

# STUDY ON THE IMPACT OF QUALITY MANAGEMENT SYSTEMS ON FOOD SAFETY

## CASE STUDY: EXPANDED CEREALS

Constantinescu G.<sup>1</sup>, Huțanu G.<sup>1</sup>

<sup>1</sup>“Stefan cel Mare” University of Suceava, Suceava, Romania

<sup>2</sup>S.C. DOMA S.R.L., Botosani, Romania

Gabriela Constantinescu: [gabriela.constantinescu@fia.usv.ro](mailto:gabriela.constantinescu@fia.usv.ro)

**Summary:** Food safety is related to the presence of hazards of food origin in food products in the moment of consumption. As these hazards may occur in any stage of food chain, adequate control throughout this one is essential. Due to the fact that most laboratory analyses made on food require some time to be interpreted (it is usually equal or longer than foods' shelf-life) is practically impossible to make these analyses and afterwards to deliver them to consumers. Three types of dangers and hazards respectively are associated with food products: biological, chemical and physical ones. Hazard assessment is made depending on their seriousness and probability of manifestation. To get very good results it is recommended to consider HACCP implementation as a working instrument and not as an objective, especially not as an objective imposed by the control authorities of the state. The aims of this paper it was to establish the monitoring systems for expanded cereal industry

**Keywords:** food safety, hazard analysis, risk analysis,

### Introduction

**Food safety** has become a more and more important public issue regarding two main aspects:

- Food borne diseases, usually of infectious or toxic nature, caused by food-ingested agents;
- A wide spectrum of these illnesses: how widely they occur among people and the extent in which they generate public health problems both in developed countries and emergent ones.

Global occurrence of food borne diseases is however difficult to be assessed.

In industrialized countries, the percentage of people suffering from food borne diseases is up to 30%. In the USA, about 76 million of new cases of food borne diseases are annually reported more exactly 325.000 hospitalizations and 5.000 deceased.

Food safety means the engagement of all factors and putting into practice of all norms which support and provide the production of foodstuffs whose nutritional and consumption value is the basis of healthy food. The main goal of food safety is to provide people with health protection at the highest standards and thus supporting consumers' interests in terms of foodstuffs.

Food safety can be achieved by introducing a new working system by which hazard degree of points causing errors are identified and assessed in view of eliminating them. There are internationally approved systems and agreeable to the European Union such as the HACCP method or Implementation of an IT control and traceability system of food production and food products to monitor and intervene in case syncope's occur in the manufacturing process.

Recent incidents regarding food products' safety have led to a decrease in trust of consumers, even for foods considered the most inoffensive, thus regaining consumers' trust has become extremely important.

According to ISO 22000:2005<sup>1</sup> standard, food safety is „a concept according to which a food product should not be detrimental to consumers if it is prepared and/or consumed consentaneously with its meant use”.

According to general requirements specified in SR EN ISO 22000:2005, any company carrying on its activity in the food field must be sure that all possible hazards regarding the safety of a food product launched on the market are identified, assessed and controlled in such a way that the product delivered to consumers is safe, does not harm their health state (directly or indirectly).

Three objectives are reached by hazard analysis and identification of corrective measures as follows:

- Hazard and control measures' identification;
- Possibility of identification the changes needed by the technological process;
- Establishing the assessment basis of critical control points.

The HACCP system<sup>2, 3</sup>, developed by CCFH (Codex Committee and Food Hygiene) as part of the General Principles of Food Hygiene (General Principles of Food Hygiene Revised) is a preventive control system referring to the ensuring of food quality (it is based, primarily, on a system of preventive actions taken throughout the economic and technical circuit of the products, namely: supply - reception-storage - manufacturing - delivery).

The need to implement the HACCP system derives from the obligation of food business operators to demonstrate that they make and market only products safe for human consumption, in conformity with the specifications of product quality standards or other sanitary rules.

Along with the identification and registration of food safety hazards, there must also take place the identification of the stages in which the respective dangers can be inserted into the product. It is recommended, whenever possible, to also determine the acceptable level of the identified hazard, depending on the established legal and regulatory requirements, customer requirements related to food safety, intended use by the customer and other relevant data.

Each of the identified hazards must be assessed, so that after this operation there can be established whether elimination or reduction to acceptable levels is essential to obtain a safe product for consumption / use. Based on these evaluations, there shall be established the measures / combination of measures capable of preventing, eliminating or reducing these food safety hazards to acceptable levels defined by the food safety team and their control measures.

The measures must be managed / monitored by preliminary operational programs (PRPO) or The HACCP plan.

Risk analysis<sup>5, 6</sup> has to be applied specifically: for each enterprise, the raw materials and auxiliary additives be inspected; the technological process (including equipment and utensils with which the process takes place); the operators involved in

the realization of production; the environment in which the technological process takes place, including storage.

The aims of this paper it was to establish the monitoring systems for expanded cereal industry. Following this analysis, there were established the hazards for achieving food safety, the required degree of control as well as control measures monitored by preliminary operational programs (PRPO) or The HACCP plan.

### Experimentals

Monitoring is essential in food safety management, especially in the meat products industry since the basic raw material in this case has all kinds of dangers, respectively risks: microbiological, chemical, physical. To ensure the smooth running of the technological process, resulting in obtaining products characterized by a high level of food safety, the HACCP plan preparation and implementation at all stages of production is recommended.

For identifying the risks the analysis of cause effect was used and was applied the decision tree in accordance with SR EN ISO 22000:2005, the complete risk analysis also assumes their fair assessment (depending on the frequency and seriousness), this approach represents a key stage of the HACCP system because an inadequate analysis of the dangers can lead to the design of a HACCP plan, inoperative in practice.

Depending on the severity and frequency of the analyzed risk, the resulting risk class was established and, while taking these into account, the identification, analysis, assessment of hazards and establishment of preventive control measures was made.

### Results and discutions

The assessment of the appearance risk of the hazards consists in analyzing the probability of manifestation (frequency) of each identified hazard and their severity (seriousness), at the time of consumption of the food, considering that the control measures (or the preventive ones) have not reached their goal.

For the case of expanded cereals the risks have been identified and CCP have been established. Assessment of risks in CCP and the measures to be taken are summarized in Table 1.

*Table 1* HACCP plan for expanded cereals

<b>Description of PCC</b>	<b>Description of hazard for food safety that must be controlled</b>	<b>Control Measures</b>	<b>Critical Limits</b>	<b>Monitoring Methods</b>	<b>Corrections and corrective actions to be made when critical limits are broken</b>
<b>CCP1</b> Reception raw and auxiliary material	Chemical-mycotoxins, pesticides, washing powders, disinfectants	Control of documents (compliance statements, analysis bulletins, visual inspection, selection of	Limits established by EU and internal Regulations for each assortment	Control of documents Registration. Book of receptions (products in and supplier)	Refusal from reception of unconfornable batches. Change of supplier

Description of PCC	Description of hazard for food safety that must be controlled	Control Measures	Critical Limits	Monitoring Methods	Corrections and corrective actions to be made when critical limits are broken
		suppliers) Control of shipping conditions			
<p><b>CCP2</b> Storage raw and auxiliary material</p>	<p>Growth of microorganisms and development of toxins</p>	<p>Monitoring of storage conditions. Conformation to FIFO principle. Hygiene of storage space; Providing of circulation and control area between bings, shelves and walls; Functionality of refrigerating unit and temperature display system;</p>	<p>Temperature 2-25°C Refrigerating unit 2-4°C</p>	<p>Observation and manual and/or electronic registration of temperature-twice a day. System control by standard control thermometer . Recurrent control of hygiene status of storage areas by sanitation samples.</p>	<p>Control of temperature and humidity registration, immediate retrieval if necessary. Mending of refrigerating equipment Hygienization and re-organization of areas</p>
<p><b>CCP3</b> Storage finished product</p>	<p>Multiplication of microbial flora</p>	<p>Monitoring of storage conditions. Hygiene of storing area;</p>	<p>Temperature 2-25°C</p>	<p>Temperature registration twice a day Recurrent control of hygiene status of storage areas by sanitation samples.</p>	<p>Control of temperature and humidity registration, immediate retrieval if necessary. Hygienization of storage areas Staff retraining</p>

Quality management system is the means by which an organization defines and demonstrates the processes required to ensure that the product / service comply with customer requirements.

Planning is one of the basic functions of quality management. By planning establishes objectives in quality, human resources, financial and material resources needed to achieve them.

According to this definition, it had to establish all the control points **CP**, identified by applying HACCP Decisional tree are keeping under control by PRPo programme (table 2).

*Table 2* Operational PRP-s for expanded cereals

<b>Description of operational PRP</b>	<b>Description of hazard for food safety to be controlled</b>	<b>Control Measures</b>	<b>Monitoring methods</b>	<b>Corrections and corrective actions to be made if operational PRP-s are not under control</b>
<b>PRPO 1</b> Expansion	Presence of foreign items or pests in raw material; Baking time and vapor pressure	Visual inspection Conformation to working instructions for expansion of cereals	Conformation to baking time and vapor pressure Number of staples per animal Observation sheet	Control and removal of foreign items Staff retraining on working technique
<b>PRPO 2</b> Dosage aromas, dyestuffs	Over doses of food additives (aromas , dyestuffs) Contamination by microbial flora from working tools or operator's hands	Control of weighing sheets Hygiene of staff and tools	Functioning of balance, Hygiene of operator, protecting equipment and working tools Control of salubrity degree by sanitation tests	Metrologic control of balances Re training of operator from the working unit
<b>PRPO 3</b> Syrup boiling frosting	Presence of foreign items or pests in raw material Boiling temperature	Visual inspection Monitoring of boiling temperature	Presence of foreign items or pests is not allowed Sheets of measuring boiling temperature	Removal of foreign items or any other contaminated elements from syrup Staff training

### Conclusions

SR EN ISO 22000: 2005 standard is fundamental to food safety management. It allows each organization directly or indirectly involved in the food chain to identify all risks and controlling and removing them in an effective way.

Also, the standard requirements change the business approach of testing retrospective quality and risk a preventive way of thinking and acting, extremely efficient given that any organization that is part of the food chain have to face some tough requirements of the legislation and consumers.

HACCP is a very effective way to visualize the process of product development to identify potential hazards and risks that, in order to implement preventive and control measures for these risks and have a plan of correction and corrective action for Critical Control. In this respect, of great importance will be documenting the entire process.

Depending on the severity and frequency of the analyzed risk, the resulting risk class was established and, while taking these into account, the identification, analysis, assessment of hazards and establishment of preventive control measures was made. To get good results, you should look at the company implement HACCP as a tool, not as a goal, especially as an objective imposed by the control of the state.

By integrating HACCP with organizations in the food chain they were familiar, and through development of the standard in a form that is harmonized and compatible with the standard of quality management ISO 9001, ISO 22000 has become unbalanced system food, it is a way for organizations to have a safety management system universally recognized food can demonstrate the quality, safety and ability to prevent and eliminate danger.

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