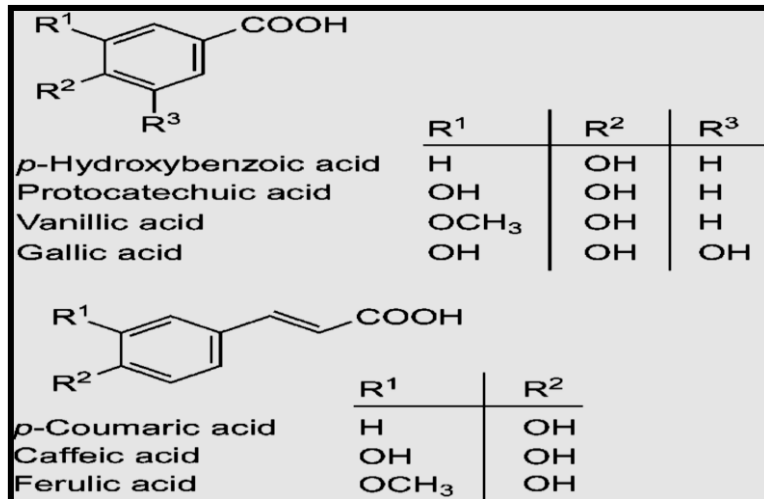


Figure (4): Synthesis of phenolic acids (Vermerris and Nicholson, 2007)

- **Tannins:** was include (Tanninshydrolysables, Tannins condensates, fluorotannin).

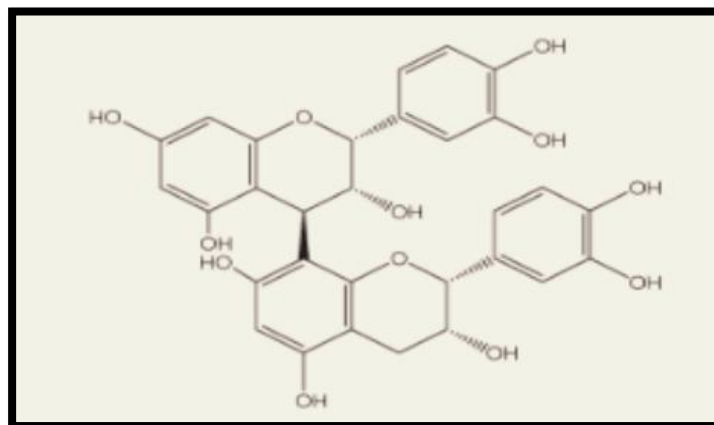


Figure (5): Tannin composition (Vermerris and Nicholson, 2007)

- **Terpenes:** They are natural hydrocarbon compounds resulting from the condensation of isoprene units with 5 carbon atoms, and they are natural products with various carbon structures. More than

36,000 different structures have been identified, as they have been isolated from flowers, stems, roots, and different parts of plants, as well as animals and insects. and marine organisms (Boukri, 2014).

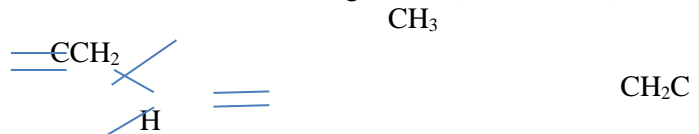


Figure (6): Turbines installation (Vermeris and Nicholson, 2007)

**Flavonoids:** are yellow pigments, contain 15 carbon atoms in their basic nucleus, and are characterized by the presence of one or two rings in their chemical structure. They include a wide family of phenolic compounds produced by plants, and they are among the most present compounds in the foods that humans eat and contain more than 8000-6000 A type with low molecular weights (Buer and Djordjevic, 2010), and flavonoids are classified into five main groups (Flavonoles, Flavones, Flavanones, Flavanols, Anthocyanins, Polyphenolic Amides).

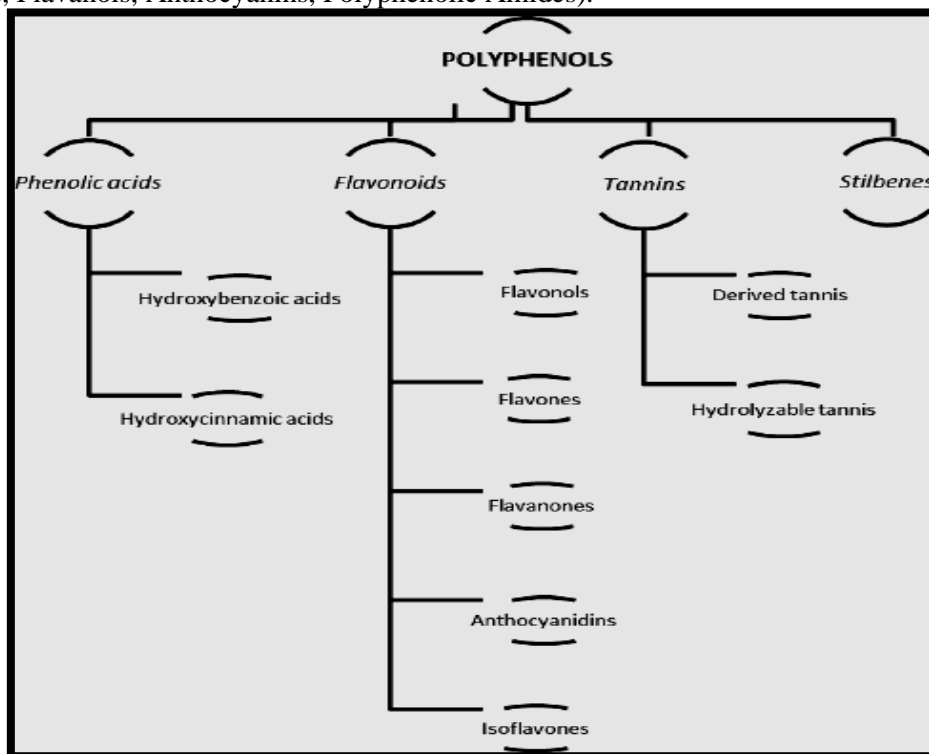


Figure (7): Classification of phenolic compounds (Ozcanet *et al.*, 2014)

### 3.2. Industrial antioxidants

There was another type of antioxidants that are industrial antioxidants, and examples of them are (Butyl Hydroxytoluene (BHT) Butyle Hydroxyl Toluene, Butyl Hydroxyanisole (BHA) Butyle Hydroxyl, Tetr-Butyl Hydroxydroxy Quinone (TBHQ) and Propyl Gallate) PG) and Nor DihydroGuaiaretic Acid (NDGA).

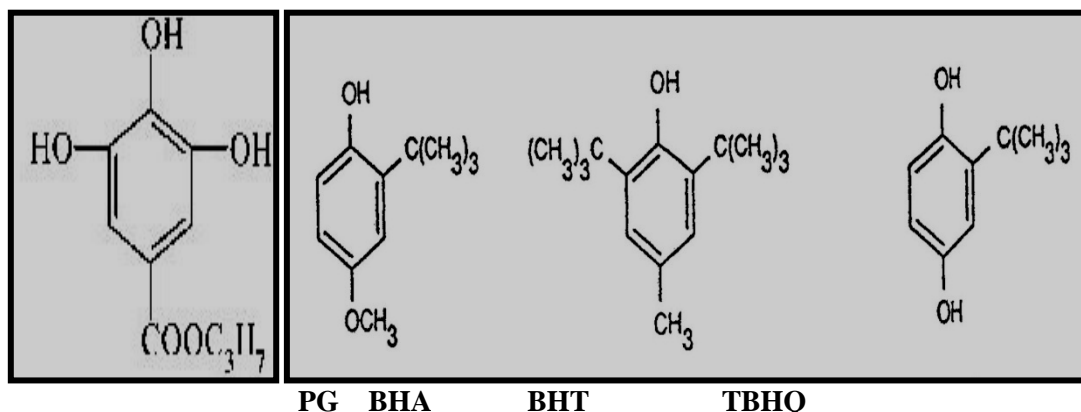


Figure (8): Chemical composition of industrial antioxidants

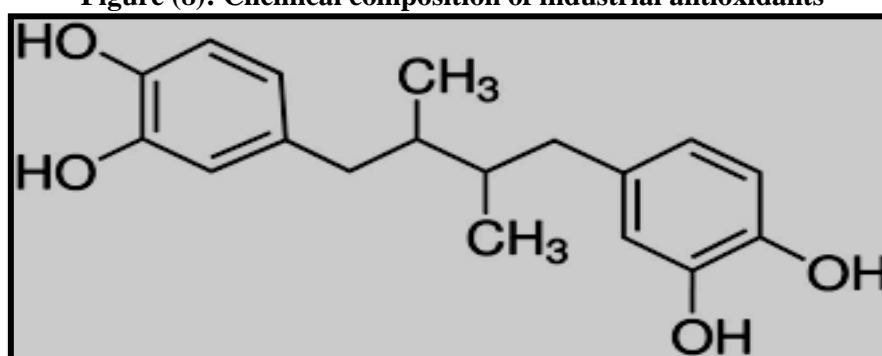


Figure (9): The chemical structure of the synthetic antioxidant nordehydrourteric acid

#### 4. The effect of adding spices on the qualitative characteristics of meat products

##### 4. 1. Effect of adding spices on the chemical content and pH value of meat products

There are effects of adding spices on the chemical composition of meat products, as Abdullah (2007) studied the chemical composition of five mixtures of luncheon meat to which a mixture of spices was added with different proportions of ingredients, as the moisture content in these mixtures was (63.5, 61.9, 61.2, 61.0, 62.0) %, while the percentage of protein was (16.7, 14.7, 13.8, 19.5, 18.5)%, the percentage of fat was (16.7, 18.4, 19.6, 15.8, 15.5)%, and the ash (3.9, 3.7, 3.8, 4.0, 4.0)%.

Terefe (2017) showed the effect of adding ginger powder at a ratio of (1, 3, 5)% to minced beef that was chilled for different periods of (0, 4, 6) days on the pH values and in the logarithm of the total number of bacteria, it was found that there is a decrease in The pH value and the total count of bacteria compared to the control sample, as the pH values were in the range of 5.55-6.11 during refrigerated storage for a period of 6 days. As for the meat treated with ginger powder, the pH values ranged from 5.53-5.87 for a concentration of 1% and from 5.04-5.36 for a concentration of 3% and from 4.91-5.19 for a concentration of 5%, while the numbers of total bacteria increased with the increase of the preservation period, and reached (1.33, 1.19, 0.87, 0.63) f. T. m / g, respectively, when preserved for a period of zero days, then it increased to reach (2.35, 1.25, 0.94, 0.73) and. T. m / g, respectively, at the end of the storage period (6 days), and the pH and the numbers of total bacteria decreased as the concentration of the powder increased.

##### 4. 2. Effect of adding spices on the color pigments of the meat product

Myoglobin was the main pigment of meat and is affected by several factors depending on the type of muscle and the type of animal, and it is the dominant pigment in muscles (Al-Husseiny and Khrebish., 2019), and myoglobin is found in three states in beef in three cases, which are reduced myoglobin, oxymyoglobin, and metamyoglobin derivatives, and that reduced myoglobin is The dominant pigment in the muscles in the absence of oxygen and gives the meat a purple color when cut. Oxymyoglobin was the oxygenated form of the pigment myoglobin, which is responsible for the

unwanted brown color of fresh meat, which is rejected by the consumer. It is a major cause of the change in the color of fresh meat (Kondjoyan *et al.*, 2022).

Salman and Saleh (2012) illustrated the effect of adding an aqueous extract of green tea with two concentrations (0.1, 0.5)% and powder of tomato seeds and peels with two concentrations (0.1, 0.5)%, and a mixture of aqueous green tea extract, powder of tomato seeds and peels, and industrial antioxidant BHA at a concentration of 20 mg / ml to frozen buffalo meat for a period of 90 days, as it was noted that there was a significant decrease in the percentage of metamyoglobin pigment, which increased in the comparison treatment from 35.64% to 73.53% during the period from (1-90) days, while the treatments to which the aqueous extract of green tea was added were the percentage of metamyoglobin contained (32.43 and 29.22)%, while the percentage of the dye in the powder of tomato seeds and peels was (34.40 and 35.39)%, respectively. The industrial oxidation rate was 61.03% after 90 days of storage, as the extracts achieved a significant decrease in the formation of the meta-myoglobin pigment compared to the control sample and the antioxidant.

#### **4. 3. Effect of adding spices on the chemical indicators bacterial indicators of meat products**

Shelbaya *et al.* (2014) used marjoram powder and an addition of 5% to the beef kofta preserved for 6 months at a temperature of -18 C, as it noted the occurrence of a significant decrease and the peroxide values increased with the increase in the storage period, and the addition of the powder to the kofta achieved a decrease in the peroxide value compared to a control sample in which the peroxide value increased (from 2.3 to 6.6) mmeq/kg after six months.

Al-Alwan *et al.* (2017) found when they added different concentrations (0.05, 0.10, 0.15, 0.20) (g carnosine acid / kg) of carnosic acid powder and a concentration (1 g / kg of meat) of rosemary and synthetic antioxidant BHA at a concentration of 0.1 g / kg of meat. To fresh beef chilled at 2 C° for different periods of (0, 3, 7, 14, and 21) days, a significant decrease occurred in the peroxide value, which increased with the progression of the preservation period, as its value was in the treatments that had different concentrations of carnosic acid added at (0) day (1.53, 1.07, 1.00, 0.82) mmeq/kg, these values increased until the end of the storage period (21) days and reached (12.02, 11.25, 11.17, 11.08) mmeq/kg, respectively, and the peroxide value was at (0) day (1.12, 1.25) mmeq/kg in the two treatments, to which a concentration of 1 gm/kg of rosemary meat was added and a concentration of 0.1 gm/kg of BHA meat, respectively, and it reached (11.85, 11.51) mmeq/kg after (21) days of cooling, while the value of peroxide in the control treatment was 2.63 mmequiv/kg at the beginning of the storage period and reached 14.30 mmequiv/kg at the end of the storage period.

Nikousaleh and Prakas (2016) reported using clove powders *Syzygium aromaticum* Linn and cinnamon *Cinnamomum verum*, and ichthyosis, *Rhus coriaria* L., and added them to the sausage preserved in the refrigerator for a month, and measured the percentage of free fatty acids every 10 days, as the spices played an important role in reducing the percentage of free fatty acids, because these spices are natural sources of effective compounds that act as antioxidants.

Studied by Vergara *et al.* (2020) effect of adding oregano powder in the quality of Burker mutton packed under vacuum during a period of (0, 7, 10, 14) days, a decrease was observed in the value of thiobarbituric acid in the samples containing oregano powder compared to the control sample, as the value of thiobarbituric acid in the sample of Burker was 0.21 mg malonaldehyde / kg of meat at the period of (0) days and remained constant for a week at this value, then decreased to 0.19 mg of malonaldehyde / kg of meat after ten days, then it rose suddenly and became 0.25 mg of malonaldehyde / kg of meat at the period of (14) days, and these values are considered low Compared to a control sample in which the values of thiobarbituric acid were (1.08, 1.98, 2.10, 2.21) mg malonaldehyde / kg of meat, respectively, during the preservation period, this indicates that oregano powder contributed to the preservation of the Burker product during the preservation period.

El-Hadidie *et al.* (2017) Study the effect of adding different levels of sweet lupine seeds flour *Lupinus albus* L. at percentages (30, 60, 100)% to the luncheon meat stored for four months, as it was noted that a significant decrease in the total volatile nitrogen values occurred when adding the three percentages, and the values were (12.6, 9.1, 7.0) mg nitrogen / 100 g for the three ratios, respectively, while the value of total volatile nitrogen in the control sample was 15.4 mg nitrogen / 100 g at the period (zero) day, and the values increased after four months and became (18.0, 16.6, 11.9) mg



nitrogen /100g for the ratios used respectively, but this increase was less compared to the control sample, in which the value of total volatile nitrogen was 19.8 mg nitrogen /100g, and it was noted that coliform and salmonella bacteria did not grow in all treatments with control during the preservation period (0, 1, 2, 3, 4) month.

Al-Rubaieet *al.* (2017) found a significant decrease in the value of total volatile nitrogen when adding different concentrations (0.05, 0.10, 0.15, 0.20)% of carnosine acid powder and a concentration of 1 g / kg of rosemary meat and a concentration of 0.1 g / kg of antioxidant meat. BHA to fresh beef that was kept in refrigeration at a temperature of 4 °C for 21 days, as the value increased with the progression of the preservation period compared to the control sample, which contained a higher value.

Shaker and Nasser (2017) studied the effect of adding sprouted barley and flaxseeds at a concentration of 5% and almaze at a concentration of 10% to minced meat discs preserved by freezing at -18 °C for four months, and noted a significant increase in the values of total soluble nitrogen, protein and non-protein nitrogen, and the values of the tyrosine coefficient / Total tryptophan and the coefficient of protein and non-protein tyrosine compared to the control sample after three months of freezing storage, as the average values of the coefficient of tyrosine / total tryptophan of the meat patties to which sprouted barley, flaxseed and amazement were added were (1.278, 32.12, 92.56), respectively, and reached in a sample The control sample was 0.840, while the average values for the protein tyrosine / tryptophan coefficient were (0.602, 0.146, 1.875) respectively, and for the control sample 0.255, while the average values for the non-protein tyrosine / tryptophan were (60.67, 0.666, 0.694), respectively, and for the control sample 0.585.

Sant-Lhoutellieret *al.* (2008) that fresh beef contains a percentage of carbonyl due to the effort exerted by the organism, and this percentage varies according to the type of muscle and the age of the animal, as the percentage of carbonyl in fresh thigh muscles was estimated at 0.20 nanomol / mg protein.

(2019) and MorsyAly made fresh luncheon meat from chicken meat, adding lentil powders, Brassica rapa turnips, Brassica oleracea cauliflower, and a mixture composed of these plants with the basic luncheon sample prepared from (chicken meat, eggs, flour, salt, milk powder, spices, soybean powder, and crushed garlic), which were preserved By refrigeration at  $1 \pm 4$  °C for a period of five months, it was noticed that a significant decrease occurred in the bacterial numbers and the numbers of cold-loving bacteria with the different type of sample, and these numbers increased with the advancement of the storage period for the treatments containing plants compared to the control sample that was rejected after the passage of the fourth month, and it was also noted that The sensory attributes evaluation scores that included (appearance, color, texture, flavour) were good compared to the control sample because the plants contain natural substances such as phenols and flavonoids, which acted as antioxidants and thus preserved the sensory characteristics of the manufactured luncheon.

Kumudavallyet *al.* (2005) cleared up the use of powders of spices (cloves, cinnamon and turmeric) and adding them to lamb meat at a rate of 2%, and this addition led to the inhibition of the numbers of lipolytic bacteria during storage at  $25 \pm 2$  °C until 48 hours, and it was also noted that samples of cloves were Acceptable up to 48 hours, cinnamon samples were acceptable up to 36 hours, and turmeric samples were acceptable up to 24 hours, compared to the control sample, which was acceptable up to 12 hours. The powders were effective in prolonging the shelf life of lamb.

Saadet *al.* (2018) a study on meat products (minced chicken meat, beef luncheon meat, chicken luncheon meat, and minced kofta), as he collected samples of these products from local markets in the Gharbia region in Egypt, as he found a high number of coliform bacteria in these products.

### Conclusions:

The following conclusions were reached: The results showed that the shelf life of the refrigerated luncheon product is fifteen days when adding spices, and the vegetable herbs (added to the luncheon product) maintained a clear stability of the percentage of moisture, protein, fat, ash and carbohydrates, and it was concluded that a decrease in the metamyoglobin dye, while an increase in each of the Myoglobin and oxymyoglobin, and there was a clear decrease by the influence of spices in pH, percentage of fatty acids, peroxide values, thiobarbituric acid values, total volatile nitrogen values, protein carbonyl groups, percentage of soluble protein nitrogen, numbers (total, cryophilic, proteolytic

and lipolytic bacteria) and inhibition of coliform bacteria and salmonella bacteria occurred. And chicha in the luncheon product compared to T1 treatment (comparison sample), T2 treatment with spices, and T3 treatment with antioxidant (BHT), while there was an increase in the coefficient of total tyrosine / tryptophan, protein tryptophan, non-protein tryptophan, and the percentage of total soluble nitrogen and non-protein nitrogen, and the treatment improved With botanical herbs (oregano and Maui rose) from the sensory characteristics of the luncheon product in terms of color, flavor (taste and smell), texture, chewiness and regularity of shape.

#### Recommendations:

- 1- Conducting more local research studies on the use of other types of plant herbs and mixing them in certain proportions in meat products, given their economic and nutritional importance, and avoiding industrial preservatives.
- 2- Conducting experiments using powdered(oregano and maui rose) inpreserving and improving other types of meat such as sheep, buffalo, poultry and fish.
- 3- Detection and identification of active compounds in botanical herbs (oregano and maui rose) using gas chromatography.
- 4- Making some modifications in the luncheon product to suit the consumer's taste.
- 5- We recommend using oregano powder with a concentration of 0.5 in factories and production plants for meat products instead of using industrial antioxidants, as it is safe for health and does not cause any diseases if its percentage is increased.

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