

**Piotr Lizakowski**

Faculty of Command and Naval Operations, Polish Naval Academy  
of the Heroes of Westerplatte, Gdynia  
e-mail address: piotrl@interia.pl

## **QUALITY AND FOOD SAFETY MANAGEMENT SYSTEMS**

### **Abstract**

This article provides information about the good manufacturing practices used. Those in which chemical, physical and microbiological hazards are prevented. The principles of GHP and GMP play a key role in food safety, their implementation is preceded by the introduction of the HACCP system principles in the plant.

**Keywords:** system, management, quality, safety, food, good practices

## **Introduction**

Good practices are steps taken at all stages of food production and marketing in order to ensure its safety. Their use can prevent chemical, physical and microbiological hazards and are treated as a condition for the implementation of other quality systems. Good practices are different Prerequisite Programs, which include Good Manufacturing Practice, Good Hygienic Practice, Good Laboratory Practice, Good Transport Practice, Good Distribution Practice, Good Veterinary Practice, Good Agricultural Practice and Good Catering Practice. The principles of GHP and GMP play a key role in food safety, their implementation is preceded by the introduction of the HACCP system principles in the plant. The obligation to introduce GHP and GMP rules in Poland has existed since 2000.

### **1. Development and implementation of the GHP program - Good Hygienic Practice**

Each plant is obliged to develop and implement a GHP program, ie Good Hygienic Practice. It should take into account the specificity of the company's operations and its organizational structure. Areas of GHP operation include the location, environment and infrastructure of the plant, its

functional system, machinery and equipment, water supply, washing and disinfection process, waste, pest control, employee training, employee hygiene and keeping records and records. According to GHP requirements, the site should have been properly located so that it can be protected against the negative influence of the surroundings. Production rooms must be easy to keep clean, their distribution must be laid out so that the crossing of clean and dirty activities does not occur. They must have adequate ventilation, lighting, temperature and humidity adapted to the activities performed, should be equipped with hand-washing basins. Toilets must be separated from the production area, the sewage system must be properly designed to avoid food contamination. The plant should be divided into high, medium and low risk zones depending on the processes and threats that occur. This is to serve employees so that, depending on the zone they are in, they adhere to appropriate hygiene regimes. All machines, devices, dishes and packaging in contact with food must be made of materials admitted for contact with it. In addition, the materials used for machinery and equipment must be durable, smooth and easy to clean. It is required to develop a schedule for the maintenance of machinery and equipment and their calibration. The washing and disinfection process should be carried out in accordance with the prepared schedule. Cleaning and disinfection

procedures using appropriate equipment and means must be carried out by trained personnel. Surveillance of their effectiveness should be carried out [1].

The plant should have a water intake, keep it clean or use water from the aqueduct. Water quality must be regularly monitored, and the results, including those received from the State Sanitary Inspection, are recorded. The plant should have a reliable waste disposal system that should be collected in appropriate places, outside the rooms where food is located, and then removed in accordance with the agreed schedule. Waste containers must be properly labeled, made of impermeable materials, easy to clean and disinfect. Bins inside the plant must be provided with disposable bags and flaps enabling opening without hands. Each plant must have a pest control and monitoring system and a safeguard program. It is necessary to supervise the proper functioning of the devices and traps used to neutralize pests.

The management of the plant should organize systematic training for employees. Raising staff awareness and qualifications are the main factors decisive about their appropriate attitude and commitment. Employees must meet the requirements for personal hygiene and demonstrate the required state of health. In the case of illness or injury, they should be immediately removed from work requiring contact

with food. In addition, they should follow the hygiene rules before and during work, and wear appropriate protective clothing and footwear. They cannot wear jewelry, watches, hair ornaments and other items that may endanger the consumer if they enter the product. The duty of employees employed in the production of food or in trade is to have up-to-date medical certificates for sanitary and epidemiological purposes [2].

GMP or Good Manufacturing Practice is "actions that must be taken and conditions that must be met in order to ensure that food production is carried out in a way that ensures its proper health quality, according to its intended use" 130. The issues related to GMP include the acceptance of raw materials and materials, storage and handling of raw materials, pre-treatment and basic processes, internal transport, storage of finished products as well as external transport and product distribution. Regarding warehouses, they should ensure conditions that guarantee the highest quality of food and protect it from contamination. They must be designed to maintain order, prevent the entry of pests, provide segregation or separate storage of particular types of food, raw materials, packaging and non-food substances, as well as the application of the FIFO principle, i.e. first in, first out. Raw materials and materials at the time of acceptance should be inspected in terms of their assessment for contamination and compliance with the

specification. Individual lots must have appropriate approvals or certificates, accepted raw materials must be stored in appropriate conditions. Internal transport should ensure proper protection against pollution by keeping the means of transport, containers and packaging clean, as well as ensuring, if necessary, the right temperature and short transport time [3].

The documentation prepared in the scope of GMP should be legible and carefully made, which will allow to avoid errors that could arise during the oral transmission and make it possible to reconstruct the history of the party. Each documentation must be updated on a current basis and dated and signed. The basic documents include procedures, technological instructions, specifications of raw materials and materials as well as finished products, reports and operational documents. A full and efficient system of documentation and records is proof that all necessary procedures are followed and properly implemented. GMP contains principles and necessary conditions to meet in order to supervise the entire food production process, which will avoid contamination and guarantee the highest quality of the product.

## **2. System HACCP**

The HACCP system is the Hazard Analysis and Critical Control Points system mentioned in Chapter I. The definition is

given in the Act of 11 May 2001 on health conditions of food and nutrition<sup>131</sup>, which defines it as "a procedure aimed at ensuring food safety by identifying and estimating the scale of threats from the point of view of food health quality and risk of hazards during all stages of the process production and marketing of food; this system is also aimed at defining methods for mitigating hazards and determining corrective actions. "Codex Alimentarius, on the other hand, describes HACCP as a system that identifies, assesses and controls threats important for food safety. It is an effective tool for controlling and improving food safety. HACCP is based on two pillars - analysis of biological, chemical and physical hazards and determination of critical control points. It is important to shift attention from the quality assessment of the final product to the preventive aspect, which consists in carrying out the control of finding critical food production points and taking into account the risks at individual stages of production. Identifies and establishes corrective actions in the event of a food safety threat [4].

From the day Poland became a member of the European Union, hence from 01.05.2004, the implementation of the HACCP system in all enterprises involved in the production or marketing of food has become an obligation whose non-performance is punishable by a fine.

The implementation of the HACCP system in an enterprise can be divided into stages, the first is the written construction by the management of the policy on ensuring health safety of manufactured products and system implementation. Also, the area of application of the system and the hazards that may occur in the plant on the production line are determined [5]. Then, the HACCP team is formed, which usually consists of three to five competent and trained people. The appointment should have an official character and result from the decision made by the management of the plant<sup>134</sup>. The next, third stage is to prepare a product description with the exact specification. The description should include the raw material composition, microbiological features, type of technology used, storage conditions and the purpose of the product and the definition of the consumer group. The fourth stage is to develop a scheme of the technological process, which should include all phases of the production process, from the adoption of raw material to distribution and the final customer. For each production stage, parameters such as: method, time and heat treatment temperature, the method of monitoring and controlling individual activities and storage conditions must be specified. In the next, fifth stage, verification of the technological process scheme is carried out in the presence of HACCP team members. Its aim is to

confront a documented technological process with a working production line in order to make appropriate corrections in case of discrepancies. The next stages from the sixth to the twelfth are the principles of the HACCP system discussed below.

The HACCP system consists of seven principles, which should not be treated as a rule, but as mandatory tasks to be performed during system implementation. The first principle is to conduct a threat analysis that will identify and assess all possible hazards that may occur at each production level and affect the safety of the product. They should be characterized in terms of their rank, degree of threat and impact on product safety, and determine control measures and methods to counteract threats. On this basis, the risk of their occurrence can be determined.

The second principle is to define Critical Control Points. On the basis of the previously performed Threats Analysis, critical points are determined, i.e. processes, stages or places where due to the risk of a threat, take any preventive or control measures to prevent their occurrence. A great facilitation in defining control points is the use of a "decision tree", which consists of a series of logical questions and guiding answers to determine the key places and stages of the production process.

The third rule provides for the establishment of critical limits consisting in assigning to each critical control point

measurable parameters that allow characterizing and assessing the correctness of a process or activity. Each parameter should have a fixed target value including acceptable tolerances. The most commonly used parameters are time, temperature, humidity, acidity and others.

The fourth rule is to develop a monitoring system for each checkpoint. It consists in continuous supervision of current production control and systematic measurement of set parameters. This system should quickly detect any deviations exceeding the accepted tolerance limits. All results from the monitoring activities carried out must be documented.

The fifth principle is to establish corrective actions, i.e. to adopt for each checkpoint appropriate measures in case of deviations. Specifically, this is the development of a way to deal with a batch of a product that is suspected to have been produced contrary to the established standard. This study should include, in addition to the description of the activities, the persons responsible for carrying out these activities. Also in these cases, all deviations and actions taken must be documented [5].

The sixth rule is the establishment of verification procedures, i.e. checking that the HACCP system is properly developed and implemented and that it achieves the correct results. Verification is carried out periodically, most often in

the form of an audit, and it consists in the examination of the finished product, reviews of HACCP records and plan as well as all control points along with their parameters. A report is prepared from the conducted audit, which may contain information on inconsistencies which the person responsible for a given area should take a position on.

The seventh principle provides for the development of a documentation system, which should consist of the HACCP Book, system procedures and instructions as well as records and records of the measurements made. The HACCP book should contain data about the company, that is its objectives and tasks, quality policy and organizational structure, detailed information on waste management, water and sewage management, pest control, principles of employee hygiene, training program, handling procedures with non-compliant products, complaints, as well as related to the maintenance and calibration of machines on the production line and the description of the HACCP138 system. The documentation should be clear, transparent, understandable, each document must be easily identified. The circulation of documents must be supervised.

The implementation of the HACCP system results in a significant improvement of working conditions, streamlining production, increasing the discipline of employees and

improving cooperation between them, as well as ensuring that the company has done everything to ensure the safety of the product [6].

### **3. System ISO 22000**

The ISO 22000 system is an international food safety management system. The project was created in 2001, but only after refining by the Technical Committee in 2005 obtained the status of International Standard ISO 22000: 2005. In the same year in Poland, it obtained the status of the Polish Standard PN-EN ISO 22000: 2005 and was published in the Polish version in May 2006 under the name "Food safety management systems. Requirements for every organization belonging to the food chain. "The aim of the international standard was to achieve harmonization at the global level, to facilitate the establishment wishing to obtain an integrated and coherent food safety management system. The main goal was to focus the processes taking place in the plant on the proper management of food safety.

The ISO 22000 standard contains eight chapters, the first three describe the standard, and the subsequent chapters from the fourth to the eighth contain requirements related to system certification. The fourth chapter describes general and documentation requirements related to food safety

management. The fifth chapter presents issues related to managerial responsibility, with particular emphasis on its involvement, as well as the issues of system planning, communication, management review, and adequate response to crisis situations.

The ISO 22000 standard combines the HACCP system, good practice requirements (GMP, GHP, GDP and others). It is based on ISO 9001 (Quality Management System), ISO 14001 (Environmental Management System), also contains requirements of the BRC143 system. The requirements of the standard allow for planning, implementation and improvement of the management system, the purpose of which is to provide consumers with safe food. They also help to implement their own security policy, ensure efficient and effective communication among all parties involved in the food chain, as well as assess consumer requirements and participate in tenders.

The ISO 22000 system is addressed primarily to food and packaging producers, wholesalers and shop owners as well as catering establishments, hotels and other companies connected directly or indirectly with the food branch, i.e. transport, storage, etc. Implementation of the ISO 22000 system entitles you to apply for a certificate which is a recognized document around the world. Having a certificate increases the brand and

the image of the plant and contributes to the increase of trust by customers. It is proof that the plant is very responsive to its activities and provides access to safe food. Also for small and medium enterprises, having a certificate is a pass to enter and enter the foreign market [1-6].

## **Conclusion**

Determinant of safe food is the washing process involving the removal of deposits, physical and chemical contamination, microorganisms and preparation of the surface for disinfection. Disinfection is a process that eliminates pathogenic microorganisms by appropriate means. Detailed information is contained in the cleaning and disinfection procedures as well as the instructions developed in the plant based on information obtained from the manufacturer or distributor of washing and disinfecting agents. Procedures and instructions determine the time and place of the process, the type of measure, its concentration and operation, the rules of conduct and the person supervising the process. The main stages of cleaning and disinfection are: preparation or preliminary rinsing removing remains, cleaning with chemicals, rinsing, disinfection, subsequent rinsing and drying. The chemicals used for cleaning and disinfection must meet the requirements

contained in the regulations, should be selected for the type of contaminants present, as well as surfaces and be stored in a designated room for this purpose. Verification of the effectiveness of cleaning and disinfection is based on visual assessment and on conducting appropriate tests confirming microbiological and chemical purity. In the case of a negative assessment, a second washing is carried out.

The disposal of waste generated during production is of great importance for food safety. It should be done efficiently and selectively, minimum once a day from production rooms. Accumulation until permanent removal should be done in specially designed containers placed in a designated place, protected against the entry of pests, separated from the production premises and intended for storage. Containers for collecting waste must be marked, sealed and easy to clean and disinfect.

## **References**

1. Bata, D., et al. "Cost of GHP improvement and HACCP adoption of an airline catering company." *Food control* 17.5 (2006): 414-419.
2. Ko, Wen-Hwa. "The relationship among food safety knowledge, attitudes and self-reported HACCP practices in restaurant employees." *Food control* 29.1 (2013): 192-197.

3. Freeman, M. C., Greene, L. E., Dreibelbis, R., Saboori, S., Muga, R., Brumback, B., & Rheingans, R. (2012). Assessing the impact of a school-based water treatment, hygiene and sanitation programme on pupil absence in Nyanza Province, Kenya: a cluster-randomized trial. *Tropical Medicine & International Health*, 17(3), 380-391.
4. Baş, Murat, Azmi Şafak Ersun, and Gökhan Kıvanç. "Implementation of HACCP and prerequisite programs in food businesses in Turkey." *Food Control* 17.2 (2006): 118-126.
5. Obadina, A. O., Oyewole, O. B., Sanni, L. O., Tomlins, K. I., & Westby, A. (2010). Improvement of the hygienic quality of wet 'fufu' produced in South West Nigeria. *Food control*, 21(5), 639-643.
6. Walker, Elizabeth, Catherine Pritchard, and Stephen Forsythe. "Hazard analysis critical control point and prerequisite programme implementation in small and medium size food businesses." *Food Control* 14.3 (2003): 169-174.