

**QUALITY AND SAFETY OF FOODS
IN TOURISTIC PLANTS**

BY

WASIM KASER ALJUHNI

B.Sc. Agric Sc. (Food Science), Damascus University, Syria, 2005

**A thesis submitted in partial fulfillment
of
the requirements for the degree of**

**MASTER OF SCIENCE
In
Agricultural Science
(Food Science and Technology)**

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

2009

Approval Sheet

**QUALITY AND SAFETY OF FOODS
IN TOURISTIC PLANTS**

BY

WASIM KASER ALJUHNI

B.Sc. Agric Sc. (Food Science), Damascus University, Syria, 2005

This thesis for M. Sc. degree has been approved by:

Prof. Dr. Hassan Hassan Abd El-Dayem
Prof. of Food Science & Technology, Faculty of Agriculture,
AL-Azhar University

Prof. Dr. Nadia Rfat Abd El-Rahman
Prof. Emeritus of Food Science & Technology, Faculty of
Agriculture, Ain Shams University

Dr. Mohammed Moustafa Mohamed Abd El-Razik
Associate Prof. of Food Science & Technology, Faculty of
Agriculture, Ain Shams University

Prof. Dr. Ibrahim Rizk Sayed Ahmed
Prof. of Food Science & Technology, Faculty of Agriculture,
Ain Shams University

Date of Examination: 27 / 1 / 2009

QUALITY AND SAFETY OF FOODS IN TOURISTIC PLANTS

BY

WASIM KASER ALJUHNI

B.Sc. Agric Sc. (Food Science), Damascus University, Syria, 2005

Under the supervision of:

Prof. Dr. Ibrahim Rizk Sayed Ahmed

Prof. of Food Science & Technology, Department of Food Science,
Faculty of Agriculture, Ain Shams University (Principal Supervisor)

Prof. Dr. Yehia Ali El-Din Hammad

Prof. of milk Science & Technology, Department of Food Science,
Faculty of Agriculture, Ain Shams University

Dr. Mohammed Moustafa Mohamed Abd El-Razik

Associate Prof. of Food Science & Technology, Department of Food
Science, Faculty of Agriculture, Ain Shams University

CONTENTS

	Page
LIST OF TABLES	IV
LIST OF FIGURES	IX
LIST OF ABBREVIATIONS	X
LIST OF APPENDIXE	XI
1. INTRODUCTION	1
2. REVIEW OF LITERATURE	4
2.1. Quality and safety of food in touristic plant	4
2.2. Risk factors of food that produced and sold in touristic plants	5
2.3. HACCP system food hygiene and food safety	7
2.4. Hazard analysis and critical control point (HACCP) system	8
2.4.1. What is the HACCP system?	8
2.4.2. History of HACCP	9
2.4.3. Reasons to use HACCP as food safety tool	11
2.4.4. Benefits of the HACCP system	12
2.4.5. The needs for full implement of HACCP in foodservice areas	13
2.4.6. How to implement HACCP system	14
2.4.6.1. Conduct a Hazard Analysis	15
2.4.6.2. Determine the critical control points (CCPs)	16
2.4.6.3. Establish critical limits	17
2.4.6.4. Establish monitoring procedures	18
2.4.6.5. Establish corrective actions	18
2.4.6.6. Establish verification procedures	19
2.4.6.7. Establish record-keeping and documentation procedures	20
2.5. Applications of HACCP in foodservice	21
3. MATERIALS AND METHODS	30
3.1. Materials	30
3.1.1. Food preparation place and types of meals used in this study	30
3.1.2. Cultivated media	32
3.2. Methods	35
3.2.1. Application of HACCP system	35
3.2.2. Inspection of kitchens	37
3.2.3. Microbiological analyses	38
3.2.4. Collection of frying oil samples	39
3.2.5. Chemical analyses	40
3.2.5.1. Proximate composition of meals	40
3.2.5.2. Chemical analysis of frying oil	40
3.2.5.2.1. Acid and peroxide values	40

3.2.5.2.2. Ultraviolet spectrum	40
3.2.5.2.3. Anisidine value	41
3.2.5.2.4. Total oxidation value	41
3.2.6. Statistical analysis	41
4. RESULTS AND DISCUSSION	
4.1. Assessment the prerequisites of HACCP system implemented in touristic restaurants	42
4.1.1. Assessment the weak points identified in the touristic restaurants	42
4.1.2. Assessment the safety of the procedures in the selected kitchens	44
4.1.3. Assessment practices and food safety knowledge of chefs	48
4.1.4. Assessment bacterial contamination of surfaces in contact with food	53
4.1.5. Assessment of the microbiological quality of water used in two selected kitchens	57
4.2. Hazard analysis of raw materials used in preparing meals	58
4.2.1. Microbiological analysis of raw materials during processing meals	65
4.3. Hazard analysis during processing and serving of tested meals	69
4.3.1. Purchasing and reception raw materials:	69
4.3.2. Storing raw materials	73
4.3.3. Thawing frozen food	74
4.3.4. Washing, peeling, cutting and mix ingredients	75
4.3.5. Handling of foods that are not subsequently heated	76
4.3.6. Cooking operator	77
4.3.7. Holding foods	79
4.3.8. Serving	79
4.4. Microbiological analysis of ready to eat food (RTE)	80
4.4.1. Microbial Count in RTE Foods	80
4.4.2. Unsatisfactory rates for microbiological qualities of RTE meals	85
4.5. HACCP control chart of manufacturing meals	96
4.5.1. Hazard analysis and HACCP control chart of Shish Taouk, Escalope and Chicken pane Sandwiches	96
4.5.2. Hazard analysis and HACCP control chart of manufacturing Fillet fish meals	127
4.5.3. Hazard analysis and HACCP control chart of manufacturing different salads	138
4.5.4. Hazard analysis and HACCP control chart of manufacturing rice with nuts meals	156

III

4.5.5. Hazard analysis and HACCP control chart of manufacturing macaroni meals	163
4.5.6. Hazard analysis and HACCP control chart of manufacturing Om Ali meals	171
4.5.7. Hazard analysis and HACCP control chart of manufacturing fruit salad with ice cream	178
4.6. Chemical composition of served meals	186
4.7. Quality assessment of frying oil	187
5. SUMMARY	189
6. REFERENCES	197
7. APPENDIX	211
8. ARABIC SUMMARY	

LIST OF APPENDIXE

NO.	Title	Page
1	Food safety checklist use to determine areas in operations requiring corrective action	211
2	Survey questions used to assessment practices food safety knowledge of chefs	216
3	Pathogens associated with different types of food	218
4	Current public health guidelines for ready-to-eat foods sampled at the point of sale	219
5	Food Category Table for Aerobic Colony Count Assessment	219

LIST OF TABLES

NO.	Title	Page
1	Significant dates in the history of HACCP	10
2	Ingredients used in preparing tested meals	30
3	Media and incubation conditions used for microbiological analysis	39
4	Weak points identified in two selected kitchens	42
5	Record keeping of daily checklist in two kitchens during visiting the establishment	45
6	Survey questions and chefs responses	49
7	Conformity microbiological counts of surfaces in contact with food to advisory standard in kitchen (A)	54
8	Conformity microbiological counts of surfaces in contact with food to advisory standard in kitchen (B)	56
9	Unsatisfactory rate of Total count, <i>E. coli</i> and <i>Staphylococcus aureus</i> in swab samples of surfaces in contact with food at different kitchens	57
10	Microbiological analysis of tap water in two selected kitchens	58
11	Hazard analysis of raw materials used in preparation different meals	59
12	The count ranges and number/percentage of bacteria and yeast & moulds on animal and plant raw material during processing in kitchen (A)	67
13	The count ranges and number/percentage of bacteria and yeast & moulds on animal and plant raw material during processing in kitchen (B)	68
14	Hazard analysis results of different processing steps used in preparation different types of foods	70

15	The count ranges and number/percentage of bacteria and yeast & moulds on animal and plant ready to eat food in kitchen (A)	81
16	The count ranges and number/percentage of bacteria and yeast & moulds on animal and plant ready to eat food in kitchen (B)	82
17	Unsatisfactory rate of Aerobic colony count, <i>E. coli</i> and <i>Staphylococcus aureus</i> in animal and plant food products at two kitchens (A & B)	86
18	Unsatisfactory rate of Aerobic colony count, <i>E. coli</i> and <i>Staphylococcus aureus</i> in hot and cold RTE food at two kitchens(A & B)	87
19	Unsatisfactory rate of Aerobic colony count, <i>E. coli</i> and <i>Staphylococcus aureus</i> in different animal and plant RTE food products	88
20	Unsatisfactory rate of Aerobic colony count, <i>E. coli</i> and <i>Staphylococcus aureus</i> in different hot and cold RTE food products	89
21	Unsatisfactory rate of Aerobic colony count, <i>E. coli</i> and <i>Staphylococcus aureus</i> in RTE food at different kitchens	90
22	Unsatisfactory rate of Aerobic colony count, <i>E. coli</i> and <i>Staphylococcus aureus</i> in animal foods at different kitchens	91
23	Unsatisfactory rate of Aerobic colony count, <i>E. coli</i> and <i>Staphylococcus aureus</i> in plant foods at two kitchens	92
24	Unsatisfactory rate of Aerobic colony count, <i>E. coli</i> and <i>Staphylococcus aureus</i> in hot RTE foods at different kitchens	93

VI

25	Unsatisfactory rate of Aerobic colony count, <i>E. coli</i> and <i>Staphylococcus aureus</i> in cold RTE foods at different kitchens	94
26	Microbial counts of Shish Taouk meal in the kitchen A	101
27	Microbial counts of Shish Taouk meal in the kitchen B	102
28	Hazard analysis results of Shish Taouk meal	104
29	HACCP worksheet for critical control points of Shish Taouk meal	107
30	Microbial counts of escalope meal in kitchen A	109
31	Microbial counts of escalope meal in kitchen B	110
32	Hazard analysis results of escalope meal	111
33	HACCP worksheet for critical control points of escalope meal	115
34	Microbial counts of chicken pane sandwich in the kitchen A	117
35	Microbial counts of chicken pane sandwich in the kitchen B	118
36	Hazard analysis results of chicken Pane sandwich meal	121
37	HACCP worksheet for critical control points of preparation chicken Pane sandwich	125
38	Microbial counts of fillet Fish meals in kitchen A	130
39	Microbial counts of filet Fish meals in kitchen B	131
40	Hazard analysis results of Fillet fish meal	134
41	HACCP worksheet for critical control points of fillet fish meals	137
42	Microbial counts of vegetables salad with mayonnaise in kitchen A	142
43	Microbial counts of vegetables salad with mayonnaise in kitchen B	142

VII

44	Hazard analysis results of vegetables salad with mayonnaise	145
45	HACCP worksheet for critical control points of vegetables salad with mayonnaise	146
46	Hazard analysis results of Babaghanoug salad	150
47	Hazard analysis results of Tehina salad	151
48	Microbial counts of different Tehina salad and Babaghanoug salad in kitchen A	152
49	Microbial counts of different Tehina salad and Babaghanoug salad in kitchen B	152
50	HACCP worksheet for critical control points of Babaghanoug and Tehina salad	155
51	Microbial counts of rice with almonds meal in the kitchen A	158
52	Microbial counts of rice with almonds meal in the kitchen B	158
53	Hazard analysis results of rice with almonds meal	161
54	HACCP worksheet for critical control points of rice with nuts Meal	162
55	Microbial counts of Macaroni in kitchen A	165
56	Microbial counts of Macaroni in kitchen B	165
57	Hazard analysis results of Macaroni meal	167
58	HACCP worksheet for critical control points of Macaroni meals preparation	170
59	Microbial counts of Om Ali meal in kitchen A	173
60	Microbial counts of Om Ali meal in kitchen B	173
61	Hazard analysis results of Om Ali meal	175
62	HACCP worksheet for critical control points of Om Ali meal	177

VIII

63	Microbial counts of Fruit salad with ice cream in kitchen A	180
64	Microbial counts of Fruit salad with ice cream in kitchen B	180
65	Hazard analysis results of fresh fruit salad with ice cream	182
66	HACCP worksheet for critical control points of Fruit salad with ice cream	185
67	Composition of served meals, 100 gram, edible portion (gm%)	186
68	Chemical properties of some frying oil samples during frying operations	188

LIST OF FIGURES

NO.	Title	Page
1	Generic flow diagram for catering operations with possible standard operating procedures (SOPs) and critical control points (CCPs)	24
2	A decision tree which used to determine critical control points	36
3	Flow diagram of preparation of Shish Taouk	97
4	Flow diagram of preparation of escalope meal	98
5	Flow diagram for preparation of chicken pane Sandwich	99
6	Flow diagram of preparation of Fillet fish meal	128
7	Flow diagram of preparation of vegetables salad with mayonnaise	141
8	Flow diagram of preparation of Babaghanoug salad	148
9	Flow diagram of preparation of Tehina salad	149
10	Flow diagram of preparation of rice with nuts meal	157
11	Flow diagram of preparation of Macaroni	164
12	Flow diagram of preparation of Om Ali meal	172
13	Flow diagram of preparation of fruit salad with ice cream	179

LIST OF ABBREVIATIONS

AV	Acid value
An.V	Anisidine value
CAC	Codex Alimentarius Commission
CCP	Critical Control Point
°C	Centigrade degree
CDA	Conjugated diene
cfu	Colony forming unit
Cm ³	Cubic centimetre(s)
CTA	Conjugated triene
FAO	Food and Agriculture Organization of the United Nations
FDA	Food and Drug Administration (USA)
GAP	Good Agriculture Practices
GHP	Good Hygienic Practices
GMP	Good Manufacturing Practices
HACCP	Hazard Analysis and Critical Control Point
ICMSF	International Commission for Microbiology Specification of Food
ISO	International Organization for Standardisation
NACMCF	National Advisory Committee on Microbiological Criteria for Foods
PRP	Prerequisite Programme
pV	peroxid value
RTE	Ready to eat foods
SOP	Standard Operating Procedures
SSOP	Sanitation Standard Operational Procedures
To.V	Total oxidation value
WHO	World Health Organization
WTO	World Trade Organization

ABSTRACT

Wasim Kaser Aljuhni. Quality and Safety of Foods in Touristic Plants . Unpublished M.Sc. Thesis, Department Food Science, Faculty of Agriculture, Ain Shams University, 2009.

There are many concerns about the sanitation practices used in the preparation of the foods and the occurrence of the gastrointestinal illness affecting mainly peoples who eating out homes. This study describe the hazard analysis carried out on manufacture of some meals preparing in two kitchens (kitchen A & kitchen B) at catering establishment in the city of Cairo. The control measures and monitoring procedures for meals preparation are suggested. The prerequisites of HACCP system implementation in two kitchens (kitchen A & kitchen B) were assessment. The microbial quality of studied meals and surface swab samples was used as indicator of food safety in this work. The result showed that the animal ready to eat (RTE) food products prepared in kitchen A were acceptable for aerobic bacteria count, *E. coli* and *S. aureus*. In the other hand 25.00% and 10.71% of plant RTE food products prepared in kitchen A was unsatisfactory for aerobic bacteria count and *E.coli*, respectively. The rates of noncompliance animal and plant RTE food products detected in kitchen B were 16.67%, 0.00%, 15.38% and 46.43%, 46.43%, 60.71% for aerobic colony count, *E. coli* and *S. aureus* counts, respectively.

The hot RTE food products prepared in kitchen A were 8.33% unsatisfactory for aerobic bacteria count, and acceptable for *E. coli* and *S. aureus*. In the other hand 17.86% and 10.71% of cold RTE food products prepared in kitchen A was unsatisfactory for aerobic bacteria count and *E.coli*, respectively. The rates of noncompliance of hot and cold RTE food products detected in kitchen B were 23.08%, 0.00%, 23.08% and 39.29%, 46.43%, 53.57% for aerobic colony count, *E. coli* and *S. aureus* counts, respectively.