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Investigation of Microbial and Mineral Contamination of Imported Meat

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Abstract

The study was carried out for the purpose of investigating the microbial and mineral pollutants in the imported red meat. This research included field work and random sampling of the markets of Diwaniya Governorate. In addition, laboratory tests were carried out on samples from the following countries: (Saudi Arabia, Turkey, Jordan, Lebanon) in the laboratories of the Department of Life Sciences. Some bacterial species were investigated in the studied meat samples. Microbial contamination The results of the study showed a high level of bacterial content and the results were the emergence of Staph bacteria. aureus in the nutritious dish. The other dishes showed no growth due to the good storage of meat. The dish in which the bacteria appeared was due to poor storage or preservatives used in the storage process. As for the chemical analysis of heavy metals using the Atomic Absorption Spectrometer technique, the concentrations were as follows: Concentration of the copper component (0.013-0.310) µg / g, while the concentration of the lead element (0.001-0.111) µg / G; for cadmium, its concentration was 0.001-0.004 µg / g and the concentration of chromium was 0.003-0.020 µg / g. The results showed that levels of copper, lead, chromium and cadmium were higher than those allowed by the World Health Organization (WHO) and FAO in some imported meat samples.

Keywords: *Microbial, Mineral contamination, Meat*

Introduction

Meat:

Meat is one of the most important and important products in human life since ancient times. The source of animal protein is of high value for its vital amino acids necessary for the survival of life. Due to the important role that meat plays in our daily lives, meat has been preserved in different ways 1. In general, this has greatly contributed to the slaughtering of the animal in a given country and its consumption in another country 2. Therefore, it was important to control these meat for the large use of people, especially the Iraqi street, Including bacteriophages, fungi and viruses to humans, causing many diseases. Meat generally contains protein, amino acids, important minerals and vitamins, including B-Complex. The nutritional value of meat depends on the content of these important ingredients, depending on the age of the animal, the type of herd, the fat content of the meat 12 . The meat is rich in important components of the human being and is also considered to be perishable and therefore undergoes natural changes (chemical and biological), which have a major effect on the suitability of these meat for human consumption. Meat can be preserved from these natural effects by freezing (freezing meat 8 . The method of freezing does not eliminate the microbes found in meat in general, since microbial growth generally stops at -10 ° C for bacteria, and for fungus it can grow on meat products clearly, leaving different spots on meat products and increasing the image Especially if the tempera-ture is higher than -11 ° C. This results in a noticeable change in the color and texture of the meat, since the optimal temperature for meat preservation (-18 ° C) 5 The microbial quality of the meat and its products is determined by the presence of the numbers and types of microorganisms in which they grow, and that the meat in general is not free of these quarters, but may increase numbers if they have some approp-riate conditions such as humidity and temperature. If the growth of these organisms is not controlled in the meat during the storage period, it may result in loss of its nutritional value and nutritional characteristics, as well as the accumulation of toxic

substances in the meat and thus lead to its unfitability for human consumption 13 . The method of storage is one of the most important ways to preserve the meat and its products in terms of quality, chemical changes and oxidation products, which include: Punching and causing undesirable changes in meat in terms of flavor, smell and color and the conversion of fatty acids to unsaturated acids and this negatively affects human health 11 . Because of the increase in the importation of meat and the dumping of commodities to the Iraqi market and because of the inability of the relevant official control bodies to impose their laws on controlling the flow of meat and the environmental conditions of the improper storage and circulation of these meat and thus lead to the possibility of negative impact on the consumer and health was conducted this study, Investiga-tion of the microbial contamination of imported meat as well as the evaluation of the content of these meat from the mineral elements (heavy metals), which included cadmium, lead, mercury, chromium, copper) to determine their suitability to Iraqi specifications and their suitability for consumption Human.

Heavy metals

Heavy metals are non-organic elements with large atomic nuclei and are characterized by a density of more than 6.5 g / cm. They can be deposited with hydrogen sulfide in an acid solution, mainly chromium, lead, mercury, zinc, cadmium, barium, silver, nickel and copper. They pose a threat to the health of living organisms if their concentration exceeds certain small limits and are usually subject to strict rules when placed in the environment.

Metal is one of the oldest toxic substances known to humans. It was started by the use of lead since 2000 BC, where primitive industrial activities began, and the metal was produced from its raw sources or as a result of silver smelting and purification. Cadmium was first known as a mineral containing zinc carbonate in 1817 AD. There are about 80 elements of the total elements that reached 105 in the periodic table of elements were considered minerals and 30 of them were found to have the potential to cause toxic effects in humans. The environmental problems caused by minerals with environmental compon-ents began with the increase in industrial processes, which led to changes in the natural and chemical properties of natural environmental components (such as low PH value), which led to acid rain. Different human activities have been found to have an effect on increasing the presence of minerals in the enviro-nment. The pollution of heavy elements in the soil leads to serious environm-ental and health problems such as the high concentration of these elements to the extent of toxicity in plants, animals and humans. On the other hand, or by this study, pollution of heavy metals is one of the forms of environmental pollution resulting from human activity of industrial or agricultural. In recent years scientists have been interested in the study of heavy elements in terms of their presence in the environment and its biological impact and its relationship to human health. Food is one of the main sources of human exposure to these elements, and therefore many studies have been concerned with the use of appropriate methods to determine the extent of contamination of food these elements and determine the minimum or critical concentration allowed Of these pollutants as mentioned in previous research by the research. The contamination of heavy elements is due to polluted fodder for beef as well as polluted water and breeding near polluted environments 9 as well as to manufacturing processes as packaging materials are another source of heavy metal contamination. Mammals, including humans, are affected by heavy metals, depending on the concentration, toxicity, chemical appearance and how the organism is exposed to it. The risk of heavy metals lies in their bioaccumulation in the body, which means that the chemical concentration of these minerals in the organism increases over time as compared to its chemical concent-ration in the environment 4. Examples of mineral elements that affect their toxicity to the human and directly affect lead compete directly with calcium for binding to protein uptake sites in the gastrointes-tinal mucosa 10 Cadmium destroys fatty acids. The increase in the level of copper causes dermatitis, cirrhosis and neurological disorders, and can cause cancer 7. Chromium is used extensively in metal plating and in other industries and enters chromium into the body by inhaling vapors containing compounds Chrom-ium is mainly a low-permeability of the skin and causes inflammation of the respiratory tract, severe inflamma-tion of the lungs and carcinogenicity. It is good for chromium that it is eliminated directly with urine and does not accumulate in any body member.6 found that beef and sheep contained arsenic, lead, mercury and cadmium, the highest concentration of arsenic (46.4 ± 3.41) ppm in beef, and the highest concentration of lead in beef at 2.19 ± 0.28 ppm The highest concentration of cadmium was in sheep meat (37 ± 0.06) ppm and the highest concentration of mercury in sheep meat (28.55

± 76.28) ppm.

Materials & Method

1. **Collection of specimens:** Meat samples were collected from the local markets of Diwaniyah, where the samples were randomly selected from meat (Saudi Arabia, Lebanon, Turkey, Jordan) and placed in clean plastic containers and a quantity of water was placed in a container. pollution.

2. **Preparation of samples for the purpose of examination Preparation of specimens:**

Each sample of imported meat was weighed using a sensitive balance. Each sample was placed in a clean, sterilized independent electric mixer. 225 mL water was added to each meat sample. The samples were mixed individually using a mixer for 3 minutes. 1: 10 for each imported meat sample (Clarence et al., 2009). (1) ml of dilution (1-10) was transferred to a clean and sterilized flask containing (99) ml distilled water and then a series of dilutions was worked.

3. **Cultivation of specimens Culture of specimens:**

After the preparation of the samples was completed and after the required drying was done and distributed in the dishes, a quantity of sterile maconkey food was poured and then cooled. These steps were re-isolated to isolate the bacteria from the imported meat and the dishes were incubated at 37 ° C for 18-24 hour.

Preparation of culture media: Preparation of culture media: The ready-to-use user medium is prepared according to the manufacturer's instructions.

4. **Sterilization methods:**

- **Sterilization of cultivars:**

1. **Autocleave autoclave:**

The irrigated media used at the incubator were sterilized at 121 ° C (15 ° C) at 15 ° C for 15 minutes.

2. **Dry heat sterilization Dry heating:** Sterilize the glass in dry oven for 15 minutes at 180 ° C for 2 hours.

Results and Discussion

First: Determination of microbial content:

• Bacterial count:

16 samples of imported meat were taken from shops in Diwaniyah. The number of total bacterial colonies developed on the mannitol medium was calculated. These numbers represented the general mean of the bacteria found in each gram of meat samples used in the imported experiment.

The results shown in Table (1) show the total number of bacteria in the studied meat species. The growth rate of imported meat ranges between 3-10 x 52 - 3-10 x 114 bg / g. Figure (1) shows the presence of bacteria

Table (1). Total number of bacteria used to detect microbial contamination in imported meat samples in Diwaniya city

Trade mark	The middle of the plant used	Dilution	Total bacteria count
Saudi Arabia	Manitol solt agar	$^{3-}10$	$1\ 10^{-3}$
Jordan	Nutrient agar Medium	$^{3-}10$	Nil
Lebanon	EMB	$^{3-}10$	Nil
Turkey	Medium Manitol	$^{3-}10$	Nil

Figure (1) Growth of Staphylococcus bacteria on central Manitol Solt agar in imported meat sample

The results of the table showed a bacterial contamination with Staph. aureus bacteria in imported meat. Bacterial contamination in Saudi Arabia may be due to poor storage and may be due to the amount of preservatives used. Other dishes that have not been shown to have bacterial contamination are due to good storage of meat. We conclude from this that the cause of the contamination in the studied sample is the origin

of these meat and the health procedures followed in the production processes follow the international health conditions, the poor transport, storage and manual handling and stay away from the health conditions of storage, which may extend for long periods of the main factors of pollution as well as ways Slaughter if it is done according to Islamic law or not. The results of the total count of Staph bacteria. aureus is 1 × 3-10 This result came close to the results of global research 1 Staph aureus bacteria are found in the meat and penetrate within it and move from the environment surrounding all its elements to the human and this indicates the need to reduce Pollution with such microbes is one of the factors causing food poisoning in humans. According to the International Agency on Microbiological Species of Food 3 , the positive microorganisms of the Kram dye are relatively resistant to freezing temperature and this is important in public health. The concentration of heavy metals copper, lead, cadmium and chromium in µg / g in imported meat varied by metal and meat type. The concentration of the mineral elements in the imported meat was the highest concentration of copper (0.310) µg / g and the lowest concentration (0.013) µg / g. For the lead element, the highest concentration was 0.111 µg / g, (0.001) µg / g and that the concentration of the lead element was less than the normal limits allowed by the Intergovernmental Negotiating Committee and the World Health Organization and identified by a concentration of 10 µg / g

Table (2). Concentrations of heavy elements in samples of imported meat in Diwaniyah city in unit of microgram / gram

Concentration of elements (µg / g)				Trade mark
Cu	Cr	Pb	Cd	
0.061	0.000	0.111	0.002	Saudi Arabia
0.121	0.009	0.003	0.001	Lebanon
0.076	0.000	0.005	0.001	Turkey
0.078	0.000	0.003	0.002	Jordan
0.097	0.007	0.005	0.000	Jordan
0.088	0.012	0.005	0.000	Lebanon
0.110	0.000	0.007	0.001	Turkey
0.214	0.000	0.005	0.000	Saudi Arabia
0.101	0.000	0.002	0.000	Saudi Arabia
0.122	0.000	0.001	0.000	Lebanon
0.013	0.000	0.001	0.003	Jordan
0.064	0.003	0.014	0.000	Turkey
0.126	0.000	0.003	0.000	Jordan
0.024	0.000	0.001	0.000	Lebanon
0.130	0.000	0.005	0.000	Saudi Arabia
0.310	0.020	0.014	0.004	Turkey

The highest concentration of cadmium was 0.004 µg / g and the lowest concentration was 0.001 µg / g.

The highest concentration of chromium was 0.020 µg / g and the lowest concentration was 0.003 µg / g.

Financial Disclosure: There is no financial disclosure.

Conflict of Interest: None to declare.

Ethical Clearance: All experimental protocols were approved under the College of science. University of Alqadisiyah and all experiments were carried out in accordance with approved guidelines.

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