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APPLICATION OF HACCP SYSTEM IN CATERING SECTOR IN TURKEY

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Summary

In this research, a flow diagram sample for the process of catering sector was presented and HACCP plan was recommended by conducting hazard analysis at the determined critical control points. The necessary activities established in HACCP system were stated for obtaining safe products.

Introduction

The main aim of the food manufacturers is to produce high quality and safe foods. To assure the safety of the food, establishing a system based on a continuous management including total quality management, hygiene and good manufacturing practices, is essential. Therefore, HACCP (Hazard Analysis and Critical Control Points) system should be examined. HACCP is defined as "an effective system based on Good Manufacturing Practices (GMP) and Standard Sanitation Operation Procedures (SSOP), for providing safe and healthy foods" (Pierson and Corlett, 1992).

HACCP is an effective system because this food safety system is designed to provide the information flow for preventive and corrective actions and can easily be established on the production lines of all kinds of foods (Unnevehr and Jensen, 1998). Safe and healthy products can be served to consumers by eliminating the safety risks after determining the critical control points by hazard analysis and establishing the necessary preventive and corrective actions (Pierson and Corlett, 1992).

HACCP can be adapted to plants that produce different kinds of foods, but industrial applications show differences because the flow diagrams of the products differ. Thus, all production lines have different critical control points and HACCP plans (Topal, 2001).

In the catering sector, different kinds of raw materials are used. So, microbiological risks must be taken into account. The main sources of the microbiological hazards threatening the health of the consumers are *Clostridium botulinum* and its neurotoxin possibly found in rice, starch, dairy and meat products; *Salmonella* originated from undercooked poultry and red meat; *Clostridium perfringens*, *Staphylococcus aureus* and *E. coli* O157:H7 (Scott and Moberg, 1995). Food intoxications and infections caused by pathogen microorganisms also cause economic losses. In the last 20 years, these economic losses are nearly 1,0-1,2 billion dollars (Korel et al., 2003) indicating the importance of food safety and HACCP System (Antle, 1999).

Application of HACCP system in catering sector is inevitable because of the developing market and increasing number of the consumers. In Turkey, plants in catering sector realized that their meal production by conventional methods and hygiene conditions is inadequate (Topal, 2001).

The first step to establish the HACCP system in catering sector should be to form the flow diagram of the production line. In this way, critical control points can be determined on the flow diagram sample and hazard analysis can be performed. A sample flow diagram for the process of catering sector is given in Figure 1. The given sample flow diagram must be verified by the Quality Control (QC) or Quality Assurance (QA) Department of the plant.

1. Hazard Analysis on the Production Line:

After constituting the flow diagram to determine the critical control points, hazard analysis can be performed. Possible risks that may occur during the production must be taken into account and necessary preventive actions must be determined.

2. Critical Control Points on the Production Line:

After hazard analysis, determined risks should be considered by decision tree if they are critical control points or not. Then, factors that constitute the hazard should be determined. Parameters used during monitoring critical control points, critical limits, preventive and corrective actions, and production and operation instructions and responsibilities of the staff should be well defined. To monitor these activities, necessary forms and records should be kept as an archive for internal and external audits (Annon, 1998).

Inspection and storage of raw materials; washing fruits and vegetables; washing and cleaning the equipment (knives, spoons, forks, saucepans, ladles etc.) used during the production; cooking; metal detection, and serving/distributing the meal, are the critical control points in the catering sector.

2.1 Inspection of Raw Materials

The plant purchases raw materials from several contractors. The production requires a stock monitoring program and raw materials should be purchased as closer as possible to the production time (Bryan, 1992).

Possible Risks

Purchasing raw materials that have microbiological loads over critical limits must be avoided to ensure food safety and quality. Toxins synthesized by microorganisms; and pesticides, chemical residues and foreign materials found in these raw materials are also potential risks for consumer health.

Control

Raw materials should be purchased in accordance with the *"Raw Material Acceptance Criteria"* determined by QC/QA Department. QC/QA staff members have to reject unsuitable raw materials. Microbiological, physical and chemical characteristics that raw materials must have corresponding and critical limits should be determined in *"Raw Material Acceptance Criteria"*. Contractors having quality certificates like ISO Quality Assurance Systems and HACCP system should be preferred. QC/QA staff members have to control the expiration date of the packaged foods. Ripped, pierced, damaged and abnormal shaped packages have to be refused.

Monitoring and Keeping Records

During monitoring the inspection and acceptance of raw materials, responsibilities of the department staff and controllers, inspection methods and instructions have to be clearly brought up for consideration *"Raw Material Control Procedures"*. QC/QA staff members should keep the acceptance records and fill the necessary forms according to the procedures mentioned above (Fıratlıgil et al., 1997).

2.2 Storage of Raw Materials

Fruits and vegetables; dairy products; frozen foods and meats; egg; and dried food products should be kept at (0-4ºC), (0-4ºC), (-18,-20ºC), (0-4ºC) and (18-27ºC) respectively. To avoid the cross contamination, these food stuffs should be kept at different temperatures, and in different places. Relative humidity of the storing places might change from 80% to 95% according to the raw material (Jay, 1992).

Possible Risks

Because of insufficient and improper storage conditions, rapid microbial growth can be seen. Cross contamination of the pathogen microorganisms from storage places to production area is an other important hazard (Bryan, 1992).

Control

"Raw Material Storing Instructions" should be determined by QC/QA department for proper storing. Storing should be performed according to First In First Out (FIFO) system.

Monitoring and Keeping Records

QC/QA staff members are responsible for proper storing conditions. Temperatures and relative humidities of the storage places should be monitored by thermocouples and hygrometers continuously. Temperatures and relative humidities of the storage places, and changes in these parameters should be recorded; when necessary, these parameters should be reset. Sanitary and hygienic conditions of the stores are very significant to avoid the contamination. In addition, hygienic barriers might be used and stores should be cleaned and sanitized periodically, and records mentioned in *"Raw Material Storing Instructions"*, should be kept for archive and audits.

2.3 Washing Fruits and Vegetables

Salads, fruits and several vegetables are consumed as raw. So, foodstuffs used for salad making, and fruits and vegetables should be well washed. Washing and rinsing periods, chlorine concentrations, temperatures and pressures of washing and rinsing water should be adequate to remove dirtiness and to decrease the microbial load.

Possible Risks

An inadequate washing program causes non-removal of physical, chemical and microbiological hazards present in natural flora of fruits and vegetables. Potable water should be used for washing process, otherwise, fruits and vegetables can be contaminated by unclean water. An effective rinsing is very crucial to remove chlorine from fruits and vegetables.

Control

A detailed *"Raw Material Washing Program"* should be prepared by QC/QA department for considering parameters such as the concentration of chlorine, washing and rinsing period, pressure and temperature of water according to the type of the raw material. Generally, 50-125 ppm active chlorine is adequate for eliminating the microbial risks of the fruits and vegetables (Aran et al., 1987). For very dirty raw materials 1-5 ppm active chlorine should be added to the final rinsing water (Aran et al., 1987). To avoid the contamination from water used for washing, water analysis (chemical and microbiological) should be performed by authorized laboratories periodically.

Monitoring and Keeping Records

QC/QA department is responsible for an effective washing and rinsing. *"Raw Material Washing Program"* should be applied completely. Water analysis reports should be kept for archive and audits.

2.4 Washing and Rinsing the Equipment

Dirty equipments are one of the main sources of physical and microbiological contaminations. Therefore, an effective equipment cleaning program should be applied (Bryan, 1992).

Possible Risks

Hazards at this step are closely related to the effectiveness of the washing program. If the washing program is inadequate, it is impossible to remove physical, chemical or microbiological hazards. On the other hand, inadequate rinsing causes non-removal of detergent, chlorine and caustic from equipment.

Monitoring and Keeping Records

Concentration of active chlorine, caustic or detergent used, washing and rinsing periods, temperatures and pressures of washing and rinsing water should be clearly determined. General cleaning of equipment used in production should be periodically done by caustic solutions. Because has toxic effect on health, it should be checked whether it was removed completely from the equipment or not after rinsing. Presence of caustic on the equipment can be detected by a test in which the colorless phenol phytalein turns into purple when dropped on the surfaces if caustic is still there (Troller, 1993).

2.5 Cooking the Meal

Possible Risks

Undercooked meals are the main sources of microbiological hazards. Garnishes added to cooked meal should be boiled very well and center temperature of meal should be followed during cooking. Dirty equipments like knives, forks and spoons which are used for preparing raw materials, should not be used again while cooking the meal. Otherwise, cross contamination is inevitable (Bryan, 1992).

Control

QC/QA department is responsible for the cooking process. Department member should monitor the meal temperature and should control whether cooking is done according to the cooking receipts *"cooking receipts"* or not. Chief of the kitchen should be very careful and avoid the usage of equipments that are used for preparing raw material.

Monitoring and Keeping Records

Jay (1992) stated that the final temperature of the meal must be 70ºC or above. QC/QA staff member should record the temperature during cooking process.

Cooked meal should be evaluated by trained sensory panel. The sensory panel results should be recorded on the *"Sensory Analysis Form"*. Samples should be taken from the cooked meals and kept for at least two days at refrigerator conditions (0-4ºC) for possible consumer complaint and should be presented to the competent authority if a problem occurs. Microbiological analysis should be performed on these samples, according to the *"Microbiological Analysis Procedures"* stated by QC/QA department. Microbiological analysis results should be kept for periodic audits.

2.6 Metal Detectors

Possible Risks

It is possible that metal particles can contaminate the meal during production. These metal particles may come from raw materials that are not properly handled during harvest and may cause physical hazards.

Control

Control is done by metal detectors.

Monitoring and Keeping Records

QC/QA department staff should constitute a detailed *"Metal Detector Manual"*. In this manual, dimensions of metal particles that metal detector should determine must be given (Mortimore, 1994). QC/QA staff member, responsible for this operation, should periodically check the detector by test and should calibrate it frequently.

2.7 Distributing Meal

Possible Risks

Because of unsuitable distributing and serving conditions, microbiological growth and spoilage of meal may occur.

Control

Serving and distributing of meal should be performed according to *"Distributing Procedure"* stated by QC/QA department. During transportation, temperature of the meal should be over 60ºC. To ensure that, meal should be distributed in thermal boxes (Bryan, 1992).

Monitoring and Keeping Records

Final product should be placed into thermal boxes and distributed as soon as possible after production. Lids of the thermal boxes should be closed tightly and checked. Also refrigerator conditions must be ensured for garnishes, salads and dairy products. Loading of the thermal boxes into the cars should be done according to the distributing route.

3. Keeping Records and Verifying

QC/QA department should ensure to avoid the potential hazards in all steps of the process by stating preventive and corrective actions. Effectiveness of the HACCP system can be stated by verifying. All the activities taken place in HACCP system should be kept as records and forms, and archived for periodic internal and external audits. Audits are performed by Production Management Department and government officials dealing with food safety (Annon., 1998).

Conclusion

HACCP should be considered as a system based on Good Manufacturing Practices (GMP) and Standart Sanitation Operation Procedures (SSOP). GMP applications include building, environment arrangements and personnel hygiene and behaviors. Sanitary and hygienic conditions of the plant can be improved by SSOP applications.

For serving high quality and safe products to the consumers, inspecting the raw materials while purchasing, storing the raw materials at proper conditions, using well cleaned equipments in all steps of the process, cooking according to receipts stated by department and assuring the adequate center temperatures while cooking are determined as critical points. Serving and distribution also should be performed according to serving and distributing instructions.

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