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لم ترد بالأصل

Cairo University
Faculty of Veterinary Medicine, Beni Suef
Department of Food Hygiene and Control

STUDY ON GRAM-POSITIVE BACTERIA IN MEAT PRODUCTS

Thesis Presented By

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(MV Sc. Cairo University, 1996)

For The degree of

Ph. D. Vet. Sci.

(Hygiene and Control of Meat, Fish, Meat products and Animal By-products)

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2001

ACKNOWLEDGEMENT

I wish to express my high appreciation and sincere thanks to **Prof. Dr. Fathy Ahmed Khalafallah** Professor of Meat Hygiene Faculty of Veterinary Medicine Cairo University, Beni Seuf for his valuable supervision, guidance and continuos encouragement during the supervision of this work. He has given much of his valuable time, experience and sincerity.

I wish to express my great gratitude and appreciation to **Dr. Hoda A. Awad** Head Researcher, Food Hygiene Department Animal Health Research Institute for her stimulating supervision, advice and continuous interest allover this work.

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INTRODUCTION

INTRODUCTION

In recent decades, the increase of human population in relative to the great development in human life caused a great demand of easily prepared meals contained high level of animal protein. However meat products are considered as an essential source of tasty and easily prepared meats as well as easily intake and digested.

Modern food technology created new forms of meat products, which found a high interest for food hygienist to avoid the public health hazards. Processed meat products may constitute a public health hazard either due to presence of spoilage microorganisms responsible for objectionable changes or pathogens leading to infection and intoxication **(FAO/WHO, 1983)**.

The type of microorganisms in processed meat products varied according to the method of manufacture, quality of used non meat ingredients, rate of contamination during the processing chain, packaging and storage. **(Narasimha Rao and Ramesh, 1988).**

One of the contaminants of the meat products is members of Gram-positive bacteria, which may lead to spoilage and appearance of objectionable changes in the meat products as well as caused food poisoning if consumed. Moreover members of Gram-positive bacteria are used as indicators for spoilage and putrefaction of the products, as well as their detection in the meat products required modern methodology for identification.

- Aerobic sporeformers including *B. cereus* are known to be associated with food poisoning and spoilage of the meat products, their incidence and numbers in the products reflecting the degree of contamination from additives such as spices and ~~casing materials~~ extenders during the processing.

- Meat products contaminated by *Staphylococcus aureus* from handling during processing, staphylococcal intoxication caused from excretion of exotoxin (heat stable toxin) in meat and meat products. Ingestion of this toxin lead to food intoxication.

Enterococci, formerly confounded with Faecal Streptococci, are recognized since the beginning of the century as being faecal in origin and are generally searched for in wastewaters and food products. Their detection may in fact indicate the presence of enteropathogenic organisms. Although nearly ubiquitous, their preferred ecological riche is the intestine sphere. Rejected in the environment by means of human faeces or animal dejecta, they are scattered afterwards in diverse niches. Once in the external environment, their survival is linked with their exceptional aptitude to resist or grow in hostile environmental aptitude to resist or grow in hostile environments that are usually detrimental to the most development of most mesophilic microorganisms (**Flahaut *et al.*, 1997**).

- The economic importance of some members of the Gram positive microorganisms including *Brochothrix thermosphacta*, lactobacilli and anaerobes, characterized by appearance of off-flavours, off odours, discolouration, slime and gas production, which considered as indicators of spoilage beside their contribution in public health hazard to consumers.

Listeria monocytogenes is Gram-positive bacteria that is ubiquitous in nature and can be found in vegetation, soil, sewage, meat and meat processing plants and can be carried also by healthy humans and animals (**Ryser and Marth, 1991**). Food borne transmission appears to be the major source of infection in human listeriosis. Meat and meat products have been recognized as vehicles for the disease (**Johnson *et al.*, 1990**).

- Because of low data considering the prevalence of Gram positive bacteria in meat and meat products, therefore, this study was planned to assess the Gram-positive bacteria in meat products as beef burger, minced meat, rice kofta and sausage. Moreover, the detection of Gram-positive bacteria in the line of processing of meat products as well as the effect of heat treatments on final products were investigated or evaluated.

REVIEW OF LITERATURE

Review of literature

I. Gram-positive bacteria in meat products:

Akimov (1969) recorded that, *Bacillus cereus* was isolated from 128 out of 2310 (5.54%) sampled of various food products examined during June-August 1968. the highest incidence were in canned foods 13.6% and sausage 7.7%.

Ingram (1969) stated that the aerobic spore-forming bacilli are among the most important groups of microorganisms occurring in foods. Due to their versatile metabolism, strong saccharolytic and proteolytic activity as well as the high resistance of their spores they are among the main spoilage organisms in foods.

Milev and Kovachev (1970) reported that, samples of commercially minced meat (each 500 gram weight) were taken and examined bacteriologically within one hour of mincing. *B. cereus* was detected in 13.3% of the examined samples.

Mol and Timmers (1970) examined quantitatively the incidence of Aerobic spore forming counts in some meat products from 1964-1968 and found that, the mean value in examined grilled sausage samples were 7.8 x10 colony per gram and in examined sausage samples from 1963-1968, the mean values were ranged from 3.5x10 to 2.7x10 colony /gram.

Kim and Goepfert (1971) examined 170 samples of dry food products including spices and seasoning mixes (used in manufacturing of food products) for incidence and contamination level by *B. cereus* and they found that the incidence of *B. cereus* in these selected products was 25.3% while in spices and seasoning mixes were 40% and 55% respectively.

Julseth and Deibel (1974) analyzed 12 samples of each black pepper and cassia used in manufacturing of food products collected from different sources (Indonesia, Brazil, India, Seychelles and Madagascar) for presence of aerobic spore former. Black pepper has been associated with high counts where all samples had counts in excess of one million organisms/gram, while in cassia the spore counts less than $5X10^4$ spore/gram.

Powers, *et al.* (1976) examined 110 processed spices, including bay leaves, red pepper, chili powder, cinnamon, garlic powder, mustard powder and oregano for incidence *of Bacillus cereus* which present in 53% of the spices and counts ranged from 50 to 8500 colony/ gram .

Deso and Engeli (1979) examined samples of minced meat from butcher's shops in the City of Zurich from (1974 - 1978), they found that Staphylococcus count was 10^3 /g. The results were compared with the standards laid down by the Federal Vet. Office, Staphylococcus standard was exceeded by 1.7 % of the samples.

Chopra *et al.*, (1980) examined 43 different food samples including meat and meat products for the presence of *Bacillus cereus*. 38 samples (88.3%) were positive. *Bacillus cereus* was detected in all the samples of meat and meat products (43 samples). The frequency distribution of *Bacillus cereus* in meat and meat products were $5x10^2$-10^3