

Ensuring food quality and safety and FAO technical assistance

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Ensuring an acceptable level of food quality and safety is necessary to provide adequate protection for consumers and to facilitate trade. These objectives can be achieved by implementing and monitoring quality assurance measures along the entire food chain, when it is appropriate and when it is possible. Everyone involved with food, from the farmer to the consumer, shares in the responsibilities to keep the food supply safe by taking the necessary precautions to keep food protected from hazards that can increase human health risks. These actions will also prevent or reduce food losses, which is especially important in those situations where food security is threatened.

GOOD PRACTICES IN CROP AND ANIMAL PRODUCTION

Implementing quality assurance measures starts at the farm with the application of good agricultural practices (GAPs) and good veterinary practices (GVPs). GAPs are those practices that enhance the production of food that is safe and of good quality, that are environmentally sound and that ensure appropriate handling, storage, shipping and management of the product. When GAPs are appropriately applied to the production of primary food crops, consumers can be assured that the food will meet quality and safety standards at the time of harvest. GAPs might include:

- selecting the right land to be cultivated for food crop production;
- planting the best-quality seeds of the most appropriate varieties;
- using authorized and acceptable chemical inputs (fertilizers, pesticides) according to approved directions (e.g. concentration, frequency, timing of use);
- controlling the quality of irrigation water (if used);
- using appropriate harvesting and on-farm storing and handling techniques;
- using appropriate methods for shipping to markets or food processors.

In much the same way, GVPs have been established to assure consumers that foods derived from animals meet acceptable levels of quality and safety. These practices are the guiding principles in professional veterinary practice for the care and treatment of animals, including animals used

for human food production. Some important GVP-related measures are those ensuring that:

- only healthy animals are slaughtered for the purpose of human food;
- any drug used in the control of animal disease is safe for its intended use and used according to approved directions (i.e. appropriate amounts, frequency and timing), and residues of such drugs do not remain in the edible tissues at unsafe levels when the food is made available for consumption;
- chemicals utilized in animal husbandry (e.g. dips for insect pest control) are safe for their intended uses and used according to instructions (i.e. appropriate levels, frequency and timing), and residues of such chemicals do not remain in the edible tissues at unsafe levels when the food is made available for humans;
- live animal inspection and handling are properly conducted before slaughter, and carcass inspection and handling after slaughter;
- appropriate temperature controls, storage conditions, handling and butchering techniques and sanitary conditions are maintained during processing and butchering to prevent post-slaughter contamination;
- shipping and handling practices prevent any unnecessary exposure of the product to contamination.

When appropriately applied, GAPs and GVPs can protect food at the primary stage of production from contamination by extraneous materials (filth, putrid or decomposed materials, rocks, dirt and sand); toxic chemicals and contaminants from the environment (heavy metals, environmental pollution and industrial chemicals); excessive or unsafe levels of agricultural chemical residues (pesticides, fertilizers, veterinary drugs and other chemicals); contamination or damage by pests, insects and vermin; and biological contamination by mould, pathogenic bacteria or viruses – any of which can cause spoilage, crop damage and foodborne illness or chronic health consequences in humans. Increased human health risks may also result from consumption of animal products if animals have been fed contaminated feedstuffs which carry over into edible meat products.

GOOD PRACTICES IN PROCESSING

The quality and safety of food intended for manufacturing or processing can be ensured by applying good manufacturing practices (GMPs) and good hygienic practices (GHPs) to food processing. When properly applied, these measures ensure quality and safety for all the processing or manufacturing steps from the receipt of the raw materials (primary products and other ingredients) to the shipping and marketing of the final products to the consumers.

Implementation of GHPs entails the use of appropriate sanitary measures to prevent microbial contamination and assurance of optimum sanitary conditions for processing food products. GHPs involve:

- the use of appropriate cleaning and sanitizing techniques, including the use of approved and effective agents used at the proper level (strength, concentration) and frequency to prevent microbial buildup on processing equipment and utensils or other food contact surfaces;
- observation of sanitary practices, use of protective clothing and strict observation of rules of personal hygiene by personnel involved in handling and processing food;
- the use of hand-washing and hand-sanitizing dip stations when and where appropriate;
- having time and temperature controls in place to prevent microbial growth in the susceptible intermediate and finished processed foods;
- the use of other sanitary measures that are specifically needed because of the nature of the food being processed, the processing technology or the facilities in which the processing takes place.

GMPs include measures ensuring that:

- food materials and ingredients, including food additives, are of the appropriate level of quality and safety before use and are stored properly to prevent contamination and mix-up with other processing material;
- facilities used in food production are of the appropriate size to prevent overcrowding and to allow proper placement and orderly storage of equipment, raw materials and other product materials such as packaging and labelling;
- layout of facilities permits the orderly flow of production materials and personnel in processing;
- facilities are suitably lit;
- equipment is maintained for proper functioning;
- temperatures, times, pressures, machine operations and other processing parameters are controlled at the specifications level required to assure proper processing;
- appropriate labels are used.

These control procedures also include the examination or

sampling of intermediate foods from the processing lines and finished foods from final storage. The products are examined or tested analytically for compliance with product specifications and quality and safety requirements.

When properly applied, GMPs also include the establishment of record-keeping systems for recording the results of quality control activities. Information that might be recorded includes:

- results of quality assurance personnel inspections of production facilities prior to and during production;
- processing parameters during food processing (cooking times, temperature recordings, pressures);
- results of specific methods or procedures for on-line product examination (net weights, can seal tear-down);
- results of examination of the integrity of the package closure systems;
- specific laboratory analysis methods to be used for quality and safety determinations, sample size and established criteria for acceptance or rejection of the lot.

Some food processing methods are very complex while others are relatively simple. Each process must be carefully assessed as to its potential for the presence of foodborne hazards and for the impact on food quality and safety if processing failure should occur, which may at times create unacceptable levels of risk for consumers.

Safety control procedures

In some cases, because of the nature of the food processing methods or the hazards associated with some foods, consideration is given to applying intensified safety control procedures or systems. One such system is that based on the Hazard Analysis and Critical Control Point (HACCP). In order for the HACCP system to be effective, there must first be an effective GHP and GMP system in place.

HACCP includes the identification of all the known potential hazards which can be associated with the food being processed. Once this hazard assessment is done, critical control points (CCPs) in the processing are identified where controls can be exercised to prevent, reduce or eliminate these hazards. Constant vigilance is maintained over the CCPs to prevent any process deviations that would result in loss of control at the CCP. Appropriate corrective actions are required whenever a CCP is found to be out of control, and the suspect food product is generally prevented from being distributed until its safety and acceptability have been determined. This system is highly effective when employed properly, but it requires considerable understanding and technical information related to the food product, the processing methods and the production facility.

In manufacturing and processing of foods it is also

necessary to ensure the safety of ingredients used as technical aids, additives, flavourings or colourings. Such safety assessments require the analysis of test data, chemical specifications for substances involved and information on human dietary consumption levels and patterns. It is also necessary to evaluate the impact of uncertainties in cases where the information is insufficient to make a clear safety assessment decision. This is the work of highly trained specialists in toxicology, nutrition, chemistry, food composition and risk assessment techniques. The necessary expertise is often found only in countries with highly trained personnel and advanced technological capabilities.

TECHNICAL ASSISTANCE NEEDS

Food technology and science are complex, involving specialized knowledge in a wide range of fields such as chemistry, biochemistry, physical chemistry, microbiology, nutrition, toxicology, physics, radiology, statistics and mathematics. As a consequence, food control measures are diverse and complicated. The technical dimensions are different for nearly every food product, for the various technologies used in food preparation, processing and manufacturing and for the various types of facilities in which food is produced.

In view of the many food safety concerns of consumers and the diversity in scope and dimensions of food quality and safety problems, technical assistance is often needed. Furthermore, new food products are created every day and new technologies are being developed and introduced rapidly, so the demand for keeping up with the scientific advancements in food technology is high. Emerging hazards such as antibiotic-resistant microbes and novel pathogenic bacteria present food control officials with new challenges in maintaining controls to ensure public health. With rapid shipping methods and the global distribution of food, serious public health risks and food hazards in one part of the world can be transferred to other parts of the world in a matter of hours or a few days.

Consumers expect government to look after their interests in making sure that the food industry produces safe food and that economic fraud, unfair trade practices and risks to human health are minimized. Government frequently does not have the financial and technical resources to provide such assurance, especially in developing countries. Many developing countries lack access to the latest knowledge and information about new food processing technologies. They may also lack technically trained staff, equipment, methods and facilities for testing or analysing food for contaminants, toxins, chemical or drug residues or microbiological contamination.

In some countries, there is a need to update and revise the existing legal framework regarding food quality and safety. Regulations governing food standards are often lacking or outdated. Food control infrastructure may be non-existent, poorly organized or inadequately supported because of the lack of sufficient financial resources. In many countries, different government ministries or agencies are involved in food regulation and control, but their failure to coordinate their activities results in a waste of resources because of overlapping and redundant work efforts. There is generally a need for improved regulatory food inspection and laboratory services, development of food control enforcement programmes and the administration and coordination of food control activities in developing countries. Training in technical areas of food control is nearly always needed in such countries.

FAO'S CONTRIBUTIONS

The Uruguay Round of multilateral negotiations included a number of agreements that relate directly to the ongoing activities of FAO – among others, the Agreement on the Application of Sanitary and Phytosanitary Measures (SPS) and the Agreement on Technical Barriers to Trade (TBT). FAO's technical assistance programmes contribute to the ability of member countries to meet their obligations and acquire the benefits stemming from these agreements. FAO is experienced in providing its members with technical assistance concerning a wide range of trade issues, especially those related to the requirements of food quality and safety. FAO's technical assistance on food quality, safety and standards dates back to 20 or more years before the Uruguay Round. Activities in this area have intensified since the Uruguay Round agreements were signed in 1994 because of the many requests from member countries for the technical assistance needed to meet the requirements of the World Trade Organization (WTO), established as a consequence of the Uruguay Round.

The recognition of the standards, guidelines and recommendations of the Codex Alimentarius Commission as the benchmark standards for international food trade has created an exceptional interest among developed and developing countries in the use of Codex recommendations in resolving food control issues. Some importing countries are imposing specific sanitary measures that are difficult for developing countries to meet, such as the required use of HACCP-based systems for exported products. Consequently, exporting countries, especially developing countries that rely on the food export trade for foreign exchange, have a particular interest in strengthening national food control systems, harmonizing national food regulations with

international standards and establishing import and export food inspection and certification systems to ensure conformity with the SPS and TBT agreements.

Strengthening food control systems

The Food Quality and Standards Service of FAO's Food and Nutrition Division has recognized the need for continued advancement in improving food quality and safety and the needs of developing countries to improve their competitiveness in the international trade arena. The service has focused on establishing or strengthening national food control systems by providing technical assistance, often directly through individual Technical Cooperation Programme projects on a country-by-country basis. Over the past two decades, hundreds of activities have been carried out, giving assistance in a number of areas, such as:

- administering and managing food control programmes;
- developing, updating or revising food laws, regulations and standards;
- establishing food inspection and sampling programmes;
- establishing food laboratory analytical programmes;
- setting up national export food certification programmes;
- developing monitoring programmes for food contaminants;
- providing inspection and laboratory equipment;
- conducting training for food control managers, food inspectors and laboratory analysts;
- strengthening national Codex Contact Points and National Codex Committees;
- providing study tours abroad to expose food control personnel to other food control systems;
- providing technical references and manuals on subjects related to food control.

Training personnel to enhance performance, to increase technical knowledge and to develop skills in matters related to food control and nutrition has been and continues to be a primary role of the Food Quality and Standards Service. FAO has conducted comprehensive training programmes on a full range of food control subjects including food inspection, food control programme management, laboratory management and good manufacturing practices. These training programmes are being incorporated into the curriculum of the new Joint FAO/International Atomic Energy Agency (IAEA) International Training and Reference Centre in Seibersdorf, Austria and will also be made available to national educational and training institutions for incorporation in their food science, food technology and public health curricula.

All training programmes are based on the Codex

guidelines, texts and recommendations, and in particular on the Recommended International Code of Practice – General Principles of Food Hygiene; Principles for the Establishment and Application of Microbiological Criteria for Foods; and Hazard Analysis and Critical Control Point (HACCP) System and Guidelines for its Application (FAO/WHO, 1997).

The training programmes have been carried out in every region of the world. The most recent programmes have concentrated on HACCP training of trainers and food control programme management.

FAO workshops and training programmes are fully supported by a series of publications in the FAO series Manuals of Food Quality Control. To date, 16 manuals have been published and provided to member countries' food control officials. They offer practical information on key areas such as food for export (FAO, 1990), food inspection (FAO, 1991a), management of food control programmes (FAO, 1991b) and quality assurance in the microbiological laboratory (FAO, 1991c).

Scientific basis

To ensure FAO's continued ability to provide its member countries with up-to-date and appropriate science-based advice on matters related to nutrition and food quality and safety, the Organization frequently holds international consultations of invited experts who provide their independent advice and make recommendations on emerging issues related to food and trade. Recent expert consultations have covered biotechnology and food safety (FAO, 1996b); the application of risk analysis to food standards (WHO/FAO, 1995); risk management and food safety (FAO, 1997); the application of risk communications to food standards and safety matters (FAO, 1998c); food consumption and exposure assessment of chemicals (WHO/FAO, 1997); food fortification technology and quality control (FAO, 1996a); fats and oils (FAO, 1994); carbohydrates in human nutrition (FAO, 1998a); and animal feeding practices and food safety (FAO, 1998b) – all except the last held jointly with the World Health Organization (WHO). Reports from these consultations provide member countries with science-based information and advice.

FAO's comparative advantage

FAO technical assistance programmes, some in existence for more than 40 years, have helped many member countries meet requirements of food quality and safety in the international markets. Through the implementation of FAO recommendations and the Organization's technical assistance projects, many developing countries have advanced their quality and safety assurance programmes sufficiently to

comply with new trading rules and disciplines recently established by WTO. Much work is needed to bring about mutual recognition of food control systems, and equivalence status is still in the developmental stages for many countries.

FAO continues to be a source of such assistance and has a strong comparative advantage in the areas of food, agriculture and trade and any of the related technologies. Technical units within FAO dedicated to fish and fish products, animal husbandry and food-animal production, plant health and commodity production, dairy production, postharvest losses, food technology development and transfer and most aspects of agriculture make their expertise available on request and within the resource constraints of the Organization, either independently or through interdisciplinary groups as needed. FAO's comparative advantage lies in this collective expertise within one organization.

With its available expertise and experience and its ability to call upon the world's experts, FAO will continue to meet the challenges of providing the technical assistance needed by its members. Potential continues to exist for increased cooperation and collaboration with other international technical assistance programmes worldwide. ♦

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Ensuring food quality and safety and FAO technical assistance

Acceptable levels of food quality and safety can be achieved by implementing and monitoring quality assurance measures along the entire food chain. Food control measures are diverse and complex; the technical dimensions involved are different for nearly every food product, for the various technologies used in food preparation, processing and manufacturing and for the many types of facilities in which food is produced. The various measures range from good agricultural practices and good veterinary practices at the farm level to good manufacturing practices and good hygienic practices applied in food processing.

In view of the many concerns of consumers and the scope and dimensions of food quality and safety problems, technical assistance is often needed. Governments are expected to ensure that the food industry produces safe food and that the risks to human health and economic fraud or unfair trade practices are minimized.

Many developing countries do not have access to the latest information related to new technologies. They may lack technically trained staff, equipment, methods and facilities to analyse food for contaminants, toxins, chemical or drug residues or microbiological contamination. In some countries the legal framework related to food quality and safety needs to be revised and regulations governing food standards are lacking or outdated. Food control infrastructure may be weak and may not have sufficient financial support. Many countries have a need for improved regulatory food inspection and laboratory services, development of a food control enforcement programme, and administration and coordination of food control activities.

Many developing countries rely on food exports for foreign exchange and thus have a particular interest in strengthening national food control systems, harmonizing national food regulations with international standards and establishing import and export food inspection and certification systems to ensure conformity with the World Trade Organization's agreements regarding sanitary and phytosanitary measures and technical barriers to trade. FAO's Food Quality and Standards Service assists developing countries in establishing or strengthening national food control systems. Over the past two decades, hundreds of projects have been carried out to improve laws and regulations, inspection, certification, monitoring and training. FAO produces technical reference materials, guidelines and manuals on food control for practical advice and for use in training. FAO invites experts to provide independent advice and recommendations on emerging food and trade issues. For instance, recent expert consultations on food quality and safety focused on biotechnology, risk analysis, risk management and risk communication.

L'assurance de la qualité et de l'innocuité des aliments et l'assistance technique de la FAO

La mise en œuvre et le suivi de mesures d'assurance-qualité tout au long de la chaîne alimentaire permettent d'obtenir des aliments d'une qualité et d'une sécurité acceptables. Les mesures de contrôle des aliments sont variées et complexes; les aspects techniques en jeu diffèrent suivant le type de produit, les technologies utilisées pour la préparation, la transformation et la fabrication industrielle et les innombrables types d'établissements de production alimentaire. Les différentes mesures vont des bonnes pratiques agricoles ou vétérinaires au niveau des exploitations aux bonnes pratiques de fabrication et d'hygiène employées lors de la transformation des aliments.

Vu la multiplicité des préoccupations des consommateurs et la portée et les dimensions des problèmes de qualité et de sécurité des aliments, une assistance technique est souvent nécessaire. Théoriquement, le rôle des gouvernements est de veiller à ce que les procédés industriels adoptés garantissent la production d'aliments sains et à ce que les risques pour la santé humaine et les fraudes économiques ou les pratiques commerciales déloyales soient minimisés.

De nombreux pays en développement n'ont pas accès aux informations les plus récentes sur les nouvelles technologies. Ils n'ont pas toujours le personnel technique spécialisé, l'équipement, les méthodologies et les installations voulus pour analyser les aliments et détecter la présence de contaminants, de toxines, de résidus de produits chimiques ou de médicaments, ou leur contamination microbienne. Dans quelques pays, le cadre juridique relatif à la qualité et à la sécurité des aliments doit

être révisé et les réglementations régissant les normes alimentaires sont inexistantes ou dépassées. Les infrastructures de contrôle des aliments sont insuffisantes et reçoivent un appui financier trop faible. Pour de nombreux pays, il est indispensable d'améliorer les services réglementaires d'inspection des aliments et de contrôle en laboratoire, d'élaborer un programme de mise en application du contrôle des aliments, et d'administrer et de coordonner les activités de contrôle des aliments.

Nombre de pays en développement comptent sur les exportations alimentaires pour se procurer des devises: ils ont donc particulièrement intérêt à renforcer les systèmes nationaux de contrôle des aliments, à harmoniser leurs réglementations nationales sur les produits alimentaires avec les normes internationales et à établir des systèmes d'inspection et de certification des importations et des exportations alimentaires pour garantir leur conformité avec les dispositions des accords de l'Organisation mondiale du commerce relatifs aux mesures sanitaires et phytosanitaires et aux obstacles techniques au commerce. Le Service de la qualité des aliments et des normes alimentaires de la FAO aide les pays en développement à établir ou renforcer leurs systèmes nationaux de contrôle des aliments. Au cours des deux dernières décennies, des centaines de projets ont été menés à bien pour améliorer les lois et les règlements, les procédures d'inspection et de certification, le suivi et la formation. La FAO publie des données, des manuels, du matériel et des directives techniques sur le contrôle des aliments, qui donnent des conseils pratiques et servent de matériel de formation. La FAO invite des experts à donner des avis et des recommandations indépendants sur les problèmes qui apparaissent en matière d'alimentation et de commerce. Ainsi, les dernières consultations d'experts sur la qualité et l'innocuité des produits alimentaires portaient spécifiquement sur la biotechnologie, l'analyse des risques, la gestion des risques et la communication des risques.

Garantía de la calidad e inocuidad de los alimentos y asistencia técnica de la FAO

Es posible conseguir niveles aceptables de calidad e inocuidad de los alimentos aplicando y vigilando medidas de garantía de la calidad a lo largo de toda la cadena alimentaria. Las medidas de control de los alimentos son de diversas clases, tienen un carácter complejo y presentan aspectos técnicos que difieren para prácticamente todos los productos alimentarios, para las diversas tecnologías utilizadas en la preparación, elaboración y fabricación de alimentos y para los numerosos tipos de instalaciones en las que se producen los alimentos. Las diferentes medidas comprenden desde las buenas prácticas agrícolas y veterinarias en las explotaciones agropecuarias hasta las buenas prácticas de fabricación y de higiene que se aplican en la elaboración de los alimentos.

Teniendo en cuenta las muchas preocupaciones de los consumidores y el alcance y las dimensiones de los problemas relacionados con la calidad e inocuidad de los alimentos, a menudo se necesita asistencia técnica. Se espera que los gobiernos garanticen que su industria alimentaria funcione de manera que se produzcan alimentos inocuos y que se reduzcan al mínimo los riesgos para la salud humana y los fraudes económicos o las prácticas comerciales desleales.

Muchos países en desarrollo no tienen acceso a la información más reciente sobre las nuevas tecnologías. Es posible que carezcan de personal con capacitación técnica, equipo, métodos e instalaciones para analizar los alimentos con el fin de determinar la presencia de contaminantes, toxinas, residuos químicos o veterinarios o la contaminación microbiológicas. En algunos países, es necesario revisar el marco jurídico relacionado con la calidad e inocuidad de los alimentos y faltan reglamentaciones para las normas alimentarias o las que existen están anticuadas. La infraestructura para el control de los alimentos es precaria y no cuenta con un apoyo financiero suficiente. Son necesarios servicios reglamentarios mejorados de inspección de los alimentos y de laboratorio, un programa de mejora del control de los alimentos y la administración y coordinación de las actividades en este ámbito.

Los países en desarrollo dependen de la exportación de alimentos para obtener divisas y están especialmente interesados en fortalecer sus sistemas nacionales de control, armonizar las reglamentaciones alimentarias nacionales con las normas internacionales y establecer sistemas de inspección y certificación de las importaciones y exportaciones de alimentos para asegurar su conformidad con los acuerdos de la Organización Mundial del Comercio sobre Medidas Sanitarias y Fitosanitarias y sobre Obstáculos

Técnicos al Comercio. El Servicio de Calidad de los Alimentos y Normas Alimentarias de la FAO ayuda a los países en desarrollo a establecer o consolidar sus sistemas nacionales de control de los alimentos. En los dos últimos decenios, se han realizado cientos de proyectos para mejorar leyes y reglamentaciones y servicios de inspección, certificación, vigilancia y capacitación. La Organización prepara referencias técnicas y manuales sobre control de los alimentos en los que se ofrecen asesoramiento práctico y materiales de capacitación. La FAO invita a expertos a que proporcionen asesoramiento independiente y formulen recomendaciones sobre problemas incipientes relacionados con la alimentación y el comercio. Por ejemplo, se han celebrado recientemente consultas de expertos sobre calidad e inocuidad de los alimentos centradas en la biotecnología y en el análisis, la gestión y la comunicación de riesgos. ♦