بسم الله الرحمن الرحيم

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Suez Canal University
Faculty of Veterinary Medicine
Department of Food Hygiene and Control

Studies on quality and Public health hazard of imported frozen liver

Thesis presented

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Under Supervision

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APPROVAL SHEET

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Acknowledgment

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INTRODUCTION

1.INTRODUCTION

Liver is one the most important meat variety due to its high nutritional value; it's content of high quality protein, fat, carbohydrate, minerals and vitamins. The liver tissue spoil faster than meat which entails practical problems when trading ? Egypt imports large quantities of frozen beef liver yearly from the different countries. Many problems arise which are restricted by the Egyptians standards to 7 months shelf life only.

Various types of bacteria and mould through hide, skin, feet, intestinal contents, equipment, hands, clothing of workers, water and air in the slaughter hall could contaminate liver as meat. The environmental conditions inside the cool cabinet particular, temperature and relative humidity play also great role in contamination of liver with various bacteria **(Mansour, 1986)**. It is worth mentioning to note that gram positive and negative bacterium as well as mould could survive during the frozen storage of foods, and when the conditions become favorable begin to multiply.

Spoilage of liver during storage has been considered as one of the most important problems facing meat producers, distributors and consumers, either on the local or international level, due to shipment of liver is normally carried out under freezing conditions.

Microorganisms are not the only cause for liver spoilage; there are other physical and chemical ones. These leads to retrogressive changes in the appearance, color, odor as well as chemical constituents states that renders liver repulsive, unpalatable and unmarketable for human consumption.

The Microbial load and pH values of liver are very important for assessment of the liver quality and are considered by some authors as an index for liver spoilage.

The Number of bacteria in the liver tissue may be increased by contamination during the preparation and freezing operation and handling process during marketing. However, freezing kills small proportion of most microorganisms especially, gram-negative rods rather than gram positive cocci.

The assessment of extract release volume can be considered a good index for assessment of the period of freezing storage. Moreover liver can play an important role in hazarding the public health due to its load of pathogenic bacteria.

Therefore due to the aforementioned reasons and limited information regarding the microbiological and chemical profiles of frozen liver in North Sinai markets the present studies was planned out to determine the following:

Part 1:

1-Physical indices

2-Chemical indices:

A-Determination of pH

B-Determination of Extraction Release Volume

3-Bacteriological indices:

A-Total aerobic counts

B-Psychrotrophic counts

C-Enterobacteriaceae counts

D-Staphylococcus aureus counts.

E-Salmonella screening.

Part 11:

Sanitary status of liver seller hands, cutting knives and table surfaces through assessment of: Total bacterial, Psychotrophic, Enterobacteriaceae, Staphylococcus aureus counts and Salmonella screening.

Review of Literature

2.REVIEW OF LITERATURE

2.1 Organoleptic Indices: -

Khan (1964) suggested that the loss of flavor and development of odor in frozen stored meat were related to proteolysis. He also added that the proteolysis affected tenderness.

Amerine et al. (1965) claimed that odors could attract or repel consumer, so it used in acceptance or refusal of various food products.

Cyewski et al. (1968) found that the livers of cattle and sheep which suffering from of Aflatoxicosis at postmortem were grossly swollen mottled and pale.

Greene (1969) indicated that a common problem in marketing prepackaged meats was the development of an undesirable brown color after the meat has been cut. Where enzymatically active muscles browned more readily during storage. This is due to oxidation of the red meat pigments oxymyoglobin (Mbo2) and myoglobin (Mb) to the brown ferric metamyoglobin (Met-Mb)

Ledward (1971) reported that the autooxidation of myoglobine to metmyoglobine occur at the surface of beef during air storage where the concentration of metmyoglobin in whole muscles remained virtually constant from 5 to at least 28 days storage and this concentration varied from muscle to muscle.

Heinz (1974) reported that the storage of beef liver at approximately $0^{\circ}C$ for 10-12 days resulted in no appreciable changes in colors flavor or consistency of the liver. However frozen storage of liver for several months at $18^{0}C$ had not effect on consistency, but resulted in slight deterioration of flavor, increased weigh loss and development of dark discoloration.

Libby (1975) repotted that the fitness of any article of food should be based on combined in formation obtained from chemical, bacteriological and organoleptic evaluation, which includes smell, appearance and texture

Shelef (1975) mentioned that the color of the normal cattle and sheep livers is reddish brown in color and firm in consistency. He added that greenish color and soft in consistency are disserved in putrefactive livers.

Mukai and Goldstein (1976) stated that the "of-flavors" in stored meat products were associated frequently with lipid changes due to accumulation of malonaldhyde and other oxidative reaction products potentially harmful to human health

Marriott et al. (1979) reported that the frozen beef stored at $-25^{0}C$ for 7 days showed color changes.

E.O.S (1980) reported that the frozen liver must be free from any abnormal odor and taste. Moreover it must be also free from any sign of spoilage

Surzic et al. (1980) observed changes in color of frozen liver samples of cattle stored at -30^0C for 6 months.

Banwart (1981) stated that microbial deterioration of food usually is manifested by alteration in the appearance, texture, colors, odors, flavors, or by slime formation. The degradation of food result in the formation of compounds which have odors and flavors different when the microbial levels reached to 10^6 to 10^8 /cm^2.

Gracey (1981) reported that all the food animal Fresh livers are reddish brown in color, while the frozen liver are yellowish green to red color due to storage and sourness.

Doxey (1983) described that normal liver is firm in consistency and reddish brown in color with smooth surface.

Smith et al. (1983a) found that livers, hearts and tongues had acceptable color and odor if wrapped during refrigeration while kidneys had acceptable color and odor if not wrapped during refrigeration

Smith et al. (1983 b) reported that the best method for assuring acceptable appearance of beef livers is to vacuum package immediately following removal the animal to ported them from weigh loss of odor and excessive microbial growth during storage .

Smith et al. (1983c) stated that the temperature at which variety meats were frozen (-12^{0}C, -34^{0}C, -18^{0}C, -8^{0}C) had little effect on weigh loss,

color, appearance, odor, tenderness. Freezing of variety meats at – 34^{0}C, 126^{0}C appeared to improve the over all appearance enough to increase retail case life and did not affect off odor incidence or tenderness variety meats.

Severini et al. (1986) recorded that the most reasoned for condemnation of bovine livers was Organoleptic due to trauma and stress or emaciation that resulting from prolonged transportation or in complete resting.

Cross and Overby (1988) reported that prolonged storage of fresh meat may cause the development of putrid odors from protein, decomposition, sour odors from microbial growth and rancid odors from fat oxidation.

Kolczak and Palka (1989) found that the color of calves, heifers and cows livers become darker after storage at 2^{0}C for 2 days. they added that the livers attains their tenderness and juiciness after 6 hours of slaughtering.

Salem (1992) recorded that the mean values of color, odor, appearance of fresh liver were 99.56%, 100% while after keeping at chilling temperature for 2 days, 4 days and 8 days were 85.80, 80.96, 83.64; 68.68, 53.88,66.28 and 27.24, 19.32, 25 respectively.

Pelczynska et al. (1992) found that the chemical sings of putrefactive changes of liver and kidneys start after 33 days but the distinct