



Science

HACCP IN CLEAN FOOD PRODUCTION: AN OVERVIEW

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Abstract

For the food security of more than 1.3 billion people, India has to keep on producing more but safe food. Various techniques have been developed over the time for keeping a check on the quality of food. Of those, HACCP i.e., Hazard Analysis and Critical Control Points is one which ensures the quality of food during the production or the processing of food. HACCP is based on seven principles and is a risk management system that identifies, evaluates, and controls hazards (biological, chemical and physical) related to food safety throughout the food supply chain. The concept first came to light in 1960s and in India it started early in 2000. HACCP is a protocol for all the stakeholders involved in food industry for the production of safe food. As the HACCP lays emphasis on “Clean Production”, therefore, it ensures the use of every single resource whether it may be water, energy or any raw material in an efficient way leading to manufacture of a priced commodity and letting out less harmful and meager waste products.

Keywords: Food Safety; HACCP; Hazard; Principles; Production.

Cite This Article: Degpal Singh, Anit Kumar, and Amandeep Singh. (2018). “HACCP IN CLEAN FOOD PRODUCTION: AN OVERVIEW.” *International Journal of Research - Granthaalayah*, 6(12), 128-134. <https://doi.org/10.29121/granthaalayah.v6.i12.2018.1096>.

1. Introduction

Today every human irrespective of knowledge and literacy talks about the hygiene and safety of the food product what he consumes. The first thing which comes to our mind while purchasing any food item is about the health concerns after consumption of that food item. We make ourselves sure about the quality of the food item. Present day, this quality parameter is undertaken by the food companies by the application of newly introduced quality control system which is based on the preventive approach rather than altering the process in food production. This system is termed as HACCP i.e., Hazard Analysis and Critical Control Points.

Every single company dealing in food items have to take care of good manufacturing practices and good hygiene practices beforehand the application of HACCP. By the introduction of such a system, food can be saved from degradation and hence wastage for a comparatively long time. This system has also led to the prevention of many food borne diseases and hence safeguarding the health of the people. In today's world more emphasis is being laid on the clean food production which can be carried out by the application of HACCP.

The present economic situation and global market conditions have led companies to look for ways to increase competitiveness by improving production processes, reducing production costs, and improving product quality. In terms of the food industry, two other factors should also be included: the need to ensure food safety and the need to protect consumers' health. Therefore, the existence of a system that ensures food safety is crucial to preserve a company's image and reputation and to increase local and international market shares.

HACCP system food safety has been recommended by the World Health Organization, the International Commission on Microbiological Specifications for Foods, the *Codex Alimentarius*, and food regulatory agencies in various countries.

2. HACCP and its Seven Principles

HACCP (Hazard Analysis and Critical Control Point) is a risk management system that identifies, evaluates, and controls hazards (biological, chemical and physical) related to food safety throughout the food supply chain. HACCP is a preventative approach where the focus is placed on the prevention of problems in order to assure the production of food products that are safe to consume. HACCP system can be applied by using its defined 7 principles as follows;

- 1) Conduct a hazard analysis.
- 2) Determine the critical control points (CCP).
- 3) Establish critical limits (CL).
- 4) Establish a system to monitor control of the CCP.
- 5) Establish the corrective action to be taken when monitoring indicates that a particular CCP is not under control.
- 6) Establish procedures for verification to confirm that the HACCP system is under control.
- 7) Establish documentation concerning all procedures and records appropriate to these principles and their application.

3. Timeline of HACCP

- In 1960's Pillsbury Company developed the concept of HACCP in cooperation with NASA for assuring safe and clean food for astronauts.
- At the 1971 National Conference on Food Protection, the HACCP system was first presented and FDA (Food and Drug Administration) started using HACCP for investigation of foods.
- During the 1980s, some of the government protection agencies asked NAS/NRC (National Academy of Sciences/National Research Council) to form a committee that should promulgate some principles for HACCP and with proper training to the workers at food industries, HACCP should be implemented in food industries.

- In 1997, implementation of HACCP in sea food processing industries took place.
- In 1998, HACCP implemented on meat and poultry processing plants.
- In 2002, HACCP implemented on juices.

4. HACCP in India

In 2000

- Government schemes for HACCP implementation.
- Encouraged other industries for HACCP.
- Indian Standard IS 15000.
- Nation specific HACCP standards like Irish HACCP, Dutch HACCP, South African HACCP were used for certification.

In 2005

- ISO 22000:2005 published.
- Scope for Food Chain.

In 2008

- GFSI approved standards certification like BRC Food, FSSC 22000, IFS.

In 2011

- Food Standards and Safety Act of India. Schedule IV made mandatory attempts for implementation of HACCP.

5. Prerequisites for The Implementation of the HACCP Plan

The application of HACCP is ensured by some of the prerequisite programs which have to be undertaken by the industry and its workers. These prerequisite programs, such as good manufacturing practices and cleaning procedures, should be established in order to ensure basic hygiene conditions in the processing plant. These prerequisite programs, if correctly implemented, will determine the principles for correct handling of foodstuffs, making HACCP more efficient and easier to manage. These programs involve the following aspects:

- physical structure and maintenance of the premises,
- water supply,
- handler health and personal hygiene,
- pest control,
- sanitization of premises and equipment,
- calibration of instruments,
- quality control of raw material and ingredients, recall procedures, and measures related to consumer complaints.

The maintenance of these prerequisites enables the HACCP plan to work in an effective way with less complexity and less Critical Control Points to be monitored.

6. Food Safety and Quality Assurance by Following HACCP Guidelines

Guidelines for employees

- 1) Wash hands properly and use hand sanitizers.

- 2) Keep fingernails trimmed and do not use nail polish.
- 3) Jewelry should be removed before preparing food.
- 4) The employer will ensure the availability of clean outer garments and headgear.
- 5) Proper and safe footwear should be worn.
- 6) Properly treat and cover cuts, burns and rashes.
- 7) Reporting emergency conditions.

Sanitary Guidelines

- 1) Equipment and utensils which come into direct contact with food must be corrosion-resistant and non-toxic, free from cracks, crevices and open seams.
- 2) Sanitation of the premises and assembly to be used for food processing is of prime importance. Garbage control of the plant should be taken care of.
- 3) Toxic and Poisonous Substances should be contained with a proper label over the container and should not come in direct control of food items.
- 4) Cleaning and Sanitizing the utensils used.
- 5) Mechanical Dishwashing Temperatures:
 - Wash: between 60°C (140°F) and 71°C (160°F).
 - Sanitizing Rinse: 82°C (180°F) for at least 10 seconds or use an approved chemical solution.

Food Safety Guidelines

Principle Behind Protocol

That the food preparation will be error free to prevent any food related illnesses.

Critical Control Points; During food production

Cooling & Cold Holding

- 1) Foods must cool from 60°C (140°F) to 20°C (68°F) or less in 2 hours and from 20°C (68°F) to 4°C (40°F) or less in four hours and should be kept in freezer.
- 2) Hot Holding at 60°C or more for no longer than 2 hours. Dispose of any foods leftover from the hot holding.
- 3) Do not prepare food ahead of time and prepare it according to the availability of consumers.
- 4) Infected persons should cover themselves properly and avoid the contamination of the food product by wearing gloves and head gears.
- 5) Reheating/Use of Leftovers: Reheat leftovers to original cooking temperature for at least 15 seconds in 2 hours or less.
- 6) All the preparation surfaces should be sanitized to reduce germ load.
- 7) The contaminated raw ingredients should be properly graded and then subjected to processing.

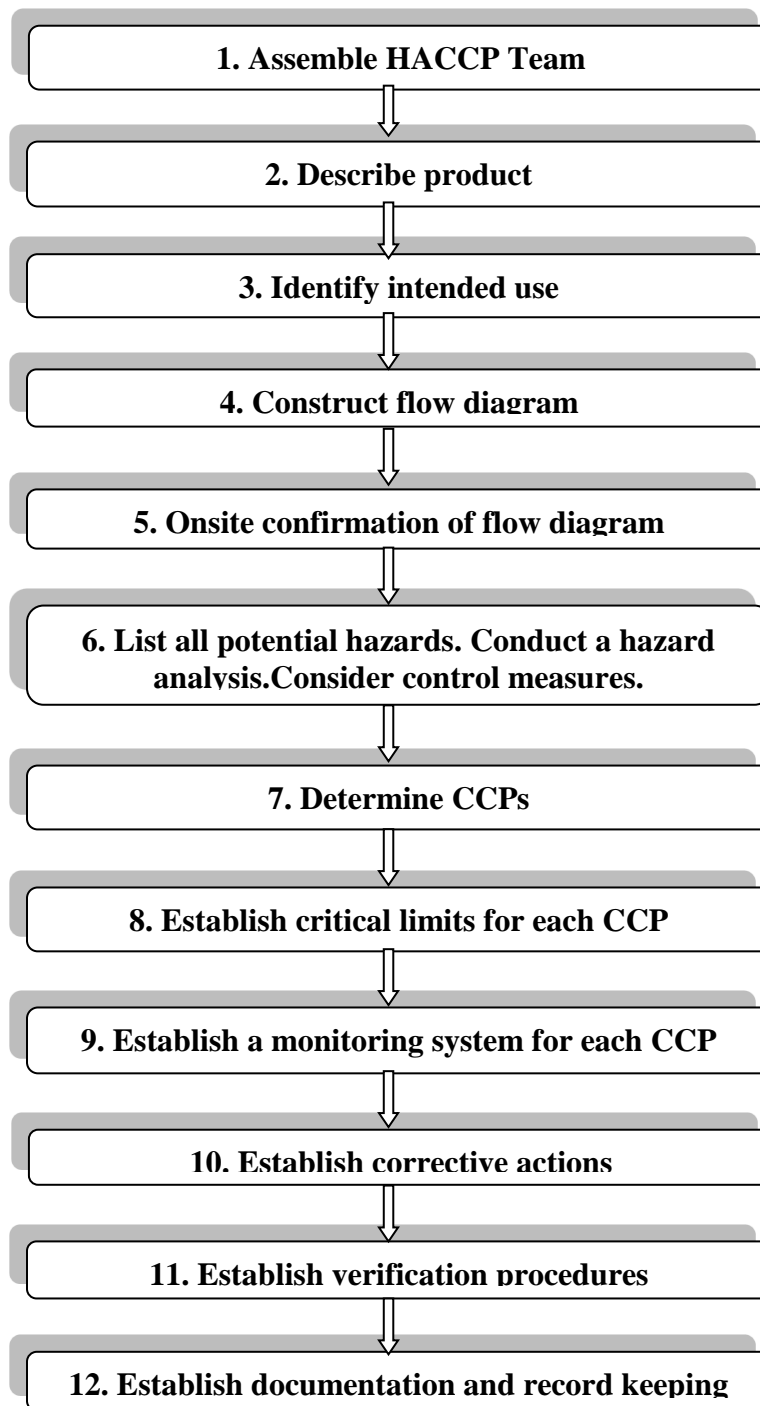
Delivery and Storage

All the incoming products are to be inspected and expiry dates are to be checked.

Use older stock first.

Freezers must operate at -18°C (0°F), refrigerators must operate at 4°C (40°F) and ensure good air flow around all products for efficient storage.

Logical sequence for the application of HACCP



(Adopted from Guidelines given by WHO)

7. Impact of HACCP on Food Safety

Data from the World Health Organization show that, in 2005, 1.8 million people died of gastroenteritis caused by contaminated food and water (World Health Organization 2007). In spite

of the technological progress in food production and control, the occurrence of these diseases has recently increased, even in developed countries. The food hazards causing such fatal diseases are generated throughout the journey of the food. Today the food chains are becoming global and cosmopolitan, and so are the food hazards. The hazards present at one place are spreading rapidly at the other place by the global imports and exports of food products. However such food hazards can be restricted and the foods can be made free of the hazards by implementing HACCP from the collection of the raw materials to the final processing of the food product by means of monitoring the CCPs.

It can be understood in a manner that one of the major CCP in the manufacturing of milk products is pasteurization of milk and by successful monitoring of this CCP, numerous pathogens can be reduced hence reducing the diseases. Factors related to the supply chain, demographic situation, lifestyle, health system infrastructure, and the environmental conditions of each country influence the prevalence, increased frequency, and consequences of these diseases. When all these facts are taken into account, HACCP is an important tool in modern quality management in the food industry, ensuring the integrity of the product, preventing FBDs, and protecting the health of the consumer.

Further the implementation of HACCP successfully reduces the transmission of diseases to the employees working in the food plants by reducing the risk of zoonoses by adoption of better personal safety methods.

8. Impact of HACCP on Environment

As the HACCP lays emphasis on “Clean Production”, therefore, it ensures the use of every single resource whether it may be water, energy or any raw material in an efficient way leading to manufacture of a priced commodity and letting out less harmful and meager waste products. Good managerial and good operational practices had a positive thrust on better storage capability of the food item, reduction in losses, discard of residues, redesign of products and production processes, and minimal and efficient use of raw material and energy thereby ensuring an overall boon to the environment. The new technologies are being used under the HACCP system which had provided an excellent scenario of decreased wastes which may pollute the environment in any form and focuses on efficient food production.

9. Advantages of HACCP

Although the main goal of HACCP is food protection, there are other benefits acquired through HACCP implementation, such as:

- Increase customer and consumer confidence.
- Provides market protection.
- Reduce costs through reduction of product losses and rework.
- Reduce risks of recalls and product withdrawals thus reducing costs associated with insurance and business liability protection.
- Increase focus and ownership of food safety.
- Simplify inspections primarily because of record keeping and documentation.
- Provide consistent quality product.

- Demonstrates conformance to the product requirements and regulations.

10. Conclusion

The advantages of HACCP are not limited. It can be implemented at any part of the globe due to its compatibility and suitability as the food production is proportional to the population. The surging population demands the better food products which ensure decreased susceptibility of people to food borne diseases and better health. The effective plan of HACCP is given by W.H.O. and it should be followed by every food processing unit for manufacturing of clean foods. However, HACCP will only become effective when its principles are correctly and broadly applied in all stages of the food production chain. Food borne diseases only occur when there are failures in implementation or limited application of HACCP, mainly in small companies. Curbing certain loopholes in the implementation of the HACCP principles assure the clean food production.

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