



شبكة المعلومات الجامعية
التوثيق الإلكتروني والميكروفيلم

بسم الله الرحمن الرحيم



HANAA ALY



شبكة المعلومات الجامعية
التوثيق الإلكتروني والميكروفيلم



شبكة المعلومات الجامعية التوثيق الإلكتروني والميكروفيلم



HANAA ALY



شبكة المعلومات الجامعية
التوثيق الإلكتروني والميكروفيلم

جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها
علي هذه الأقراص المدمجة قد أعدت دون أية تغيرات



يجب أن

تحفظ هذه الأقراص المدمجة بعيدا عن الغبار



HANAA ALY

ASSESS FOOD SAFETY CRITERIA FOR THE SERVICES PROVIDED IN THE COLLECTIVE CATERING PLACES

By

HUSSEIN RABEE ALI SWIFY

B.Sc. Agric. Sc., (Agronomy) Faculty of Agric. Cairo Univ., 1999

M.Sc. Agric. Sc. (Agronomy) Faculty of Agric. Cairo Univ., 2006

**A Thesis Submitted in Partial Fulfillment
Of
The Requirements for the Degree of**

**DOCTOR OF PHILOSOPHY
in
Agricultural Sciences
(Food Sciences)**

**Department of Food Science
Faculty of Agriculture
Ain Shams University**

2021

Approval Sheet

ASSESS FOOD SAFETY CRITERIA FOR THE SERVICES PROVIDED IN THE COLLECTIVE CATERING PLACES

By

HUSSEIN RABEE ALI SWIFY

B.Sc. Agric. Sc., (Agronomy) Faculty of Agric. Cairo Univ., 1999

M.Sc. Agric. Sc. (Agronomy) Faculty of Agric. Cairo Univ., 2006

This thesis for Ph.D. degree has been approved by:

Dr. Samir Youssef Abdou Elsanat

Prof. of Food Science and Technology , Faculty of Agriculture,
Kaferelsheikh University.

Dr. Alaa Abd Elrashid Mohamed

Prof. of Food Science and Technology, Faculty of Agriculture, Ain
Shams University

Dr. Yosry Ahmed Abd El daim

Prof. Emeritus of Food Science and Technology, Faculty of
Agriculture, Ain Shams University

Date of Examination: / / 2021

ASSESS FOOD SAFETY CRITERIA FOR THE SERVICES PROVIDED IN THE COLLECTIVE CATERING PLACES

By

HUSSEIN RABEE ALI SWIFY

B.Sc. Agric. Sc., (Agronomy) Faculty of Agric. Cairo Univ., 1999

M.Sc. Agric. Sc. (Agronomy) Faculty of Agric. Cairo Univ., 2006

Under the supervision of:

Dr. Yosry Ahmed Abd El daim

Prof. Emeritus of Food Science and Technology, Faculty of
Agriculture, Ain Shams University. (Principle Supervisor)

Dr. Yehia Ali El-Din Hammad

Prof. Emeritus of Dairy Science and Technology, Faculty of
Agriculture, Ain Shams University;

Dr. Mohammed Zakaria Sedik

Prof. of Microbiology Science, Faculty of Agriculture, Cairo
University

ABSTRACT

Hussein Rabee Ali Swify: Assess Food Safety Criteria for The Services Provided In The Collective Catering Places. Unpublished Ph.D. Thesis, Department of Food Science, Faculty of Agriculture, Ain Shams University.

This study aimed to assess the food safety criteria of services used to preparation, cooking, holding and serving meals for (the female students' department) in the Cairo University Dormitory Restaurant and to adopt hazard analysis and critical control point (HACCP) system during the period of 2017-2019 in order to assure a secure supply of food for colleges students.

A total of 1950 random food and swab samples throughout production chain then analyzed and monitored hazards microbiologically, chemically and physically.

The HACCP system in this study implemented throughout roasted chicken (n=240), fried rice (n=240), cooked potatoes (n=240), peas (n=180), pickles (n=180) and food additives(n=300) entire production chain.

Swabs of work surfaces conduct (n=480), and the handlers hands (n=90) in catering services within the university dormitory meals to assure a secure supply of food for college students.

The hygienic practices assessed during the handling of raw food and cooking equipment on-site observations were done. Evaluating food' handlers knowledge, attitude and their practices. Food safety training program were developed for improving safe food handling practices

The results obtained appeared no contamination with *L. monocytogenes*, *Salmonella* spp., *Shigella* spp., and *Clostridium perfringens* before the applying of the HACCP system. While the fluctuation within the microbial numerous total viable bacteria, total

molds, and yeasts, *B. cereus*, *Staph. aureus*, spore-formers, and coliforms in served meals ascribed to inadequate handling or processing procedures, multiplication of microorganisms during some production steps of meals, poor hygiene of utensils, and equipment as well as the survival of microorganisms to the cooking process.

The examined food samples in boiling, roasting, frying and cooking steps were free from any detectable levels of microorganisms before and after HACCP application. All the products showed a high level of microbial load before applying the HACCP system were to undetectable count or decreased in number considerably after application of HACCP system.

Application of the HACCP framework shows a low rate of examined microorganism with a decreasing percentage reached 100% of 1 or more microbial groups in serving step and $p < 0.05$ which demonstrates a critical impact of HACCP application.

Swabs samples analysis which taken before and after HACCP application from handlers, utensils, equipment and work surfaces observed different levels of significance in the reduction of microbial load in one or more of selected examination.

A significant improvement was demonstrated for knowledge about personal hygiene and related to rules for preparing safe food after the training food safety program.

Keywords :Food safety; HACCP, Microbiological hazard; Catering services; Criteria; Ready to eat meals, Safe food handling and Food safety training.

ACKNOWLEDGMENT

Praise and gratitude is to Allah, the God of all creatures for helping and directing me to the right way.

The author wishes to express her deepest gratitude and sincere appreciation to **Dr. Yosry Ahmed Abd eldaim, Prof. Emeritus of Food Science and Technology**, Faculty of Agriculture, Ain Shams University for his keen supervision and suggestion, valuable guidance, continuous encouragement and follow up through out this work, understanding and constructive criticism which have vitally contributed to this study and revision of the manuscript.

Deep gratitude is also **the soul of Dr. Yehia Ali El-Din Hammad, Prof. Emeritus of Dairy Science and Technology, Faculty of Agriculture, Ain Shams University**, for his supervision, patience, valuable advices and comments, preparation and revision of the manuscript, achievement of present work was mainly based on her efforts, which deserve my thanks and indebtedness.

Deep gratitude is also to **the soul of Dr. Mohammed Zakaria Sedik Prof. of Microbiology Science, Faculty of Agriculture, Cairo University** for his supervision and valuable advice and comments, continuous encouragement and follow up throughout this work.

Special thanks to all staff members of Food science department, Faculty of Agriculture, Ain shams University for their help, and providing facilities to carry out this work.

Many thanks to my family, my wife, my sons and daughter, additionally no words can express my gratitude and love to me mother and my father.

Finally, the author owns too much indebted to all those who contributed in any way to fulfill this investigation.

CONTENTS

LIST OF TABLES	IX
LIST OF FIGURES	XII
LIST OF ABBREVIATIONS	XV
1.INTRODUCTION	1
2.REVIEW OF LITERATURES	7
2.1. FOOD SAFETY	7
2.2. FOODBORNE DISEASES (FBD)	9
2.3. HAZARD ANALYSIS AND CRITICAL CONTROL POINT (HACCP)	11
2.4. Mass catering industry	15
2.5. Food service for health care mass catering and related foods	16
2.6. Sources of contamination in catering	20
2.7. Application of sanitary control in food-service	26
2.8. Monitoring examinations	29
2.9. Training food safety program	30
3. MATERIAL AND METHODS	32
3.1. Materials	32
3.2. Methods	33
3.2.1. Sampling plan	33
3.2.2. Sample collection	34
3.2.3. Developing the HACCP plan	34
3.2.4. Food description and distribution	34
3.2.5. Intended food consumers	34
3.2.6. Process flow chart	35
3.3. Application Hazard analysis	35
3.3.1. Hazard analysis and HACCP control of roasted chicken.	35
3.3.2. Hazard analysis and HACCP control of cooked fried rice.	38
3.3.3. Hazard analysis and HACCP control of cooked fresh potatoes .	40
3.3.4. Hazard analysis and HACCP control of cooked frozen peas	42

3.3.5. Hazard analysis and HACCP control of pickled.	44
3.4. Monitoring procedures establishment.	46
3.4.1. The microbiological analysis.	46
3.4.2. Food Contact Surfaces Swabs analysis .	48
3.4.3. Chemical analysis..	48
3.4.4. Physical analysis.	49
3.5. Reduction percentages.	49
3.6. Evaluation of the degree of hazard in the restaurant.	50
3.7. Auditing and monitoring of good hygienic practices (GHP)	56
3.8. Application of training program about food safety	56
3.9. Statistical analysis	59
4. RESULTS AND DISCUSSION	60
4.1. Assessment microbiological quality of roasted chicken meal throughout the process steps before and after the HACCP application.	60
4.2. Assessment microbiological quality of fried rice meal throughout the process steps before and after the HACCP application.	63
4.3. Assessment microbiological quality of cooked fresh vegetables process steps before and after the HACCP application.	66
4.4. Assessment microbiological quality of cooked frozen vegetables process steps before and after the HACCP application	71
4.5. Assessment microbiological quality of pickles throughout receiving to serving before and after the HACCP application.	76
4.6. Assessment microbiological quality of food additives before and after HACCP application	79
4.7. Assessment microbiological quality of swabs before and after HACCP application	87
4.8. Chemical analysis of individual foods	103
4.9. Physical analysis of individual foods	104

4.10.Evaluation of the degree of hazards observed with the food catering services	105
4.11. Assess handler's knowledge and their practices and attitude in catering food service before and after training program.	110
4.11.1. Assessment Food safety knowledge of the handlers before and after training program	112
4.11.2. Assessment Food safety attitude of the handlers before and after training program	114
4.11.3. Assessment Food safety self-reported behavior of the handlers before and after training program	117
4.12.Assessment regarding personal hygiene and cleaning and sanitizing process before and after training program.	119
4.13.Assessment regarding food preparation and storage before and after training program.	122
4.14.Assessment regarding hot, cold, and freezing process before and after training program .	125
5. SUMMARY	128
6. REFERENCES	134

LIST OF TABLES

Table No.		Page
1	The samples collected throughout the study from different sources.	33
2	HACCP control chart of roasted chicken throughout the process steps .	37
3	HACCP control chart of cooked fried rice throughout the process steps..	39
4	HACCP control chart of cooked potatoes throughout the process steps.	41
5	HACCP control chart of cooked peas throughout the process steps	43
6	HACCP control chart of pickles throughout receiving to serving	45
7	Media and incubation conditions applied in microbiological analysis	47
8	Evaluation of the degree of hazard in the restaurant report form	51
9	The microbiological profiles of roasted chicken meal throughout the process steps before and after the HACCP application.	61
10	The microbiological profiles and detection of fried rice meal throughout the process steps before and after the HACCP application.	65
11	The microbiological profiles of cooked potatoes meal throughout the process steps before and after HACCP application .	69
12	the microbiological detection of cooked potatoes meal throughout the process steps before and after HACCP application.	70
13	The microbiological profiles of cooked Peas meal	74

	throughout the process steps before and after HACCP application.	
14	The microbiological detection of cooked Peas meal throughout the process steps before and after HACCP application.	75
15	The microbiological detection of pickles throughout receiving to serving before and after HACCP application.	78
16	The microbiological profile of food additives throughout the process steps before and after HACCP application.	80
17	The microbiological detection of food additives throughout the process steps before and after HACCP application.	81
18	The microbiological profiles of handlers throughout the process steps before and after HACCP application.	88
19	The microbiological detection of handlers throughout the process steps before and after HACCP application.	88
20	The microbiological profile of surfaces throughout the process steps before and after HACCP application.	91
21	The microbiological profile and detection of surfaces throughout the process steps before and after HACCP application.	92
22	The microbiological profile of utensils throughout the process steps before and after HACCP application.	96
23	The microbiological profile and detection of utensils throughout the process steps before and after HACCP application.	97
24	The microbiological profile of instruments and equipment throughout the process steps before and after HACCP application.	100
25	The microbiological profile and detection of instruments and equipment throughout the process steps before and after HACCP application.	101

26	Score percentage of the degree of hazard detected at the catering industry before and after the application of HACCP.	107
27	Demographic characteristics of the participants	110
28	Food safety knowledge of the participants.	113
29	Food safety attitude of the participants.	115
30	Food safety self-reported behavior of the participants.	118
31	Record Keeping of daily checklist regarding personal hygiene and cleaning and sanitizing process before and after HACCP application.	121
32	Record Keeping of daily checklist regarding food preparation and storage before and after HACCP application.	124
33	Record Keeping of daily checklist regarding hot, cold, and freezing process before and after HACCP application.	126