بسم الله الرحمن الرحيم

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Department of Food Hygiene and Control

Hazard Analysis and Critical Control Points In A Governmental Abattoir

Thesis Presented By

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Hygiene and control of Meat and its Products

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جامعة القاهرة

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قسم الرقابة الصحية على الأغذية

بسم الله الرحمن الرحيم

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CONTENTS

INTRODUCTION 1

REVIEW OF LITERATURE 3

MATERIALS AND METHODS 49

RESULTS 77

DISCUSSION 92

CONCLUSION 103

SUMMARY 109

REFERENCES 112

ARABIC SUMMARY

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Abstract

-This work is done for trying application the HACCP system in one of governmental abattoirs to produce meat free from pathogens or minimization of it. The production under ordinary circumstances procedures in the abattoir were studied starting from arrival of life animals trucks to deboning and cutting process for risk sources analysis and determination of critical control points.

Microbiological examinations was done as A.P.C (aerobic plate count) Staphylococcus count, coliforms count and mould count as well as isolation of some pathogens as Yersinia enterocolotica, *Staphyllococcus aureus*, salmonella typhimurium, shigella and Esherichia coli. From the previous and analysis of hazard sources, CCPS were after washing, after chilling and after meat cutting. By studying risk sources, corrective actions, the critical limits was established. In second case HACCP system was applied more over the system was verified as previous work and comparison of results in two cases was done which indicated great decreasing in bacterial load and disappearance of some pathogens. The results were agreeable with critical limits to large extent, which indicate the ability of application of HACCP system in abattoirs so a HACCP plane was designed for these abattoirs.

INTRODUCTION

Introduction

The acronym HACCP stands of Hazard analysis and critical control point, which is a prevention-based food safety system. HACCP system are designed to prevent the occurrence of potential food safety problems. Essentially, HACCP is a system that identifies and monitors specific food born hazards of biological, chemical or physical properties that can adversely affect the safety of the food product. This hazard analysis serves as the basis for establishing critical control point (CCP) further, critical limits are established that document the appropriate parameters that must be met at each CCP. Hazard analysis critical control point, critical limits and monitoring and verification steps are documented in HACCP plan (guide line)

The beginning of HACCP system occurred in 1959 when Pillsbury Company & National Aeronautics and Space Administration & The Natick Lab. Of U.S Armed forces and U.S Air forces Space Lab. Project group participate in production of food could as close to 100% assurance level as possible. The food product being produced for space use would not be contaminated with pathogens (bacterial & Viral), toxin chemicals or Physical hazard that could cause an illness or injury. To do this, searches for a new techniques that would help to approach the 100 % assurance level , and decrease industry missing by minimal test of the raw material and in-line and end product test .

Searches showed the zero defects program utilized by National Aeronautics and Space Administration (NASA) was examined and was found to be designed for hard ware .In looking for a better system, It was concluded after extensive evaluation that the only to succeed would to be develop a preventive system . This would require control over the raw

materials, the process, the environment, personal, storage and distribution beginning as early in the system as possible.

Although HACCP started in 1959 and used in the Pillsbury Company production plants for several years, it was first formally presented to the general public in 1971 National conference of food protection (Dept. Health Educt. Welfare 1972).

The first comprehensive document on HACCP was published by Pillsbury company (1973) and was used for training FDA inspectors in HACCP principles .

Druring the period from 1970-1980 a number of companies established their own HACCP programs and in 1985 the HACCP system was recommended by the National Academy of science.

In 1987 the National oceanic and atmospheric Administration was charged by the United States Congress.

The present study involves a semi automatic beef plant which is concerned with the beef supply for a very special governmental sector. The end consumer supplied from that governmental beef plant is a very special sector of the community which is needed for one reason or another to be always kept save. The nature of the consumer require a high standard of physical fitness and health condition.

The objective of this study is to apply the HACCP system to insure a save meat supply for the purpose previously mention, therefore the following had been planned to investigated:

1- Investigation for the Determination the C.C.Ps in the plant.

2- Determination of the corrective actions.

3- Application of the HACCP system in the plant to insure safe beef production.

LITERATURE

Review of Literature

For many things in life, what we want is not necessary the same as what actually is. Food clearly fits this truism. In an emotional level, we think of food, as that which sustains life .we doesn't mind learning that some of the constituents of food enhance nutritive value; in fact, we pay little attention to these discoveries because it is only what we expect. On the other hand we feel betrayed when we learn that some constituents or combination "nutritional" Of natural foods contain things that decrease nutritional value or worse.

Food safety is a topic of man concern since erra, ancient rulers and kings had determined food safety by using a food taster. The judgement was easy; if the taster life, then the food proclained. As food taster no longer fined employment, determination of food safety had passed a series of development passing through a series of laboratory investigation and in some instances legislative action.

Microbiological contamination of food is the one, which cause more concern to the public than any other food safety hazards. Many studies had been conducted to declare how meat is contaminated?, How contamination could be prevented and/or removed?

A-Contamination in beef production:

Until a few years ago, muscle tissues in living and growing animals was considered to be sterile, or nearly so, except lymph nodes. However, recent studies indicate that research have found viable bacteria in the interior of muscles.

Mulder & Krol (1976) in their study on the effect of transport on the bacteriological features of fresh meat, they reported that meat from three slaughterhouses was examined. The meat of each slaughterhouse, specimens transported over a short distance, over a long distance or by the butcher's own vehicle were studied. The transported meat was found to be contaminated by bacteria, which had developed on meat. The hygienic condition of the meat –van obviously is a factor in the transfer of bacteria to legs and carcasses; this was not observed where the parts were concerned. The effect of bacterial contamination was that the decrease in stability was most marked in meat showing low bacterial counts. There was a relatively marked increase in bacterial counts on a particular transport route on which the travel for periods varying from five to six hours.

Mulder & Krol (1976a) they concluded that, when beef carcasses were stored in the chilling rooms of seven slaughterhouse for periods varying from ten to thirteen days and bacteriological state of the carcasses continued to be acceptable for nearly two weeks; under adverse conditions, it was acceptable for a week. The temperature markedly affected the bacteriological keeping qualities, by contamination during slaughter and loss of weight due to evaporation. The importance of these factors as well as that of the method adopted in sampling is stressed.

Mulder &krol(1976b) reported that, in slaughter-houses in Netherlands the bacteriological contamination of beef- carcasses was determined immediately after slaughter. The highest aerobic bacterial counts as well as the largest number of enterobacteriaceae were to be present on the carcasses at those sites at which the skin or meat had been cut. It is likely that bacteria are carried from the skin to the meat during cutting. Differences in bacteriological contamination of carcasses are attributed to the difference in transmission from the skin. Mechanization of the dressing-line did not have any perceptible on the degree of contamination.

Meara et al. (1977) concluded that the microbiological surveillance by swabbing meat wholesaler premises revealed ineffective cleaning and build-up of bacteria. Proper cleaning, sanitation and handling resulted in a vast improvement during 1975-77.beef samples from the neck of carcasses in the wholesale trade were investigated by microbiological methods. Excessive total bacterial counts were obtained from numerous carcasses. Most carcasses carried coliform organisms. Roughly 90% of carcasses tested. Twenty stereotypes of Salmonella were identified. Salmonella contamination decreased from nearly 5% in 1975 to less than 0.5% in 1977,and s. aurous contamination from 52% to 36% during the same period. Approximately 30% of carcasses revealed contamination with unidentified clostridial species. The results indicate the need for stricter control over the production and slaughter of animals and over the handling of carcasses in the wholesale trade.

Pavlov (1977) investigated the microflora of various objects contributing to the contamination of veal during the process of its production. It was found that the main sources of primary contamination of the carcass

surface with microorganisms are the hair coat, residual mud on the hooves, intestinal contents of the calves for slaughter, the slaughter premise itself (walls, floor, air), tools used in slaughter (knives, axes for cutting open), clothing for work as well as the hands of the workers .The microbial contamination of the objects studied during work proved strong, in some cases the log value of the total count of organisms for some of them reaching up to 8.90, of the psychrophiles-up to 7.91, of the coliform bacteria – up to 7.04, of the moulds and yeasts - up to 6.08. Disinfection with I percent water solution of vosfasteril lowered the contamination of the objects studied by more than 99 percent. the detergent used produced a high bacterial effect and could successfully employed at the meat producing enterprises throughout the country.

Peel & Simmons (1978) stated that immersion of knives momentarily in that water ($82C^0$) was ineffective in destroying Salmonellas on knives used in meat works to carry out the dung dropping operation. Laboratory experiments confirmed that knives covered with meat products required 10 or more seconds to be effectively decontaminated at this temperature. Examination of knives used for slaughtering and for dressing beef carcasses showed that knives coming into contact with hides had higher count for Salmonella and a higher percentage positive than knives used for other cutting operation. Knives used for cutting the skin of the forelegs and hind legs highest counts.

McCulloch & whithead (1979) examined two hundreds and sixty nine beef, 230 sheep and 165-pig carcass surface bacteriologically. Direct and indirect contact examination techniques were utilized. Colony counts per cm^2 were expressed in geometric progression. Counting procedures, direct and indirect contact examination, and effects of chilling were consideration. Subsequently, results from an additional 489 beef, 520

sheep, and 408 pig carcasses were employed to illustrate a count classification arrangement against which bacteriological monitoring assessments could be measured.

Pavlov (1979) studied the changes in surface microflora quantity and composition on cattle carcasses cooled and preserved in various ways. It was established that immediately after production beef meat has a small number of microorganisms on its surface. Log_{10} 3.74 on the average. The surface microflora on slowly cooled meat increases comparatively quickly and on the microflora eleventh day reaches the number Log_{10} 7.22. In case of fast meat cooling a considerable reduction in the total number of surface microflora is observed during the first days. Its reproduction is slowed down and the number of log_{10} 8.0 is reached only on the 40^{th} days. The studies were not restricted only on total number of microorganisms, but covered also some other important meat microflora groups. psychrophyls, coliform bacteria ,moulds and yeasts.

Kriaa et al. (1985) studied the contamination and bacterial retention capacity of beef carcasses at the abattoir and reported that, the contamination varied along the processing line, but that this pattern was essentially dependent on the contamination at the dressing station .It decreased or remained unchanged during the first 12 min. and then increased even without additional contamination.

The contamination varied according to carcasses and microorganisms studied and was not greatly affected by spray cleaning. The number of bacteria retained changed at a rate similar to that of the contaminants. The attachment was instantaneous. The results were discussed and compared with the various hypothesis about contamination and bacterial attachment process.