

Session 8 Quality control and methodological problems

L 1 GENERAL ASPECTS OF QUALITY MANAGEMENT IN FOOD PROCESSING

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Background

This paper focuses on the meat industry, but most of detailed topics relate more generally to all branches of the food industry. The field of quality and food safety assurance is changing. A new period is starting because both new requirements and new solutions have become available. As an example, two key factors that have recently arisen: new international standards for quality management; and disquieting animal diseases in several areas of the globe.

The quality assurance model known as ISO 9001:1994 standard was originally intended for process management and the continuous production of a standard quality of products and services. Unfortunately in many applications, this method has had only a marginal role, and has not succeeded with the traditional style of corporate management. Because of this, quality assurance systems have often caused disappointment and have created additional work and bureaucracy rather than visible advantages. In some cases the only benefit has been an increased business reputation because of certification approval.

The functionality and benefits of the HACCP technique (Hazard Analysis and Critical Control Points) and use of critical control points is more unambiguous but its role in combination with GMP/GHP (good manufacturing and hygienic practice) is not always exactly clear. There is a new 'risk'. GMP hasn't been systemized, and its efficiency sometimes decreases when combined with HACCP. The focus and management pressure on key risks sometimes distracts from less critical but still necessary hygienic elements. In other words, a management focus only upon key risks can reduce its focus on a number of lesser risks (which, when we look at their additive effect, can be substantial). This asymmetry of introduction is not always compensated for, or corrected even by quality assurance procedures.

Under pressure by market and customer expectations, the competitiveness of business and growing challenges of food safety are creating a demand (and an opportunity) for the food industry to be renewed and to turn its attention to a new approach, involving continuous learning and development. The new ISO 9001 standard requires new techniques and solutions. It deals with new concept of management, resource and process controls, and requires continuous development. Because of this, it will cause a reengineering of related management systems.

Objective - fulfillment of new expectations

During last two years we have achieved a systematic planning approach in preparation for the introduction of the new ISO 9001 standard. At two Hungarian meat processing plants, the companies were waiting for re-certification. After 6 years it was the best time for replacing existing system with a new, ISO 9001 : 2000 based quality management system (2), or extend it by a TQM development process started in 1995 (1). These changes gave an opportunity to solve actual problems and realize a set of new operations/activities relating to actual problems and the challenges of meat processing and debates on meat consumption.

There are many actual questions and objectives:

- continuous improvement of technology and **product quality** using best practices, latest research results, technologies and other knowledge.
- response to actual questions of **food safety**: new problems with some bacteria as E.Coli O157 H7 or Listeria, effective use of HACCP systems etc.
- handling of problems originated by **animal diseases**, having human impact (BSE) or influencing the world meat trade (FMD of pigs).
- issues of **human health** (questions of additives, allergens, residues and contaminants, red meat consumption, less fat etc.).
- increasing awareness and **orientation of consumer**: protect them at new marketing methods designed to appeal to customer's emotion and generate increased consumption using psychological tools („vision bakeries“, „show-kitchens“, antraiement-full shopping centres), which reduce a focus on healthy nutrition and give priority to new, more profitable food products (e.g. chips, soft drinks and sensory attractions based on effect of additives like „big“ bakery products etc., and highly processed foods).
- objectives derived from extended term of quality (quality of the organization, as by the TQM expectations): saving the environment, use of sustainable systems in production, save workplaces and give benefits to employees and society.

Methods

We did not use special methods used to accomplish our objectives but rather make use of management tools and problem-solving methods to help identify key tasks and implementation. During elaboration of TQM project steps, team work, benchmarking, QFD and other known (or local, self-developed) methods were used (1).

For development of sanitation and food safety issues, a new process and resource management regime was introduced exploiting the framework of the new ISO 9001 system procedures, and even creating a separate **food safety management system** (2).

Relating to animal diseases, the highest attention to traceability and a strict regime of supplier management has been placed into the systems (two-step receiving inspection system for differentiation between regular and new subcontractors).

For increasing efficiency of the company management and achieving harmony in fulfillment of the „extended“ quality requirements, integration of traditional and functional management systems has been prepared and a new management structure developed (2).

Results and discussion

Systems affecting quality

Summarizing the objectives of complex quality, and reviewing existing methods for their realization, we feel that the best sharing of functions could be reached by use of several managing (sub)systems:

- quality assurance system,
- hygiene assurance system,
- HACCP,
- technological management system,
- logistics,
- environmental management system,
- occupational health and safety management system,
- controlling

Highest importance, as to the quality of food, relates systems for quality assurance, hygiene, HACCP and technological management.

The role of **quality assurance system** (QAS) is well known, but in practice these systems have often superfluous or needless additive functions, trying to substitute for inadequate company regulations. There is a latent need for further systems, sharing activities depending on their function. For example, group of procedures for hygiene could form a part of the QAS, as food safety is a basic component of food quality; but control of related functions is more suitable by a separate **hygiene assurance** (sub)system with separate duties, responsibilities, documents and records. This new solution has been developed at Délhús meat company, Hungary (2).

Another situation is in case of **HACCP**, which could be subordinated to the QAS. But partial separation of HACCP as a **subsystem** is preferable, which gives simple and free access to it for the government inspection or veterinary service.

Next suggested solution, the **technological management system**, deals with managing of raw material treatment (pre-blending for homogenization), in-process analysis (rapid methods) and SPC-based formula-optimization (intervention for best-composition/lower-cost results by linear programming). This system doesn't need separation, since it doesn't need separate external evaluation or assessment and – in details – it is more closed to quality assurance processes. It is a small subsystem, covered simply by **one of the procedures** of QAS, having many connections with other functions of quality assurance (process control, in-process testing, quality control laboratory).

Integration of management systems

Integration of management systems is a necessity. Otherwise, such functional systems like ISO 9001, HACCP, or ISO 14000 for environmental management, will confuse the company, trouble the managers and increase bureaucracy.

Connection of systems has two features: the "traditional" with the "new", and a new system with other new systems has to be integrated.

The architecture of the **integrated management system** has to be in accordance with general rules of the company and to give harmony between manuals and procedures of the independent new managing systems. Fundamental question is the structure, distinguishing general elements and functional (managing) (sub)systems. There is a question of harmonization of regulation levels, horizontal and vertical links within the management structure.

A part of the integrated system, illustrating place of QMS, hygiene and HACCP, is in *fig. 1*.

Resources, processes and procedures

A **systematic management** of resources and processes is preferable, e.g. regular evaluation of all basic resources (technical, human, informatical etc.) and all definitive processes (purchasing, production, sales, marketing, hygiene, maintenance etc.) having influence to quality of products, quality of work and services, food safety and other - above mentioned - complex quality components. Evaluation by a team, in a form of matrices, using some selected aspects in columns and giving evaluation scores, e.g. for capacity, productivity, actual condition, accuracy, need of maintenance etc. could be applied. Results are to be presented to the top management, which is responsible for realization of important improving proposals of the team.

Procedures, e.g. written managing rules of the company have different functions and scope. Some procedures are general, other are relating only the quality management. In documentation approach, there are general documents (organizational and operational codex, company rules, general procedures) and local documents (procedures and work instructions of managing systems). In case of integrated management system, it gives a general level of procedures having higher priority and a functional level set of procedures e.g. for quality. Types of procedures are given in *Table 1.* and *Table 2.* and structure is visible in the *Fig. 1.*

Benchmarking, QFD and other „TQM“ methods

Unfortunately, these methods, being very useful in comparison and improvement of any functions, helping (increasing) business efficiency, are mostly used in „TQM projects“ only. In case of food industry, where many producers offers big amounts of excellent food, the marketing and business process decides about future of the company.

QFD, quality function deployment, is a tool, giving clear picture of interrelations of product quality, influence of technological treatment, advantages and disadvantages of changes of selected characteristics (because e.g. of competitor's

products, indicated in the same table in visible way) and calculating costs, economical results. This analysis shows, which of quality characteristics has to be developed (to be competitive), which treatment has to be selected and how much it costs. It is a direct link between quality, technology and business. Use of benchmarking is similar, if it is used e.g. for comparison of quality components and market results.

It should be very important to introduce these methods independently if there are some „TQM projects“ or just the daily management has its functions. Company, winning a TQM award (1), use these methods for its own, but the project has an „internal name“ (Pick 21 development program), helping to focus on company needs instead of award criteria. Results are convincing, a „backwarded“ parameter of a sausage has been discovered and corrected, giving further good position on the market (cross-section structure of a frankfurter-type sausage - produced in large amounts - by changing the raw material preparation technology). After real problems and useful development, based on internal needs, is easy to document the program and find wording to demonstrate the success by given award criteria.

HACCP and food safety

An enhanced focus on food safety is still necessary. After few years of implementation of HACCP, a need of promotion of GMP / GHP is as well preferable. A part of hygienic problems and bad results - even if the HACCP system is active - is still related to basic requirements, there is no big change in safety after starting the HACCP. In particular at small enterprises, together with the „critical control points“ the basic rules of hygiene and good practice has to be „re-introduced“. The possible best solution - after our experiments in public catering - is a parallel program for implementation of HACCP and refreshing of good hygienic practice. Because the CCPs are written or illustrated on posters, even the GHP rules are to be „visible“. In a related place, double tables were prepared, with a red side for CCP-s and with blue letters on the other side for repetition of knowledge about important - even if not critical - basic rules.

The widest solution, „from harm to harmony“, giving best effect on food safety, is the elaboration of a separate, „complete“ food safety management system, harmonizing all efforts relating food safety and hygiene, with separate duties, responsibilities, procedures and records. This new solution has been developed at one of the referred companies (2).

Marketing aspects of quality and customer communication

The basic aim is a bilateral communication (try to sell, what produced and know what is expected) but an advanced company, being certified against to the new standard, has to demonstrate that - among others - has a detailed knowledge about the customer's satisfaction, too. In a new quality management system, there are ISO 9001 procedures, to control related activities and interpretation of collected and evaluated information about market results and acceptance of products by the customer. In the food industry, similar importance belongs to the direct consumer's opinion, which is not always transferred exactly by the customer.

Possible tendencies and main areas of development

Thinking about future of quality management in the food branches, several tendencies and changes are already visible or derived from the new requirements and changes of food business.

The basic tendency is - motivated by the new standard - the change of approaches from the static „assurance“ to the dynamic improving management. In a new implemented or re-engineered system there are teams and leaders, dealing with „gap-analysis“, problem-solving, benchmarking and using methods for elimination of causes and improvement of processes. Only systematic activities are giving results, therefore written procedures, declared personal responsibilities, quality records - relating the continuous improvement - are helping in implementation.

Other tendencies and areas of development:

- Efforts „from science to practice“, (e.g. the European Flair-Flow technical manuals).
- Enhanced role of food safety knowledge and practices.
- Studies, discovering brain functions, giving ideas for adequate selection of best tools depending on the type of the problem: when the creativity and when the step-by-step thinking is more effective (examples: team-work for improvement, hazard analysis of steps of technology).
- Use in wide range of information technology, e.g. for traceability (EAN solutions) and logistics, or data/information transfer by Internet.
- Change of management from „partial“ to „general“ (like integration of management systems as above).
- „Introverted“ approach - systems for internal interests instead of certifications.

Conclusions

Quality Management System means a complex solution for achievement of the complex quality: product and service quality, food safety, environment, work safety, benefits for all partners, company effectiveness and business success. Quality management means business management, focused on quality, based on use of best practices and some models of „excellence“. Thinking in „systems“ and working in „management systems“ gives the opportunity for survival of best food processing traditions and exploitation of latest results of food science and technology. It is very important in our quickly changing situation, where both the requirements and the possibilities are changing day by day.

References

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Table 1	
No.	GENERAL PROCEDURES
E - 1	Management activities
E - 2	Resource management
E - 3	Process management
E - 4	Monitoring, inspection and control
E - 5	Informatics (information as resource)
E - 6	Technical facilities
E - 7	Hygienic, environmental and safety conditions
E - 8	Training
E - 9	Control of measuring devices
E - 10	Control of documents and records
E - 11	Use of documents and records
E - 12	Analysis of data
E - 13	Internal / external survey
E - 14	Internal audits
E - 15	Management review
E - 16	Control of nonconformities
E - 17	Corrective and preventive actions, improvement
E - 18	Offers and contracts
E - 19	Marketing, customer service
E - 20	Product design and development
E - 21	Subcontractors

Table 2	
No.	QUALITY MANAGEMENT PROCEDURES
QE - 1	Purchasing
QE - 2	Identification and traceability
QE - 3	Livestock handling
QE - 4	Slaughtering (beef)
QE - 5	Slaughtering (pork)
QE - 6	Raw materials and raw products
QE - 7	Control of processing - product group 1
QE - 8	Control of processing - product group 2
QE - 9	Control of processing - product group 3
QE - 10	Control of stores and delivery
QE - 11	Receiving inspection
QE - 12	In-process inspection
QE - 13	Final inspection
QE - 14	HACCP
QE - 15	Control of nonconforming products
QE - 16	Activity of Quality control department and laboratories

Figure 1.
INTEGRATED MANAGEMENT SYSTEM

