

# QUALITY MANAGEMENT SYSTEMS IN THE FOOD INDUSTRY

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## SUMMARY

*This paper describes several quality management systems in the food industry. The systems are applied in the quality assessment of all business subjects in the food industry, with the primary objective of protecting consumers and gaining their trust in safe food production and distribution. The adoption of food management systems also gives businesses in the food industry the security and the competitiveness they need on the market. Quality management systems keep up with market globalization and are consequently applied as standard worldwide.*

**Key words:** quality management systems, safe food

## INTRODUCTION

Quality management systems (QMS) are indispensable in each sector of the food industry, to ensure safe, quality food for the consumer (ORRIS and WHITEHEAD, 2000). The number of businesses in the food industry which adopt QMS in order to enhance their competitiveness on the global market is continually rising (BEATTY, 2006; KARIPIDIS and associates, 2008). The most important quality management systems in the food industry are: Global Food Safety Initiative (GFSI), International Food Standard (IFS), British Retail Consortium (BRC), Safe Quality Food (SQF) 2000 and International Organization for Standardization - ISO 22000:2005 (BAERT and associates, 2005).

## GLOBAL FOOD SAFETY INITIATIVE (GFSI)

The Global Food Safety Initiative was launched in 2000, coordinated by CIES – The Food Business Forum, an association of the largest retailers worldwide. The mission of the GFSI is to continually advance food safety management systems, so as to gain the trust of the consumers in safe food delivery. The objectives of the Initiative are: 1. to

ensure consumer protection and to build up and maintain consumer trust, 2. to increase cost efficiency in the entire food supply chain through common acceptance of GFSI recognized standards by retailers worldwide, 3. to provide a unique international platform for networking and the exchange of knowledge, information and best food safety practices. The basic principle the GFSI rests on is the fact that ensuring food safety is not a competitive process, since each potential problem may affect the entire sector, due to market globalization. The GFSI does not provide accreditation or certification (CIES, 2008).

The fifth edition of the GFSI guidelines (GSFI Guidance Document) was released in September 2007. It contains the commonly agreed upon criteria for food safety standards, by which standards may be compared and evaluated. The GFSI has thus acknowledged four standards: BRC, IFS, Dutch HACCP and SQF. Each of these food safety schemes meets the criteria defined jointly by food safety experts, with the objective of making food production as safe as possible. The main results are cost reduction in the food supply chain and fewer audits. The GFSI vision of 'once certified, accepted everywhere' has become a reality. Carrefour, Tesco, Metro, Migros, Ahold, Wal-Mart and Delhaize have all agreed to reduce audits by accepting any of the four GFSI recognized standards (CIES, 2008a).

## BRITISH RETAIL CONSORTIUM (BRC)

The due diligence principle formulated in the UK Food Safety Act in 1990 made retail chains in Great Britain responsible for the food they sold as their products. Retailers, as well as all other sectors of the food industry, were obliged to take all appropriate measures to avoid any problem which could threaten the health of consumers. The application of this principle included technical

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check-up of the supplier's production process by each retailer they supplied. For years retailers did this separately, depending on their standards and internal control. Consequently, the producers had great costs, since they had to meet various requirements set by each retailer they supplied food to and were assessed at meeting each of the requirements. Retailers also had more costs, since they had to expand their quality control departments in order to set standards by which their suppliers would be controlled (BRC Standard, 2005). As a way round these problems, in 1998 the British Retail Consortium (BRC), an association of the largest British retailers (Tesco, Sainsbury, Somerfield, Sainsbury etc.), published the BRC Food Technical Standard, a list of requirements suppliers had to comply with. This standard enabled retailers to fully meet their legal obligations regarding consumer protection. It also set up common criteria to control all companies supplying retailers with brand products, by requiring a plan for the implementation of HACCP, a documented quality management system and control of factory environment, products, processes and personnel. Finally, there is only one standard in Great Britain and consequently one certificate acknowledged by all retailers (BAERT and associates, 2005; BRC, 2005).

After the original version, the BRC Standard has been regularly revised to include new trends in food safety. Although the initiative was British, the Standard has been used in other countries as well. The latest, 5th issue, has thus been published with the purpose of its application worldwide, and the BRC has renamed it Global Standard for Food Safety – GSFS (BRC, 2008).

### **INTERNATIONAL FOOD STANDARD (IFS)**

In 1999 the association of German retailers, Bundesvereinigung Deutscher Handelsverbände (BDH), started developing a standard by which suppliers would be controlled for products with their labels (declarations), in an effort to provide a norm with a single assessment and control system. The standard was supported by French retail chains and consequently it became significant for the entire Western Europe. The fifth version, issued in 2007, was developed in cooperation with Italian experts and interest groups. The content of the IFS is based on the BRC Standard and the structure on ISO 9001:2000. The IFS is in fact a list of requirements that businesses in the food industry have to fulfill in order to be certified. The fulfillment of each requirement is evaluated and scored as:

- A. full compliance with the IFS criteria,
- B. nearly full compliance with the IFS criteria, apart from

minor irregularities,

- C. partial application of the IFS criteria,
- D. no application of the IFS criteria.

The fifth version eliminates the earlier three levels (basic, higher and recommendations on good practice) and offers a single set of requirements. Furthermore, it introduces more requirements regarding risk analysis, as well as a new evaluation system, which facilitates the comparison of results (IFS, 2007).

### **SAFE QUALITY FOOD (SQF 2000)**

The Australian government and several farmers' associations developed in 1995 a system which could control the entire agro-food chain, the Safe Quality Food system – SQF. It was later renamed SQF 2000. This standard is based on the requirements set by Codex Alimentarius and those of ISO 9000. Since farmers' representatives were directly involved in developing it, SQF is applicable in the primary production as well. Since 2003, the Food Marketing Institute (FMI) in Washington manages SQF.

Due to differences in size, processes and products and the impracticability of using a single standard for all businesses in the food industry, several standards have been developed: SQF 1000 for primary production and smaller businesses, SQF 2000 for bigger food enterprises and SQF 3000 for retail and restaurants (Safe Quality Food Institute, 2008).

### **HACCP CERTIFICATION**

The initiative to develop a standard for certifying the Hazard Analysis and Critical Control Point system (HACCP) was launched by the Dutch food-processing industry. The first version, 'Criteria for the assessment of an operation HACCP-system', was introduced in 1996. Six years later it was renamed 'Requirements for a HACCP-based food safety system'. The structure of the standard is based on the 7 basic principles and the 12 steps of HACCP, with additional requirements for a quality management system (SCV, 2008).

### **INTERNATIONAL ORGANIZATION FOR STANDARDIZATION (ISO)**

ISO 15161:2001 – 'Guidelines on the application of ISO 9001:2000 for the food and drink industry' is a document which illustrates the interaction of the norm ISO 9001 and HACCP and gives directives on the implementation of ISO 9001 in the food industry. According to this standard, food safety is considered part of quality. However, certification by ISO 15161:2001 was not possible and businesses in the food industry were certified according

to ISO 9001:2000 instead (the only difference being the specific interpretation of each single requirement in ISO 15161). The standard was later revised by ISO 22000.

### ISO 22000:2005

Since the national initiative for the certification of HACCP in the Netherlands and Denmark did not achieve international success, Denmark suggested a new international standard. Thus in 2001 the International Organization for Standardization started working on a standard with requirements for a food safety management system based on the HACCP principles (BEART, 2005).

ISO 22000:2005 was published in September 2005. It offers a practical framework for coordinating different requirements and norms in a single global standard. The standard encompasses requirements for prerequisite programs, including good production practice, and the requirements for the implementation of HACCP and a quality management system. It also includes HACCP according to Codex Alimentarius, so that it can be easily applied in companies worldwide. Its objective is to establish a single food safety standard, applicable by any business in the food industry, by integrating the existent food quality and safety management systems, and thus to offer a firm basis for consumer trust. ISO 22000:2005 'Food safety management systems – requirements for any organization in the food chain' can be used by different subjects in the food chain, from animal feed producers, plant and cattle breeders, to food manufacturers, transport and storage operators, retailers, to suppliers of additives and ingredients, food processors, producers of packages, chemicals, sanitary and other material. ISO 22000 was developed by experts in the food industry, retail and services, representatives of international trade associations and other experts in related fields, in cooperation with the Codex Alimentarius Commission. This standard represents a model for the improvement of food industry business management, which is based on risk management. The standard is applicable on its own, but it is also in full accordance with ISO 9001:2000, so that companies which already operate according to the ISO 9001 system can simply expand that norm to ISO 22000. The ISO 22000 set of standards includes ISO 22001 – 'Guidelines on the application of ISO 9001:2000 for the food and drink industry', which has replaced ISO 15161:2001. (HAH, 2008)

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### ZUSAMMENFASSUNG SYSTEME, DIE DIE QUALITÄT IN DER NAHRUNGSINDUSTRIE VERWALTEN

*In der Arbeit sind Systeme, die die Qualität in der Nahrungsmittelindustrie verwalten, beschrieben. Die Systeme werden bei der Bewertung der Vortrefflichkeit aller Subjekte bei Geschäftigkeit mit Nahrung angewendet, mit dem Ziel des Verbraucherschutzes und des Erwerbens von ihrem Vertrauen hinsichtlich Herstellung und Distribution von sicherer Nahrung. Den Subjekten selbst gibt die Aneignung des Systems die notwendige Sicherheit und Konkurrenzfähigkeit gelegentlich der Geschäftsführung. Die Marktglobalisation begleiten auch Systeme, die die Qualität verwalten, und demzufolge werden sie in der Welt standardisiert angewendet.*

**Schlüsselwörter:** Systeme, die die Qualität verwalten; Sicherheit der Nahrung

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# INFLUENCE OF CALIBER AND BULLET ENERGY ON TISSUE DAMAGE AND LOSS OF MEAT MASS IN HUNTED WILD BOARS

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## SUMMARY

During two hunting seasons (2006 – 2008), the influence of different rifle calibers on tissue damage and loss of meat mass in hunted wild boars was researched. On the grounds of hunting- instructional site "Črnovščak", the influence of four different calibers (30 - 06; 7 x 64; 8 x 68 S and 9,3 x 62) on individuals of both sexes was observed, and hunted wild boars were classified to five weight categories according to their body weight (Category 1: weights ≤ 25 kg; Category 2: weights from 25 to 50 kg; Category 3: weights from 50 to 75 kg; Category 4: weights from 75 to 100 kg and Category 5: weights ≥ 100 kg). It was found that the greatest loss of meat mass (from 9 to 11%) and the greatest coefficient of tissue damage (from 0,0885 to 0,0933) was with the usage of 9,3 x 62 caliber and bullets of somewhat higher grammage (18,5 g) with all the weight categories of hunted wild boars. The lowest coefficient of tissue damage (from 0,0869 to 0,0913) and the least loss of meat mass (5% to the utmost) was found when using 30- 06 caliber and bullets of 11,7 g of mass. Considering the targeting distance, the smallest tissue damages were noted for 30 – 06 calibers and 7 x 64 with the kill of wild boars of lesser weight categories (up to 75 kg) at medium-distances (from 50 to 100 m), whereas the coefficient of tissue damage was decreasing with increasing the distance and increasing weight category of wild boars, which was especially observable with adult wild boars (strong male boars of body weight of over 150 kg). By comparing the efficiency of caliber considering the kill distance and the circumference of tissue damage, we set apart 8 x 68 S caliber and bullet of 12,1 g of mass as the most efficient

caliber for hunting higher weight categories of wild boars. The most researched caliber (9,3 x 62) showed the greatest efficiency with the kill of wild boars of large biomass (male boars of over 150 kg), but it also showed the greatest coefficient of tissue damage and the greatest percentage- portion of meat mass loss, which was proportionally increasing with the wild boars of lesser weight categories hunted at shorter distances, especially in cases when larger bones were hit (brachium, shoulder).

**Key words:** caliber, bullet energy, wild boar, gunshot wound

## INTRODUCTION

Wild boar (*Sus scrofa L.*) is acknowledged in Croatia as one of the most important and the most interesting species of big game for hunting and economy (Pemper, 2004). Numerosity of population of the so called "black game" on the territory of the Republic of Croatia has been in growth in the last twenty years, and expansion of wild boar population is also followed by evident increase in kill quotas, which have doubled during the last decade (Konjević et al., 2008). On the one hand, this appreciated and attractive game is searched for in every hunting preserve, and on the other, it causes headaches to landowners and hunting lease- holders because of the immeasurable economic damages, which it makes on field crops (Janicki et al., 2007). Exactly because of great damages and hyper reproduction, wild boar is hunted all year long, whereas close season applies only on sows in the period from 31<sup>st</sup> January to 1<sup>st</sup> July during gravidity time, and while they care for and nurture young wild boars

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