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# CHARACTERISTICS AND SPECIFICS OF FSSC 22000 APPLYING IN THE MEAT INDUSTRY

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## Abstract

FSSC 22000 is an effective management system for food safety and quality of processes and products that has been accepted by the Global Food Safety Initiative (GFSI). It encompasses the requirements of the ISO 22000:2005 Food Safety Management Standard - requirements for any organization in the food chain, and ISO/TS 22002-1:2009 Prerequisite programs on food safety. Insufficiently defined requirements of prerequisite programs of the ISO 22000:2005 have been fully compensated by this system. Moreover, it has a special significance for the realization of cooperation between the supplier/manufacturer and leading international retail chains since food safety presents a priority in their business.

The aim of this paper is to present experience in the implementation of FSSC 22000 so as to highlight characteristics and specifics of its application in the meat industry. The emphasis has been placed on the control of the operational prerequisite programs and critical control points, preparedness and responsibility in emergency situations, trends in the results of auditing and non-conformities management, through the experience of the subject, consultants and auditors in the food business. The application of the system in the honey industry is particularly evident in the systematic infrastructure management whose requirements are included in legislation, EU regulations and normative documents, the implementation of standard sanitation operating procedures, control of raw materials, production processes and finished products defined by control plans, and the insurance of traceability for the purposes of product recall. This ultimately results in realization of the food safety objectives and the system certification by an accredited organization.

The result of the application of FSSC 22000 is reflected in the improvement of food quality and safety with simultaneously integrating other management systems and reducing operating costs. The system presents fulfillment and continuous improvement of the regulatory requirements and demands of customers and consumers.

***Key words**: FSSC 22000, ISO 22000:2005, GFSI, ISO/TS 22002-1:2009, Meat industry.*

## 1. Introduction

FSSC 22000 is an effective food safety management system accepted by the Global Food Safety Initiative (GFSI). It encompasses the requirements of the ISO 22000:2005 Food Safety Management Standard - Requirements for any organization in the food chain, and ISO/TS 22002-1:2009 Prerequisite programs on food safety [1, 2].

The application of the food safety management system according to the requirements of FSSC 22000 presents a complex approach and a very common business requirement for manufacturers of brands [1, 2].

The application of the system in the meat industry is particularly evident in the systematic infrastructure management whose requirements are included in legislation, EU regulations and normative documents, the implementation of standard sanitation operating procedures, control of raw materials, production processes and finished products defined by control plans, and the insurance of traceability for the purposes of product withdrawal/recall [3, 4].

By defining responsibility, using resource management, planning and realization of products (the full scope of prerequisite programs - PRP, detailed hazard analysis, selection of the methodology of risk assessment, and detection of operational prerequisite programs - OPP and critical control points - CCP), and by identifying ways to validate and verify as well as to improve the system, advances in the efficiency of the system have been successfully made. This ultimately results in realization of the food safety objectives and the system certification by an accredited organization.

## 2. Materials and Methods

### 2.1 Materials

The paper is based on the experience of a private company in the northern part of Croatia. There are seventy people employed in the company and they work in two shifts. The company's business involves the slaughter of animals and meat processing, the capacity of which depends on the animal species and the type of product. The production plant was completely renovated in 2010. The base raw materials mainly originate from the farms owned by affiliated companies located in the eastern part of Croatia, while a smaller part of the raw material comes from import.

The company is organized in two production units - slaughterhouse and processing. The program for the monitoring of business operations is fully computerized, with the information software application adapted to the company's activities. Production is carried out in accordance with the specifications of products sold as the company's own brand and as a brand of international retail chains. The preparation of the project with the purpose of increasing the capacity of the production and storage of durable goods is in the progress.

The facility implemented the HACCP system in 2005 and it is in the system of permanent supervision of the competent authorities.

FSSC was certified by the accredited company in 2013, with the obligation of supervision in the certification cycle. The analyses of raw materials and finished products are carried out by the accredited laboratories in accordance with the applicable regulations.

### 2.2 Methods

The methodology of work includes experience in the implementation of FSSC 22000 so as to highlight characteristics and specifics of its application in the meat industry. The emphasis has been placed only on the part of the prerequisite programs that have been evaluated as the most important with regard to the initial infrastructural condition of the facility, the importance of prerequisite programs and CCP, preparedness and responsibility in emergency situations, as well as trends in the results of auditing and management of non-conformities, through the experience of the subject, consultants and auditors in the food business.

## 3. Results and Discussion

When implementing FSSC 22000, the requirements that were primarily taken into consideration were those of ISO/TS 22002-1:2009 Prerequisite programs on food safety that complement the section 7.2.3. of the standard ISO 22000:2005 Food safety management systems - Requirements for any organization in the food chain (* is the mark used for the components not listed in ISO 22000:2005) [3, 4]:

- construction and layout of facilities and related infrastructure
- space arrangement, including service utility rooms for employees
- air, water, electricity supply and other ports
- auxiliary services, including waste disposal and sewage
- suitability of equipment and its accessibility for cleaning, maintenance and preventive maintenance
- management of purchased materials
- measures to prevent cross-contamination
- cleaning and sanitization
- pest control
- hygiene of staff
- further processing*
- procedures for the product recall*
- storage*
- informing about products and raising consumer awareness*
- ood protection, biovigilance and bioterrorism*.

The production processes are characterized by the type of facility, types of products, and technological processes. They cause diversity in the fulfillment of these requirements. Deviations or application of alternative measures are justified and documented by hazard analysis, according to the requirements of ISO 22000:2005, section 7.4. [3]. No deviation or adopted alternative measure affects the organization's ability to meet the requirements [4].

Initial activities related to the implementation of the system included the verification of the fulfillment of the requirements of the PRP and the efficiency of the HACCP system. Based on the indicators obtained, a proposal of measures was made so as to comply with the normative requirements. The document was approved by the Management and it presents the activities, deadlines and responsibilities for the procedure. It is this part in particular where more important prob-

lems caused by the need for the investment of funds have been expressed. In our case, we came across the need for the reconstruction of one part of the space (space conditionality) for the storage of raw materials, preparation of additives, and changing rooms for employees. Also, some changes were made in the sequence of raw materials and the movement of employees in order to prevent cross-contamination (Figure 1).

In the present case, as well as in a number of successful projects realized in the meat industry, there was a demand for the making of an adequate technological project in the construction or reconstruction of the facility. The usual situation is that limitations occur due to the lack of clear expectations of the owner (products, quantities, types of raw materials, degree of processing of raw materials, sales management) and the full elaboration of technological operations. These limitations can be removed afterwards, but this could be a difficult and/or a costly activity. This is usually visible in the lack or inadequacy of space and equipment (capacitive or functional) and in respecting the linear sequence of production activities.

Upon the adoption and implementation of proposals related to the infrastructure, the activities are focused on the fulfillment of other prerequisite programs.

In order to increase the efficiency of sanitation measures, the range of cleaning and disinfection agents was changed (long-term application in the meat industry and the increased possibility of microbial resistance) as well as the sanitation plans. The responsibilities regarding the activities of the staff were more clearly defined alongside the provided additional training. In coordination with the Procurement Department the contractual requirements were changed, which obliges the suppliers during the contract period to perform quarterly training for all employees, assess the quantity of resources spent (with regard to the number of employees and square footage of space), and produce related reports. The results of the measures taken are continuously expressed in the trend analysis of establishing microbiological purity of space and employees' hands, and in establishing the food safety. In the first quarter following the adoption of the new methodology, the number of unsatisfactory marks of surfaces and hands of employees decreased by 15%, when compared to the previous year. Food safety was established in all the analyzed samples (the same as in the previous period). The advantage of this procedure is reflected in the systematic management of sanitation.

These and all other PRP are documented within a separate document, which forms a link to other documents [6].

Depending on the level (size) of the hazard and the probability of its occurrence, whose multiplication product shows the hazard, PRP, OPP and CCP were detected (Figure 2). Here the following methodology was used [7]:

Based on the collected procedures that represent a significant hazard from the aspect of food safety, the making of Control Plans was initiated (Table 1). As a result of further improvement of existing plans, the number of identified noncompliances was reduced when conducting internal audits relating to the activities of employees (supervision of PRP, OPP and CCP, documentation) for 20%. All this is a result of clarification of certain items, clearer defining of responsibilities, enabling availability of work instructions on the site, intensifying training and checking its efficiency). More raw material returns to suppliers were detected, which affected the assessment (average score of all suppliers for 2014 was 4.30 compared to the previous year when it was 4.80) and the intensification of communication with suppliers by enlarging the list of approved suppliers.

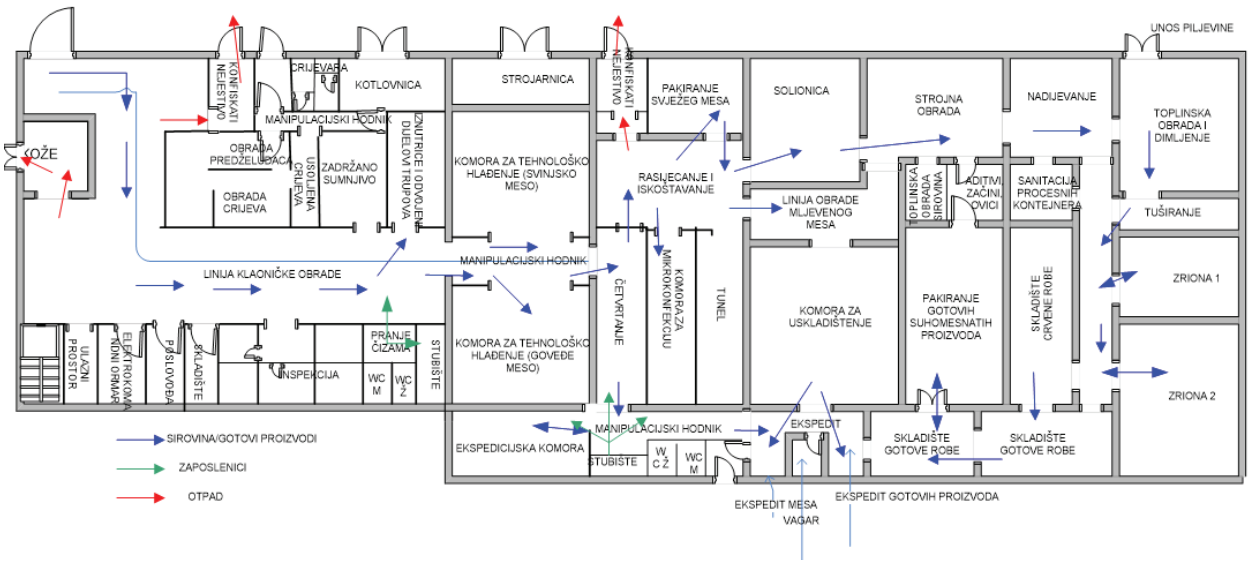


**Figure 1. Space/equipment arrangement and the sequence of raw materials and the movement of employees**

| | | | | |
|---|---|---|---|---|
| HAZARD LEVEL | 3 | PRP | CCP | CCP |
| | 2 | PRP | OPP | CCP |
| | 1 | PRP | PRP | PRP |
| | | 1 | 2 | 3 |
| | | PROBABILITY OF OCCURRENCE | | |

Legend:
Product up to 3 - PPR; Product 4 - OPP; Product 6 - 9 - CCP.

**Figure 2. The level of hazard/probability of occurrence**

**Table 1. Control Plan (Excerpt) [7]**

| Product / Process | Methods of control | Frequency of control | Reference documents/ Reference values | Records | Responsibility | Corrective actions |
|---|---|---|---|---|---|---|
| **Receipt of raw materials, additives and spices** | - visual control<br>- control of the amount and receipt of all necessary documents<br>- control of expiration dates | Every incoming shipment | - Work instruction of control<br>- Delivery note<br>- Raw material needs to be of satisfactory quality<br>- The amount and documentation data need to correspond to the delivery note | - signature on the delivery note<br>- the date is written by hand on the box | Stockman | Do not receive the goods that have no expiration date; the products with defective packaging should be singled out as noncompliant and returned to the supplier. |
| **Receipt of raw materials (fresh/ frozen)** | - documents review<br>- visual inspection<br>- temperature check using thermometer or by reading the vehicle display<br>- control of the amount, expiration date<br>- analysis, if necessary | Each package | - WI** of control<br>- Declarations<br>- Delivery note<br>- Raw material needs to meet the requirements of the regulations, the temp. of fresh meat needs to be < +4 $^0$C, of frozen meat -18 $^0$C<br>- Raw material needs to be of satisfactory quality<br>- The amount needs to correspond to the delivery note | - signature on the delivery note<br>- form Visual control of the raw material | Stockman and Technologist | Defrozen raw materials should not be received at receipt and should be returned to the supplier. |
| **Preparation of stuffing - weighing** | - visually<br>- organoleptic tests<br>- weighing | Each cart | - According to the WI** Pickling, mincing and cuttering<br>- According to the recipe<br>- Mark (on the cart with the raw material) | No records | Processing Manager, Cutterer | Single out stuffing that weighs too much or too little and inform FSTL*/ Technologist and follow their instructions. |
| **Control of cuttering temperature** | visually on display | During every cuttering | - WI Pickling, mincing and cuttering<br>- According to the norms the temp. of cuttering must not exceed 12 $^0$C | No records | Processing Manager or Cutterer measures the temperature of stuffing several times during the cuttering | Single out meat from the cutter, inform PR, Technologist FSTL* and follow their instructions (cool down using ice, remove from production ) |
| **Weighing spices and additives** | - visually<br>- weighing | Each weighing | - Product norms<br>- It has to correspond to the norms and recommendations of the producer | form Records of Production | Registrar of Production | Single out the weighing with too small or too big quantities, repeat the weighing to achieve the set weights |

*FSTL (Food safety team leader); WI** (work instructions)

The challenge presented in the formation of the system was to solve the system of traceability, i.e. traceability of raw materials used for the production of food or a substance that is intended to be incorporated or is expected to be incorporated into the food, through all the stages of production, processing and distribution [5].

The reason for this is a large number of input raw materials and the method of distribution in this particular case. Documentation processing of procedures is processed in the Procedure of Product Traceability (Table 2).

The procedures of withdrawal and recall of food from retail, including communication with consumers, were developed through documentation. The withdrawal is carried out when it is determined that the food is not safe with regard to health and that it can be established that it is fully in the distribution chain and that it did not arrive to the final consumer [5].

The lists of internal contacts, the contacts of customers and suppliers, of the competent authorities, media representatives and the certification companies are

**Table 2. Traceability steps (Excerpt) [7]**

| No. | Location of the goods in the delivery chain | Accompanying documents | Traceability identification | Responsible staff |
|---|---|---|---|---|
| 1 | Cattle depot | Receipt of goods,<br>Weighing ticket | - Number and type of the animal, name of the owner, date of receipt | Stockman for livestock |
| 2 | Slaughterhouse | Order for slaughter | - Number and type of the animal, name of the owner, date of slaughter, stickers with the number on the parts of the cattle trunk<br>- Sticker on the halves (slaughter date, document number, number of related doc., ordinal number of the slaughter, lot number) | Classifier, Slaughterhouse Manager, Stockman for livestock |
| 3 | Storage of raw materials | Receipt of goods,<br>Delivery note | - Date of receipt at the storage and receipt number<br>- Date of processing issuance | Stockman |
| 4 | Storage of frozen raw materials | Recording of storage of frozen raw materials in the computer | - Date of freezing | Stockman |
| 5 | Cutting plant | Work order for cutting | - Date of slaughtering, date of cutting, type of cutting | Cutting plant Manager |
| 7 | Processing | Order to the production,<br>Records of production,<br>Notebook for the records of finished products,<br>Delivery note | - Date of freezing, date of receipt at the raw materials storage<br>- Date of production (filling) and the name of the product on the cart | Production Manager |
| 8 | Salting room | Records of production,<br>Delivery note | - Date of freezing, date of pickling<br>- Date of submission of additives for pickling<br>- Date and amount of raw materials at the exit | Butcher |
| 9 | Thermal processing | List of monitoring thermal processing | - Date of production (filling) , the name of the product, date | Production Manager |
| 10 | Meat product shipping | The storage status of finished goods | - Date of production (filling) , the name of the product, the date by which it is best to use the product, name of the buyer | Stockman |
| 11 | Fresh product shipping | Consignment note<br>Transfer note<br>The storage status of finished goods - fresh | - Number and type of the animal, name of the owner, date of slaughter, stickers with the number on the parts of the cattle trunk<br>- Sticker on the halves (slaughter date, document number, number of related doc., ordinal number of the slaughter), name of the buyer | Stockman |
| 13 | Meat product packaging plant | Storage card LOT | - Date of cutting/production<br>Date of packaging<br>- Declaration | Packaging Plant Manager |

prepared on the location of the facilities for the purposes of communication between employees and of informing the competent authorities. The process (information from the market, instruction of the governing body) is checked at least once a year, more often if necessary.

During the implementation of the requirements of the section 5.7 of the ISO 22000:2005 - Requirements for any organization in the food chain that refer to preparedness and responsibilities in emergency situations, all the real situations where food safety may be compromised were analyzed. As the result of analysis, the document Responses to Emergency Situations was adopted - it contains technical properties of the equipment used (the ability to keep the temperature in the event of interruption of electricity supply - stationary and mobile capacities), employee responsibility in informing and decision making, alternative supply options (electrical energy, water for human consumption), the contracted capacity in case of need (storage and transport), and the method of notifying authorities. The adequacy of procedure is checked once a year (simulation of an emergency situation), and the efficiency check is mandatory after actual emergencies.

The requirement for the protection of food/biovigilance/bioterrorism is a specificity of FSSC 22000. It represents the totality of the effort to prevent deliberate contamination of food by biological, chemical, physical or radiological contamination for which there is no reasonable probability that it will appear in the food supply. Moreover, it includes human intervention as a source of pollution [4].

In order to fulfill this requirement, a special team was formed with the purpose of creating a Checklist for the Food Preservation (Table 3), which will be continuously applied. The hazard analysis is conducted for the detected hazards and the measures for improvement are proposed. All the employees are familiar with the procedure through training.

**Table 3. Checklist for the Food Preservation (excerpt) [7]**

| QUESTION | YES/NO | Remark |
|---|---|---|
| Are the doors, windows and roof areas kept safe? | | |
| Is the fence in good condition along its entire length (does it prevent entry)? | | |
| Is there adequate lighting? | | |
| Is there controlled access of persons and vehicles? | | |
| Are there alternative sources of critical utilities, such as electrical energy, water, information technology (electronic data), in case of an emergency? | | |
| Is parking space controlled and monitored? | | |
| Is the ventilation system adequately protected? | | |
| Is the reception place secured? | | |
| Are control methods such as cameras, supervision of staff or security service used? | | |
| Is there a system that effectively warns employees in the event of a breach of food safety? | | |
| Is there any control over hazardous materials or controlled substances? | | |
| Is personnel access limited at the appropriate workplace? | | |
| Are the vehicles locked? | | |
| Do suppliers of transport services pass through the supplier approval process? | | |
| Are the missed or late deliveries checked? | | |
| Is the source of water in the facilities safe and supervised? | | |
| Are all the raw materials secured and supervised when not in use? | | |
| Are the materials for packaging and labels of the products under control? | | |
| Are the inspections of employees necessary and conducted, if permitted by law? | | |
| Is the staff under supervision? | | |
| Are employees trained on food safety and can they identify / inform about unusual or suspicious behavior? | | |
| Are wardrobes checked? | | |
| Are cameras allowed? | | |
| Is there a constraint on the entry of personal items in the production facilities? | | |
| Is there a policy that defines the legality of drugs and weapons? | | |

## 4. Conclusions

- FSSC 22000 is subject to the fulfillment of the service users' requirements, primarily of the brand buyers. In order for the system to be implemented in all segments, it is necessary to make prerequisite programs more effective. This is done on the basis of ISO/TS 22002-1:2009 - Prerequisite programs on food safety and the fulfillment of the requirements of ISO 22000:2005 Food Safety Management Standard - Requirements for any organization in the food chain. Above all, it is necessary to ensure the efficiency of the system which guarantees the improvement of the quality and safety of products and services while maintaining competitiveness in an increasingly demanding market.

- The application of the system in the meat industry is particularly evident in the systematic management of infrastructure whose requirements are included in legislation, EU regulations and normative documents, the implementation of standard sanitation operating procedures, control of raw materials, production processes and finished products defined by control plans, and the insurance of traceability for the purposes of product withdrawal/recall.

- The paper presents the implementation of FSSC 22000 so as to highlight characteristics and specifics of its application in the meat industry. The emphasis has been placed on the control of the part of operational prerequisite programs and critical control points, preparedness and responsibility in emergency situations, trends in the results of auditing and non-conformities management, through the experience of the subject, consultants and auditors in the food business.

## 5. References

[1] Global Food Safety Initiative (2016). *Consumer goods forum*. <URL:http://www.mygfsi.com. Accessed 14 August, 2016.

[2] FSCC 22000. (2016). *FSSC 22000 requirements*. <URL:http://www.fssc22000.com. Accessed 15 August 2016.

[3] ISO 22000:2005. (2005). *Food safety management systems - Requirements for any organization in the food chain*. International Standardization Organization, Geneva, Switzerland. <URL:http://www.iso.org/iso/catalogue_detail?csnumber=35466. Accessed 15 August 2016.

[4] ISO/TS 22002-1:2009. (2009). *Prerequisite programmes on food safety*. <URL:http://www.iso.org/iso/iso_catalogue/catalogue_tc/catalogue_detail.htm?csnumber=44001. Accessed 16 August 2016.

[5] Croatian Ministry of Agriculture. (2012). *Guide on traceability, withdrawal and of food recall* (2nd. Ed.) (in Croatian). *Vodič - sljedivost, povlačenje i opoziv hrane*,. Directorate for food safety and phytosanitary policy, Zagreb, Croatia.

[6] Šušnić S. (2013). *Manual for prerequisite programs* (in Croatian). Šušnić d.o.o., Rijeka, Croatia.

[7] Šušnić S. (2013). *Manual in food safety*. Šušnić d.o.o., Rijeka, Croatia.