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Effect Of Frequent Thawing And Cooling On Red And Chicken Meat

* Zainab A. Saud *Samar Saeed Ghaz * Rana Hashim Adlan *

*Department of Veterinary Public Health, college of Veterinary Medicine- University of Basrah, Iraq.

I. Abstract

Cooling and freezing are important processes that directly affect the quality and safety of Meat (red and white meat, especially poultry). It is widely used in meat preservation in factories and during home storage.These methods or processes are very important in preserving meat, as they help slow down the growth

and reproduction of microorganisms inside the meat and extend the shelf life of the product, but they have a direct impacton the quality of the product. This is due to the formation of ice crystals inside the muscle tissue, which causes cell damage, which leads to an increase in the loss of protein-rich juices as well as the loss of water. This exposes the muscle tissue of the meat to dehydration and changes in taste and texture, especially in chicken breasts, making them undesirable to consumers. The more times meat is thawed and frozen using traditional methods, the more fat oxidation occurs, which affects the flavor and taste of the meat. Freezing does not kill microorganisms, but it reduces their activity and prevents their reproduction, which leads to compliance with and control of temperatures and sanitary conditions to ensure food safety, such as using the quick-freezing method, storing at low and stable temperatures, using appropriate packaging, and thawing meat under controlled sanitary conditions. This is an important factor in maintaining the quality and safety of meat and providing a safe product to consumers**.**

II. INTRODUCTION

Unless preservation techniques are employed, meat is a highly perishable, protein-rich food with a limited shelf life (Olaoye 2010). A number of interconnected factors affect shelf life and meat quality maintenance, including holding temperature, which can lead to negative changes in meat quality characteristics. The most significant factor affecting meat quality is spoilage caused by microbial growth (Olaoye 2010). Meat provides us with amino acids and has the ideal composition to support protein synthesis for muscle growth and maintenance because it is compositionally similar to human skeletal muscle. Maintaining skeletal muscle mass is crucial for preserving both metabolic health and physical function (Sandoval, 2017).

Group B vitamins and a number of minerals, including iron and magnesium, can be found in red and poultry meat. Our bodies and brains get their energy from group B vitamins. It is regarded as a great source of high-quality protein that is necessary for the nutrition of adults, young children, and infants. Additionally, poultry meat contains significant amounts of vitamins, particularly B (Cahe et al., 2002). The meat components of different animals are displayed in the following table.

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The meat composition

Kind of meat	Protein	Moisture	Fat	Ash	Chol mg/100g	Energy Kcal
Beef meat	21.5%	69.5%	8.0%	1.0%	70%	160
Pork	19.5%	60.5%	9.5%	1.0%	70%	170
Mutton	19.5%	71.5%	7.0%	1.5%	70%	145
Emu	21.2%	21.2.6%	1.7-4.5%	1.0%	39-48%	113-121
Chicken	23.4%	73.7%	1.9%	1.0%	60%	117
Turkey	20.4%	70.4%	8.02%	0.88%	68%	270

Effect of Freezing on Meat

Freezing is the most common way to keep food safe, especially for meat products that are sold abroad (Leygonie et al., 2012). This method of preserving meat gives exporters a big logistical advantage (Fagan et al., 2003). Freezing can make meat less tasty (Vieira et al., 2009). The crystals of ice form between and inside the fibers, which hurts the ultra-structure of the meat during the meat frozen. A big problem with frozen meat is that it loses its ability to hold water (WHC), which shows up as exudate loss (drip loss) when the meat thaws. Drip loss directly affects how proteins work, which causes more water to be lost because proteins and water don't interact as well. (Xiong, 2000; Reznick et al., 1992)

The multiple cycles of freeze-thaw enhance the loss moisture of muscle, this caused damage to the ultrastructure of meat fiber inhibits moisture absorption into the intracellular spaces, resulting in thawing. Conversely, freezing degrades caused loss of the meat quality via removed the osmotic water, formation ice crystals oxidation lipids and protein (Benjakul et al., 2001; Xiong, 2000). meat discoloration occurs through meat thawing, its induces lipid oxidation (Xia et al., 2009).

Freezing and thawing are complicated processes that involve moving heat and a number of physical and chemical changes that can change the quality of meat products (Bing et al., 2002).

The look, feel, taste, color, microbial activity, and nutritional value of meat are all factors that affect its quality. The quality of meat is affected by how quickly it freezes and thaws (McMillin, 2008). Multiple freezing and thawing cycles impact the physicochemical quality and protein damage of beef muscles, leading to a decline quality of beef (Jin-ping et al., 2012).

The impact of successive freezing and thawing cycles on beef, particularly regarding sensory attributes. When you freeze meat, ice crystal form in the cells of muscle, which caused break cells wall. That's why meats let out juices when they thaw. Refreezing meats makes them lose even more moisture, and when they are finally cooked. The outcome of this study is also connected to the findings of Lui et al., (2010). He noted that the trained sensory panel assessed the frizzed and thawed beef was significantly less than child meat when compared with. Changes occurred du to the decline the temperature and pH after the slaughter, also increase glycolysis rats, degree the actinomycin lead to decline ATP finally loss the enzymes activity (Lawrie, 1998). Conversely, the loss of exudates (drip or thaw loss) from beef is inevitable, as moisture reduces transpiration because of the presence of free water within muscles tissue (Joo & Kim, 2011). The oxidation of the lipid is a significant quality metric for beef and beef products, as it can result in rancidity (Jin et al., 2009; Nolsøe and Undeland, 2009). Storing beef and beef products in the freezer may slow down microbial spoilage, but it can also cause the fat to break down and the beef parts to oxidize. Numerous studies have indicated increasing TBARS levels during the freezing and refrigerate storage of meat and meat products (Devatkal et al., 2004; Rajkumar et al., 2004). In the current study, the TBARS value increased gradually both within and between cycles through thawing methods. Tan & Shelef (2002) assert that oxidation of fat with frozen meat occurs at a diminished rate compared to refrigerated meat, with TBARS values indicating minor variations at 69 days of frozen storage at -20°C. The findings of the current study concurred with a prior report (Tan & Shelef, 2002). The TBARS value in this experiment goes from 0.26 to 0.51. TBARS values in this study were still lower than the level that is acceptable for rancidity (1.0 mg/kg). The oxidative stability of meats relies on the equilibrium between antioxidants and pro-oxidants, as well as the makeup of oxidation substrates such as polyunsaturated fatty acids (PUFA), cholesterol, proteins, and pigments (Bertelsen et al., 2000). These compounds are found in large amounts in beef.

Effect of freezing and thawing on microorganism

Temperature is a key factor in how quickly microbes grow. Every species has a temperature range that is best for its growth. Most human microbial pathogens do best at 37ºC, which is the temperature of the body. Low temperatures usually stop or slow down the growth and spread of microbes, but they don't always kill them. In the food, pharmaceutical, and biotechnology industries, refrigerated at a (4ºC) and freezing at a (-20ºC or less) are common methods of preserving food (Hamid et al., 2014). Freezing temperatures slow down the spoiling process caused by bacteriological in meats, but they can also keep some pathogen microorganisms alive and unharmed for a long time. By freezing some microorganisms hurt but don't killed then recovered and became pathogenic microorganisms while some others die du to physical trauma by the freezing. Microorganisms don't grow when food is below -9.5°C, which is enough to keep it from going bad. This means that frozen foods don't need any extra preservatives. For long-term food storage, it may be necessary to keep it at lowers temperature (Neelam et al., 2005). Most microorganisms do not grow at freeze temperatures, and some may be die due to district their enzymes, which keep normal cell activity going. In addition to , microorganisms used water to growth, the freezing makes ice crystals from waters. Freezing is a common practice in the meat, fish, and other animal protein-based industry because it keeps the quality for a long time and has many benefits, such as only minor changes in the size of the product and only minor changes in the color, flavor, and texture of the products (Bibek and Marvin, 2008; USDA Food Safety Information, 2013). You can freeze almost any type of foods, but many food need to be treated in a certain way before they can freeze safely. If you thaw frozen food properly, it is usually just as safe as it was before it was frozen. However, freezing bad food will not make it good. The safest way to defrost food is in the fridge when it is between 8ºC and 0ºC (Leticia et al., 2009). So, while putting food in the fridge is the best way to keep it safe from bacteria, there are some bacteria that can grow in cold places like refrigerators.

Some pathogenic bacteria that can live in refrigerated or frozen foods are Campylobacter jejuni, Listeria monocytogenes, Yersinia enterocolitica, Aeromonas hydrophila, and Pseudomonas sppGeoffrey et al., 2007). Microorganisms can contaminate food stored in the freezer when it thaws, which is when microbes that were dormant during refrigeration can start to grow. Many of these microorganisms caused infections from food while many caused food poisoning (Sanni et al., 2000).

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The role of temperature control in microbial growth and food preservation.

Temperature is a key factor in the growth of microbes. Every species has a temperature range that is best for its growth. Most human microbial pathogens do best at 37ºC, which is the temperature of the body. Low temperatures usually stop or slow down the growth and spread of microbes, but they don't always kill bacteria. Food, drugs, and biotechnology often use refrigeration (4ºC) and freezing (20ºC or lower). Refrigeration keeps food from going bad by effect on microorganisms through decreasing reproduction and growth microorganisms lead to reales enzymes caused rot the food (Roberto and Richard, 2006; Geraldine and Mary, 2007

Freezing food slows down the breakdown process by turning leftover moisture into ice, which stops most types of bacteria from growing. Refrigerator temperatures are more effective at preventing the growth of bacteria than molds and yeast (Neelam et al., 2005; Karoline et al., 2012). The bacteriological quality of frozen products is contingent upon the bacterial load of the raw materials, contamination occurring during handling and processing, and the efficacy of contaminant removal during processing. There are some problems with storing things in the freezer (Taha et al., 2004). These include freezer burn, product dehydration, rancidity, drip loss, and product bleaching, all of which can lower the quality of frozen foods. There have been reports of illnesses related to frozen foods, ice cream, strawberries, and contaminated ice (Stephen & Phil, 2004). When food is frozen to 0OF (-17.8OC) or lower, microbes (bacteria, yeast, and molds) in the food are killed. But when the food is thawed, these microbes can become active again and multiply to levels that can make people sick. Since they will then grow at about the same rate as microorganisms on fresh food, thawed items must be handled like any other food that goes bad quickly (USDA Food Safety Information, 2011).

The bacteriological condition of frozen meat for 11 weeks were similar for refrigerated meat for 7 days. Some studies found that the numbers of microorganism in all of the bacteria in frozen meat was higher than numbers during 24 hours after shooting. we looked at in the frozen meat was higher than the number of microorganisms found 24 hours after shooting. The growth of microorganisms in frozen meat during thawing can be explained by the fact that they multiply. Leygonie et al. say that microorganisms grow very quickly during thawing because the conditions are very good for growth, especially because thawed meat has nutrients that are easy to get to. Also, some parts of meat may be more likely to grow microbes than others because thawing takes longer than freezing [Leygonie, C.et al 2012].

The moisture that is lost during thawing is full of vitamin, protein and mineral that come from the structural disarray that happens when something freezes. This makes it a great place for microbes to grow [Pham, Q.T 2004].

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