Scientific Papers Series Management , Economic Engineering in Agriculture and Rural Development
Vol. 13 , Issue 1, 2013
PRINT ISSN 2284-7995 , E-ISSN 2285-3952

QUALITY MANAGEMENT OF BAKERY PRODUCTS: A CASE STUDY IN SC "DOBRE AND SONS" S.R.L. CONSTANTA- ROMANIA

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Abstract

The paper aimed to present the benefits of implementing HACCP (Hazard Analysis and Critical Control Points) to company S.C. "DOBRE AND SONS" S.R.L. Constanta, Romania. The data have been provided by the above mentioned manufacturer. The objectives of S.C. "DOBRE AND SONS" S.R.L. are protecting the health of the consumers of the products and their satisfaction regarding the consumption of products that are nutritional, tasty, fresh, free from microbiological, chemical and physical hazard, as well as possessing stable properties during the validity for consumption. In this respect, there has been implemented and maintained an integrated management system of food quality and safety according to SR EN ISO 9001:2008, SR EN ISO 22000:2005 and according to IFS standard, version 5/2007, which consists of determining the potential biological, chemical and physical hazards that might affect the safety of bread and bakery products, or the health of the consumer. HACCP team is analyzing hazard using one of the recommended techniques: brainstorming or the cause - effect diagram. In conclusion, the company S.C. "DOBRE AND SONS" S.R.L. Constanta, Romania provides awareness and employee involvement at all levels in achieving the appointed objectives.

Key words: *quality management, bakery products, Constanta, Romania*

INTRODUCTION

Considering that the company slogan is "A good taste is never forgotten", it aimed that the products obtained in the organization would reach the approved and required quality level, would be safe in terms of health and hygiene and in accordance with national regulations. Top management has ensured that the principles stated in the organizations policy are translated into specific measurable goals for each department of the organization and that the responsibilities and timelines for achieving these objectives are defined and communicated to the employees involved in each department [1].

MATERIALS AND METHODS

To ensure the implementation of HACCP, critical control points (CCP) and points of attention (PA) have been identified using the methods: brainstorming and cause – effect diagram. It is substantial that Critical Control Points (CCP) and Control Points (CP) (or Points of Attention, PA) are not to be confused. The difference between them lies in the answer to the question: "If the phase steps out of control, is it possible that this would endanger the health or life of the consumer?" If the answer is YES then one talks about CCP, and if the answer is NO, one talks about PA. Manufacturing technologies of bakery products and specialties may vary in terms of the risk of hazard and points (steps, operations) which are critical control points. This may be due to differences in terms of: location of the section, machinery and equipment, raw material selection, materials and ingredients. Research on determining PA and CCP has established itself as a must as some fresh bakery products were not consistent in organoleptic and sanitary terms.

RESULTS AND DISCUSSIONS

CCP determination is a complex process that applies to all types of biological, physical and chemical risks by analyzes and debates held in the HACCP team. The various manufacturing

technologies of the same food product may differ in terms of risks of hazard and points / stages / operations that form CCP.

Depending on the severity and frequency of the analysed risk, the risk class is determined (1, 2, 3 or 4) resulting from the intersection of these two elements, using the table as outlined below.

Table 1. The severity and frequency of the risks

Severity	Frequency (in the final product; at intake)		
High	3	4	4
Medium	2	3	4
Low	1	2	3
	Low	Medium	High

The assessment of risk of danger is to analyze the probability (frequency) of each identified hazard manifestation and their severity (severity), on food consumption, considering that control measures (or preventive ones) have not reached their goal. Such an assessment provides a quantitative ordering of hazards, followed by the application of HACCP decision tree to identify critical control points of significant risks, which typically come in grades 3 and 4. Stages of flow diagrams identified as critical control points are addressed in the HACCP plan for each product. Implementation of HACCP involves inserting a system of documents and records to confirm all data and information related to the safety of the manufactured products, to reflect the severity of the risks, the methods used for their supervision and measurements obtained in the CCP [2].

Table 2. Flow chart - white bread

STAGE	PROCESS	DESCRIPTION
1. CCP	Quantitative and qualitative reception of raw and auxiliary materials: flour, yeast, water, salt, etc.	Raw materials are received in quantity and quality by the Commission of reception, checking the accompanying documents (invoice, data sheets, physico-chemical and microbiological analysis bulletins), checking compliance with Product Description. Storage Card is drawn and then operated in the accounting software.
3.	Storage of raw and auxiliary materials: flour, yeast, water, salt, etc.	Raw materials are stored on pallets in the food commodities area of the raw materials warehouse, located within the production unit. Material use in production will respect the principle of FIFO (first in, first out). Temperature and humidity in storage will be monitored in the Register of temperature / humidity storage by the working time manager, 3 times a day.
4. CCP	Sifting flour	It is mandatory that flour be sprinkled by passing it through a sieve with 7-8 metal mesh / cm or magnet sifter. This control screening removes any possible impurities, ensuring the purity of flour. Vibrating sifter is used.
5.	Emulsification of the yeast	Before use, compressed yeast is dissolved in warm water, forming suspension in order to achieve a uniform distribution of bacterial cells in the semi-finished mass which undergoes fermentation, and thus, a uniform raising of the dough, or bread. For making yeast *the simple mechanical agitator* is used.
6. CCP	Iodized salt dissolution	The saturated salt solution is prepared, which was filtered before use. Salt preparation is done using solvents as agitator, or using a continuous dissolving installation. The amount of salt is determined from the production recipe
7.	Tempering water	Process water must be heated to a certain temperature, usually ranging between 25 º -35 º C, depending on the necessary temperature for dough, flour temperature and working season.
8. CCP	Raw and auxiliary materials dosage	Is done by dosing water in the quantities specified in the recipes for making the product
9.	Kneading	Previously prepared and dosed ingredients are introduced into the mixer in the following order: water, flour, salt, yeast. - Kneading is performed by the working time manager. - Kneading of the ingredients is performed with the mixer for 15-20 min
10.	Ferment	Fermentation is done in order to obtain well loosed dough, resulting in a well-bred product. Temperature at which the fermentation is performed is 30-32 ºC for dough. The duration of fermentation is longer for leaven 120-150 min. and 20-30 min for dough.
11.	Dividing dough	- The piece of dough is weighed and divided into portions corresponding to the nominal mass of the product. - Weight-checking takes place piece by piece by using the scale at partition -The division is made in the manufacturing of bread, with uninterrupted machines or by hand.
12.	Pre-shaping / mechanical shaping	The dough is divided into two pieces, and each piece is round shaped. The shaping operation allows the achievement of both aesthetic form of the product and a uniform core structure by eliminating large gaps formed during fermentation.
13.	Pre-yeasting	This operation is achieved by keeping in standby, in appropriate microclimate conditions, pieces of dough after dividing and preshaping. Pre-yeasting duration is of 5-8 min, in a conditioned atmosphere, with temperature around 30 º C and relative humidity of 75%.
14.		Final yeasting must be conducted in a warm and humid environment, with

STAGE	PROCESS	DESCRIPTION
	Final yeasting	temperatures of 35-40 ° C and relative humidity of 75-80%. The final acidity of the piece of dough 3-3.5 degrees.
15. CCP	Baking	Baking takes place in the oven with temperature monitoring, time is set according to weight: 15 min and the oven temperature is 280 ° - 29 °C; Baking stage is a critical control point and temperature and baking time are being monitored, data is recorded in the Temperature Register. Removing the products is done by hand, the product must have a beautiful look, with the typical colour of a well baked product.
16. CCP	Cooling	Cooling occurs at a temperature of 18-20 ° C. There must be sufficient ventilation and relative air humidity of 65-70%.
17.	Crate washing and drying	Crates are washed, dried and properly sanitizes without residual detergent or other debris left on them.
18.	Packing	Packing is carried on in adequate hygienic conditions and washed packaging (crates) are used, dried and sanitized.
19.	Storage	In the finished product warehouse, on rack, for 1-2 h
20.	Delivery (and transport)	Are done following the principle of FIFO, with means of transport that are suitable in terms of health and hygiene

Technological flow must follow the path of raw materials from their point of entry into the production unit, throughout the manufacturing process, the route of the semi-finished products, of residual waste, of by-products up to the final product. On these routes will be identified the microbiological, chemical and physical hazardous risks to the safety of the bakery products. Identifying the critical control points lead to the additional safety measures, as follows:

• An additional mesh sieve and magnet sifter have been installed at the outlet of flour in the mixer bowl to retain physical impurities;

• The duration of dissolving of salt in water has been increased and the number of filters through which saline solution passes has also been increased;

• Scales were replaced with more efficient ones;

• Baking temperature is monitored at shorter intervals;

• For a better cooling of bread the technological line has been changed by passing the cooling belt - which was located above the oven - in its sequel, in a better-ventilated space.

The review of the system is a periodical, well documented evaluation of activities included in HACCP plan in order to change it when necessary (i.e. when there are changes in raw materials, the manufacturing recipes, the production conditions, the conditions of storage or distribution, new scientific information about contaminants, changes in product use, the inefficiency of the system established on the checking route).

CONCLUSIONS

1. HACCP approach to food safety assurance shifts the attention from finished product testing to the control of the process and raw materials.
2. The study revealed that the production of bakery products is subject to a variety of risk factors during the technological flow.
3. HACCP monitoring system is an effective framework for determining risk factors in the production of bread.
4. Implementation of HACCP system provides benefits to society and consumers as a preventive method of quality assurance.
5. Implementation of HACCP system helps reduce scraps and customer complaints and allows to extend the validity of the products.
6. By improving product quality, customer and employees confidence in the company are increased, as well as in its ability to achieve only quality products, consistently representing a way to withstand the increasing competition.
7. Implementation of HACCP system helps to improve company image and credibility on international markets and to potential investors.
8. Key elements of the manufacturing process must be continually monitored and controlled, enabling implementation of corrective measures on time.
9. Benefits are besides food safety of the manufactured products, a better use of resources and a faster response to problems arose in production.
10. For an effective implementation of HACCP program, staff training and consumer awareness regarding HACCP principles and applications are essential.

11. Compliance with legislative requirements of Romania, EU and the world regarding food safety.

ACKNOWLEDGEMENTS

The research was carried out with the support of the trader SC "DOBRE AND SONS" S.R.L. Constanta, Romania.

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