

Effectiveness of the machines maintenance and processes

Monography

Editing and scientific elaboration

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ISO 22000: INTERNATIONAL STANDARD IN FOOD SAFETY MANAGEMENT IN THE PRODUCTION OF BREAD WITH ADDITIVES

Abstract: The proposed research shows the necessity of applying the rules of HACCP to baking production on the example of mixed bread with additives (vital gluten, vitamin C). To this end, a 12-stage procedure in accordance with the seven rules of Codex Alimentarius (and also of the HACCP system) was conducted. The result was meeting with the legal requirements (hygienic packet), with special emphasis placed on the analysis of potential hazards. Four critical control points were determined (CCPs), along with the methods of their verification and its frequency. What followed was defining the necessary corrective actions and the methods of the system's audit (Codex Alimentarius, 2003), (PN – EN ISO 9004:2001).

Owing to the very recent introduction of norm ISO 22000, the proposed research has a significantly innovative character and are demonstrative in nature for most baking plants in Poland.

Key words: PN – EN ISO 22000:2006, Food production, system HACCP

9.1. Introduction

ISO 22000 is a norm issued by the International Organization for Standardization in September 2005, and it is applied to the food industry. Since 2006 there exists also the Polish Norm PN-EN-ISO 22000:2006 compliance with which is supposed to ensure high quality and, more importantly yet, safety at consuming various foods (PN – EN ISO 22000:2006).

ISO 22000:2005 is a system directed at producers of food and additives, as well as of packages, wholesalers and retailers in the food industry, logistics and transportation companies.

The norm constitutes International Standard (IS) referring to food safety,

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and created for all participants in the given “food chain” ranging from the basic producer to the final consumer.

As such, the norm directly concerns the following links within the chain:

- Producers of food and fodder.
- Transport and storage of food and fodder.
- Distribution companies (warehouses, wholesalers).
- Producers of food additives.
- Producers of equipment, machines and devices.
- Packages for the contact with food.
- Hygienic measures (GHP, HACCP).
- Servicers (hygienic services, DDD)
- Basic (farm) producers.

It can be asserted that the international norm PN-EN ISO 22000:2005 blends in itself norms ISO of the 9000:2000 series and the HACCP system. The relation to norm ISO 9001:2000 stems from the fact that the most effective systems in the field of food safety are those which work within the framework of a constructed management system and are included in the organizations’ activities related to management. This ensures maximum advantage for the organizations and the involved sides (PN – EN ISO 22000:2006), (PN – EN ISO 9000:2001).

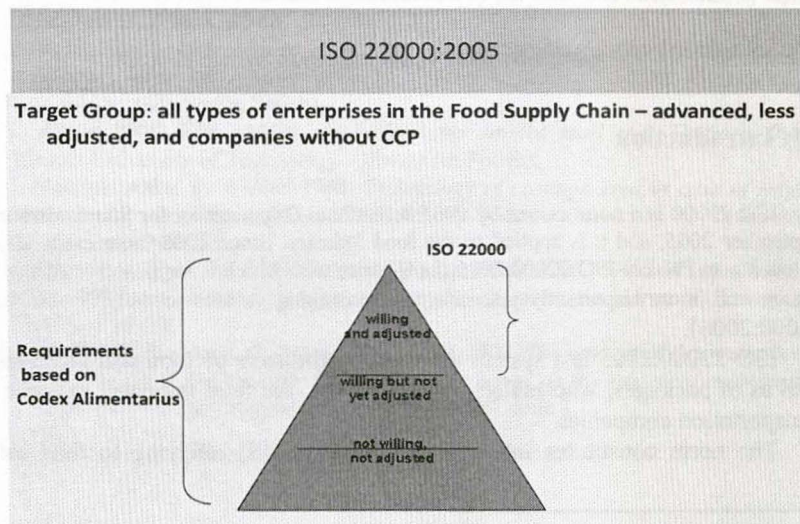


Fig. 9.1. Requirements in the food supply chain.

Source: (Kowalska J. 2006)

Norm ISO 22000, similarly to norms from the ISO 9000 family, introduces the notion of the process approach and process management, however, ISO 9001 and ISO 22000 have disparate applications:

- ISO 9001: ensures the organization's ABILITY to achieve the professed goals,
- ISO 22000: ensures FOOD SAFETY.

9.2. General characteristic of norm ISO 22000

Norm PN – EN ISO 22000:2005 was prepared in accordance with the plan of norm ISO 9001, with the aim of improving the compatibility of the two norms. ISO 22000:2005 integrates the rules of HACCP system. With the aid of controllable requirements, this norm blends the HACCP plan with the Preliminary Rules Programs (PRPs). Hazard analysis is the key to effective system of food safety management, since conducting a hazard analysis helps in ordering knowledge essential to introducing an efficient combination of supervisory measures.

Norm ISO 22000:2005 requires that all hazards which can be expected to occur in the food chain be identified and estimated. The purpose of preparing the norm ISO 22000 is global harmonization of requirements in the area of **FOOD SAFETY MANAGEMENT** in all links of "food chain."

Norm ISO 22000:2005 meets the requirements of: 7 rules of Codex Alimentarius, 12 stages of the HACCP system, the norm, legal regulations (hygienic packet – Fig. 9.2).

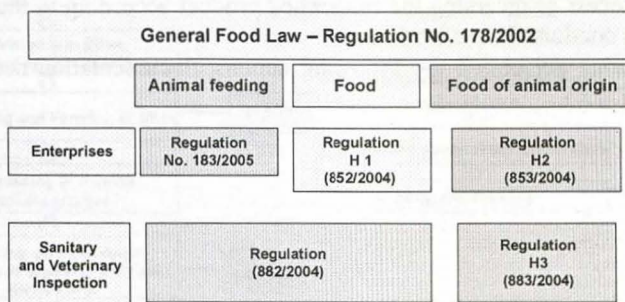


Fig. 9.2. Requirements in the Food Supply Chain.

Source: (www.europa.eu)

The content of norm ISO 22000:

1. Range.
2. Reference documents.
3. Terms and definitions.
4. System of food safety management.
5. Management responsibility.
6. Resource management.
7. Planning and realization of safe products.
8. Verification, validation and perfecting of the SZBŽ.

Attachment A: Common elements of ISO 22000:2005 and ISO 9001:2000

Attachment B: Common elements of ISO 22000:2005 and HACCP

Attachment C: Requirements of Food Codex with regard to particular sectors (PN – EN ISO 22000:2006).

9.3. The application of the norm ISO 22000 in the production of rye bread with additives

As has already been mentioned in Part I, the stages and rules of the HACCP system constitute the basis of norm ISO 22000, therefore, they need to be meticulously described during the process of their implementation.

After having established HACCP team, this team describes the product, its future application, prepares a technological schema and analyses CCPs.

Further on technological schema of the researched product was presented below: „Rye bread with additives” (Fig. 9.3).

Then, in compliance with the prepared procedure, taking account of the requirements of the so-called Nottermans Tree, analysis of CCPs likely to occur during the process of receiving the researched product according to the worked-out scale was conducted.

After having performed the following actions, documentation needs to be prepared (Fig. 9.4).

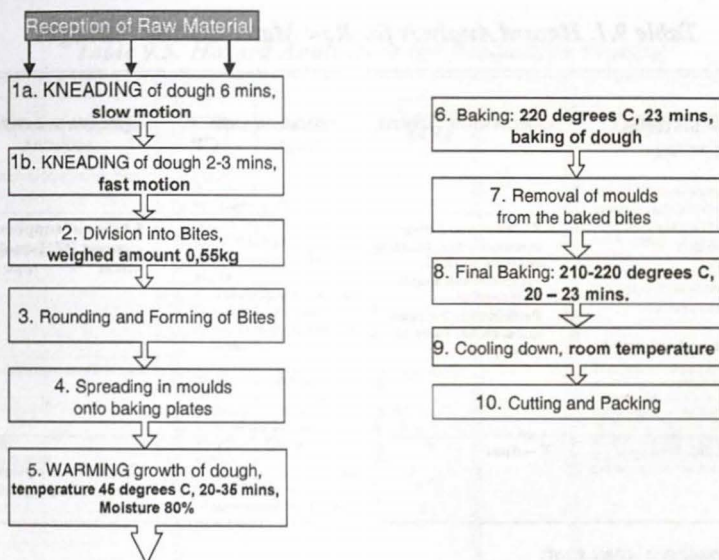


Fig. 9.3. Technological schema of rye bread with additives.

Source: authors' own study

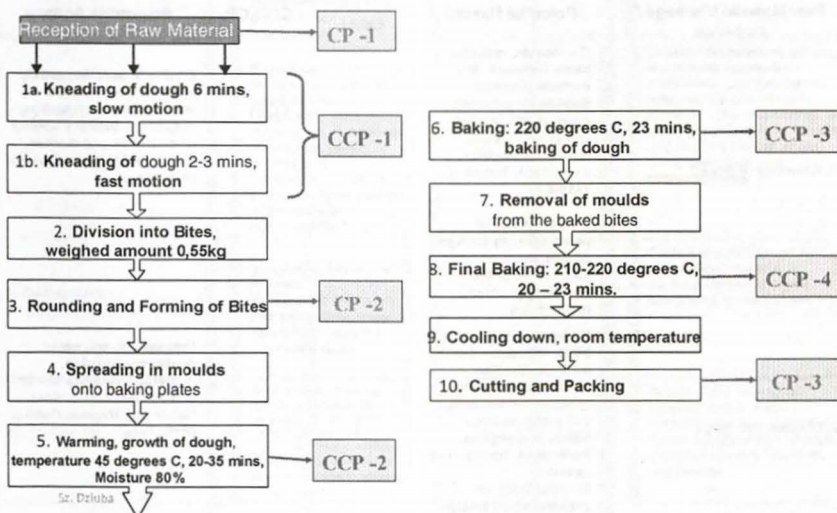


Fig. 9.4. Technological schema of rye bread with additives with Control and Critical Control Points.

Source: authors' own study

Table 9.1. Hazard Analysis for Raw Materials and Packages

Raw material, package	Potential hazard	Risk level	CCP, CP	Preventive Actions
1. Receiving the raw material: 1.1. flour 1.2. yeasts 1.3. potato starch 1.4. salt 1.5. fruit and vegetable	B – insects and their remnants, M – bacteria (Bacillus subtilis, magaterium), musts (Aspergillus, Penicilium), F – sand, glass, rocks, roots of other plant	3	CP- 1	Choice of supplier, current PZH quality attest
2. Water	-	-	-	-
3. Packing foil	F – dust	1	-	Choice of supplier, current PZH quality attest

Source: authors' own study

Table 9.2. Hazard Analysis in the Production Process

Raw Material /Package / Activities	Potential Hazard	Hazard Level	CCP, CP	Preventive Actions
1. Kneading of dough	B – insects, rodents, birds, leftovers, M – bacteria (Bacillus Subtilis Megaterium type), putrid bacteria, coli group bacteria, musts (Aspergillus, Penicilium), Torulla type yeasts F – possibility of penetration by foreign bodies, dust; parameters of the Kneading process, temperature	4	CCP-1	Choice of supplier, quality attest, process control, water quality examination, Hygienic – Sanitary Control of machines and devices, Health and Hygiene Control of the Crew
2. Division into Bites	B – insects, rodents, birds, leftovers, M – bacteria (Bacillus Subtilis Megaterium type), putrid bacteria, coli group bacteria, musts (Aspergillus, Penicilium), Torulla type yeasts F – possibility of penetration by foreign bodies, dust; the weight of a single bite	2	-	Process control, water quality examination, Hygienic – Sanitary Control of machines and devices, Health and Hygiene Control of the Crew

Source: authors' own study

Table 9.3. Hazard Analysis in the Production Process

Raw Material /Package / Activities	Potential Hazard	Hazard Level	CCP, CP	Preventive Actions
5. GAROWANIE – the growth of the dough	B – insects, M – bacteria (Bacillus Subtilis Megaterium type), molds (Aspergillus, Penicilium), Torulla type yeasts F – possibility of penetration by foreign bodies, dust; parameters of the process – moisture	6	CCP-2	Constant temperature control, maintaining appropriate parameters, process control, water quality examination, Hygienic – Sanitary Control of machines and devices, Health and Hygiene Control of the Crew
6. Baking baking of bread	B - insects, rodents, birds, leftovers, M – bacteria (Bacillus Subtilis Megaterium type), molds (Aspergillus, Penicilium), Torulla type yeasts F – possibility of penetration by foreign bodies, dust; parameters of the process: temperature, time	6	CCP-3	Constant temperature control, maintaining appropriate parameters, process control, water quality examination, Hygienic – Sanitary Control of machines and devices, Health and Hygiene Control of the Crew, prevention from microorganisms
7. Removal of moulds from the baked bites	M – bacteria (Bacillus Subtilis Megaterium type), molds (Aspergillus, Penicilium), Torulla type yeasts; F – possibility of penetration by foreign bodies, dust	-	-	Hygienic – Sanitary Control of machines and devices, Health and Hygiene Control of the Crew, prevention from microorganisms
8. Final Baking	B - insects, rodents, birds, leftovers, M – bacteria (Bacillus Subtilis Megaterium type), molds (Aspergillus, Penicilium), Torulla type yeasts F – possibility of penetration by foreign bodies, dust; parameters of the process: temperature, time	6	CCP-4	Constant temperature control, maintaining appropriate parameters, process control, water quality examination, Hygienic – Sanitary Control of machines and devices, Health and Hygiene Control of the Crew, prevention from microorganisms
9. Cooling down	B - insects, rodents, birds, leftovers M – bacteria (Escherichia coli, Salmonella, Shigella, Thamnidium aurantiacum – colourful spots)	1	-	Control of conditions of storing and cooling, Hygienic – Sanitary Control of rooms designated for cold stores
10. Cutting, Packing	B - insects, rodents, birds, leftovers, M – bacteria (Escherichia coli, Salmonella, Shigella, Thamnidium aurantiacum – colourful spots), moulds, yeasts (chalk spots)	3	CP-3	Choice of the packages' supplier, quality attest, hygienic – sanitary control of rooms designated for storage, control of packing machines and devices

Source: authors' own study

Table 9.4. Table of all Control Points (CPs)

CP location	Monitoring	Frequency	Corrective actions
1. Receiving the raw material, flour, yeast, potato starch, salt, vegetable and fruit	Controlling the raw material according to the norm, laboratory analysis	Each supply Once in a quarter	Evaluation of the supplier, Replacement of supplier
2. Rounding and forming of bites	Control of the devices' efficiency, hygienic – sanitary control	Constant	Repairs, trainings
3. Cutting, packing	Control over complying with the hygienic-sanitary rules, control of protections against penetration by foreign bodies, control of rooms	Constant Once a week	Eliminating disparities, Enhancement of protections' efficiency

Source: authors' own study

Table 9.5. Table of all Critical Control Pints CCPs

Location and number of CCP	Supervision method	Frequency	Toleration border	Critical value	Corrective measures
Kneading of the dough CCP 1	Laboratory control, organoleptic control	once in a quarter, constant	according to the norm and good practice of production	Borderline norm's values, bad texture of the dough	Corrective procedures admissible in the production process, rejection of further production
Warming CCP -2	Time control, Temperature Control, Moisture Control	Constant	time: 20-35 mins, temperature 45 degrees C, moisture 80%	Borderline values	Parameters regulation
Baking, baking of bread CCP -3	Time control, Temperature control	Constant	time: 20-25 mins, T 220 degrees C	Borderline values	Parameters regulation
Final Baking CCP- 4	Time control, Temperature control	Constant	time: 20 – 25 mins T=210-220°C	Borderline values	Parameters regulation

Source: authors' own study

Table 9.6. Verification of all Critical Control Points (CCPs)

CCP number	Verification Method	Verification Frequency	Corrective actions
CCP-1	Evaluation of production conditions, technical inspection of the device	Constant	Replacement of devices, Regulation, Trainings
CCP-2	Control of the technological card during production, Technical inspection of the device	Constant	Introducing modifications on the parameters, Replacement of devices
CCP-3	Technical inspection of the device	Constant Once a week	Cleaning, Regulating, Replacement of devices
CCP-4	Technical inspection of the device	Constant Once a week	Cleaning, Regulating, Replacement of devices

Source: authors' own study

9.4. Summary

The goals of ISO 22000 implementation

The requirements of the norm are supposed to help the organization in the following spheres:

- providing final products which do not pose any threat to the consumers' health,
- assessing and estimating the consumers' expectations,
- demonstrating how to successfully communicate with clients,
- demonstrating how to adjust to and meet legal requirements with regard to food,
- ensuring adherence to the self-determined policy of food safety.

Benefits of implementing norm ISO 22000

- systematization of actions related to the production of safe foods,
- introducing an efficient communication between all elements of the food chain,
- improving food safety and decreasing the risk of transmitting diseases,

- increasing the clients', contractors', and suppliers' trust,
- efficiency at conducting a systematical analysis with the aim of hazard elimination,
- compliance with the EU General Food Law,
- international certificate, acknowledged in Poland, Europe and other countries.

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