Strengthening the food supply chain

From great achievements to a new beginning

by Jean Baptiste Finidori (France) and Cláudio Guerreiro (Brazil), twinned secretariat of ISO/TC 34, Food products

From its inception, ISO has been concerned by the challenges faced by the food and feed supply chain and its consumers. Conscious of the importance of ensuring the quality and safety of food products, as well as of the global need for harmonized specifications – not just to facilitate access to global markets, but also to address increasingly multinational production processes – ISO/TC 34, *Food products,* was among the first technical committees created when the organization began its activities in 1947.

Today, a changing landscape calls for new solutions to respond to emerging practices – such as evolving food habits, urbanization and economic and population growth – which have dramatically increased the demand for human and animal foodstuffs, as well as the competition between food and non-food markets like bio fuels. True to its role, ISO/TC 34 is envisioning innovative developments to address these challenges.

Members of the ISO/TC 34 Chair's Advisory Group had the opportunity to tour the wholesale market of Rungis in Paris, France, said to be the largest food market in the world.

PHOTO COPYRIGHT: Mrs. Annick HAMEL from AFNOR

About the authors

Jean Baptiste Finidori is co-Secretary of ISO/TC 34, *Food products.* With a doctorate in pharmacy and an education in political sciences, he joined AFNOR in 2001 as a project manager.

Mr. Finidori has been extensively involved in the activities of ISO/TC 34 over the years. Previously he was Secretary of ISO/TC 34/SC 12, *Sensory analysis* and of the now disbanded ISO/TC 34/WG 7, *Genetically modified organisms and derived products*.

Cláudio Guerreiro is Manager of the International Standardization area of the Standardization Directory of ABNT, the ISO member for Brazil.

He has worked in standardization for more than 10 years, mainly in connection with regional and international work. Mr. Guerreiro manages the secretariats of AMN (Mercosul Association for Standardization), COPANT (Pan American Standards Commission) under ABNT leadership, and the secretariats of some ISO technical committees, among which the twinned secretariat of ISO/TC 34, *Food products*.

"There are around 310 recommended methods of analysis and sampling which refer to ISO/TC 34 standards."

A first after two decades

An initial step was the organization of a plenary meeting in Paris, France, in October 2008 – first of its kind in over two decades[1]. More than 20 national delegations attended, among them China, India and the USA. Interestingly, countries that do not often participate in international meetings were also present, highlighting the global importance of the event.

1) Prior to the October 2008 meeting, the last plenary of ISO/TC 34 had taken place in 1985.

The Paris meeting was also the first held under the new twinned leadership of France (AFNOR – *Association française de normalisation*) and Brazil (ABNT – *Associação Brasileira de Normas Técnicas*), that took up responsibility for the ISO/TC 34 secretariat in September 2006.

To address a changing business environment, one of the specific tasks facing ISO/TC 34 is to adapt its structure and to involve new stakeholders. A move in this direction took place in 2007, with the creation of a Chair's Advisory Group (CAG) to coordinate the work done within the technical committee and to advise the Chair on strategic issues. Several decisions taken during the plenary continue this effort. Discussions included:

After some hard work the ISO/TC 34 Chair Advisory Group enjoys a hearty meal.

- a proposal to modify the scope in order to align it with recent developments, in particular in the field of food safety management system standards, as well as the application of ISO 9001 (quality management systems);
- revision of the committee's business plan.

Safety and quality in focus

With more than 100 members and over 700 published standards and guides, ISO/TC 34 is the main ISO technical committee developing standards for the food and feed sectors. In practice, ISO/TC 34's scope covers almost all agricultural products, whether or not they have been processed for human or animal consumption.

A strong team – From left: ***Jean Baptiste Finidori*** *and* ***Cláudio Guerreiro*** *co-Secretaries of ISO/TC 34 with* ***François Falconnet*** (back)*, Chair of ISO/TC 34.*

As currently defined the committee addresses:

"Standardization in the field of human and animal foodstuffs as well as animal and vegetable propagation materials, in particular terminology, sampling, methods of test and analysis, product specifications and requirements for packaging, storage and transportation. Excluded: products covered by ISO/TC 54, *Essential oils* and ISO/TC 93, *Starch (including derivatives and by-products)*."

It is envisaged that the technical committee will focus its efforts in particular, though not exclusively, on two key elements: food safety and quality.

"ISO/TC 34, Food products, was among the first technical committees created."

Food safety

The ISO/TC 34 work programme is predominantly made up of methods of test and analysis. However, given the considerable size differences between the various organizations which put these documents into practice, special attention must be given in terms of how suitable they are for small and medium enterprises (SMEs).

With this in mind, ISO/TC 34 participates in ISO's Joint Technical Coordination Group on Management System Standards (JTCG-MSS). Whilst agreeing in principle with the initiative, delegations to the 2008 plenary reaffirmed that the specificities of the food sector must be considered, in order that future work remains applicable and that any new process rules not be time-consuming.

Quality of products

This topic revolves around the following two points:

- product specifications with work already initiated or ongoing, as for example the draft standard ISO/DIS 26642, *Food products – Determination of the glycemic index (GI) and relevant classification*,
- the process in place to ensure that the quality expected is obtained. Since this particular point is not specific to the agri-food sector, ISO/TC 34 uses existing documents – in particular ISO 9001 – to carry out its work in this respect. For example, to develop ISO/DIS 22006, *Quality management systems – Guidelines for the application of ISO 9001 in crop production*.

"As the main ISO technical committee in the food and feed sectors, ISO/TC 34 plays a core role."

International partnerships

Developing partnerships between ISO/TC 34 and other international organizations is one of the technical committee's stated objectives.

Amongst its most important partnerships is that with the Codex Alimentarius Commission (CAC). In its document CODEX STAN 234-1999, *Recommended methods of analysis and sampling*, the CAC refers to ISO/TC 34 standards in 310 methods. Coordination of work between the two organizations is therefore of particular importance.

For that reason, ISO/TC 34 subcommittees are directly registered in the Codex committees of interest for their work. This facilitates their being in a position both to comment on Codex documents under development and to identify ISO standards of interest. In support of setting up a sustainable framework

to continue the partnership between the CAC and ISO, a CAC representative was invited to attend the plenary and present the current CAC work programme.

A similar invitation was also extended to a Global Food Safety Initiative (GFSI) representative, who presented the organization's benchmark process for existing documents on food safety management, bearing in mind that ISO/TC 34 has developed ISO 22000:2005, *Food safety management systems – Requirements for any organization in the food chain*.

As there are many other organizations with work in the food sector, the delegations to the plenary meeting decided to continue to work on this objective through evaluations of other organizations with a view to possible liaison.

Start of a new era

From a global point of view, this recent plenary meeting can be seen as the starting point of a new dynamic and approach, to ensure that ISO/TC 34 can ably face the emerging challenges of the food and feed sectors. However, this by no means implies that the committee wishes to oust its past, which holds great achievements. Nor will it take anything for granted.

"The most important of these partnerships is the one that ISO/TC 34 has with the Codex Alimentarius Commission."

A concrete example of this revitalized approach will be the drive in Latin America, under the supervision of ABNT (ISO member for Brazil and co-secretary of ISO/TC 34), to foster the participation of developing countries in the committee's work – notwithstanding that ISO/TC 34 does already have a fairly high number of developing countries either registered as P-members or having responsibilities within the technical committee or its subcommittees. ■

International standards for food safety – A collaborative approach

by Kazuaki Miyagishima, Secretary, FAO/WHO Codex Alimentarius Commission

The Codex Alimentarius Commission (CAC) was jointly established in 1963 by two specialized agencies of the United Nations – the Food and Agriculture Organization of the United Nations (FAO) and the World Health Organization (WHO). Since then and continuing to this day, the CAC has relentlessly been developing international food standards in the areas of food safety, food definition and essential quality, and methods and procedures for conformity assessment. The adopted standards and related texts are published in the *Codex Alimentarius* (Latin for "food code")[1].

The purpose of the CAC is to develop international standards and related texts for food safety and quality, with the aim of protecting the health of consumers and ensuring fair practices in food trade, as well as promoting coordination of all food standards work undertaken by international governmental and non-governmental organizations. Therefore, it comes as no surprise that the history of collaboration between the CAC and ISO also dates back to as early as the 1960s.

In the past, the interaction between the CAC and ISO mainly, though not exclusively, took place between the Codex Committee on Methods of Analysis and Sampling and ISO technical committee ISO/TC 34, *Food products*.

More recently, interaction and coordination is extending to other areas, such as food safety management, traceability/product tracing and inspection/certification. This has opened up the potential for cooperation with other ISO bodies such as ISO/TC 234, *Fisheries and aquaculture*, and the ISO committee on conformity assessment (CASCO).

1) Web site: www.codexalimentarius.net

Fruit market in Jerez, Spain, photo: P. Krieger

Integrating the food chain

A series of food safety problems that we have experienced in recent years has demonstrated that there are no national borders for these issues and that the international community needs to commit itself to joint action in order to address them. To be successful, prevention of food-borne diseases must integrate the full food production chain: from farm to fork. Critical points for effective intervention might be at the farm level for some food-borne hazards, or at the retail level for others. Regardless of the types of foods, their origin and methods of production, one thing is clear: primary responsibility for food safety lies with the operators in the food chain.

The CAC has fully recognized the importance of the food chain approach. The *Codex International Recommended Code of Hygienic Practice – General Principles of Food Hygiene*[2] was thoroughly revised in 1997 to emphasize the food chain approach across the entire food sector, including primary production, processing, storage, through to transportation and final consumption. In the same year, an annex was attached to the General Principles, recommending the Hazard Analysis and Critical Control Point (HACCP) system as a powerful tool for food safety management.

However, the implementation of an HACCP-based system may pose significant challenges to governments and the industry alike, particularly in developing countries. Good hygienic practices, for instance, should be in place as a prerequisite to the HACCP system. Recognizing these challenges, FAO and WHO published in 2007 a guidance document to provide countries and relevant stakeholders with practical solutions for the implementation of HACCP in small and/or less developed food businesses[3].

Complementary activities

Codex standards are addressed to governments, and it is up to governments to convert Codex recommendations into national legislation or regulations. ISO standards, on the other hand, are voluntary standards which may be taken up both by industry and governments.

In the area of food safety management, ISO 22000:2005, *Food safety management systems – Requirements for any organization in the food chain,* provides a model of HACCP application which a food business operator can refer to, even when there is no official requirement for HACCP in the country concerned.

This ISO standard, complemented by ISO/TS 22004:2005 giving application guidance, and ISO/TS 22003:2007 giving requirements for audit and certification bodies, offers a practical tool to those who choose to use it for assuring quality of products and demonstrating compliance with requirements specified by the authorities of the target market. This can be seen as an example of how standards developed by governmental bodies and by ISO – whose standards are developed with the participation of experts both from industry and regulatory bodies – complement each other.

The food chain approach calls for food safety standards that address a whole process of food production (process standards); this however does not reduce or eliminate the role of commodity standards and commodity specific codes of practice (product standards).

The CAC has been revising a number of product-specific codes of practice in line with modern risk-based approaches, to take full account of specific food-borne hazards in foods such as eggs or milk or in animal feed. Moreover, end-product testing can also be used to verify the effective implementation of process standards, and, under certain circumstances, may be considered as an effective means of preventing adulteration of food and guaranteeing safety of food.

Monitoring of food supply for compliance with food safety and quality standards must be conducted using reliable food sampling and analysis techniques. Furthermore, these techniques must be accessible to developing countries, in order not to deprive the latter of the opportunities to produce value-added food products, some of which may be exported to foreign markets. A number of ISO standards are recognized by the CAC as reliable and affordable methods of testing and are used by many countries as reference methods.

Dynamic perspective

Without prejudice to ongoing discussion on the respective roles of standards developed specifically for the public sector (e.g. Codex standards) and voluntary standards developed by non-governmental organizations such as ISO[4] in the food trade, we can clearly see that the two types of standards-setting bodies cannot ignore the work done by each other.

The complementary input from public and private sectors to standards will have to be seen in a dynamic perspective as the food regulatory authorities progressively adopt the food chain approach. So long as consumers continue to expect the role of a final arbitrator in their government to ensure safe food supply, international public sector standards will increase their importance in a globalizing world.

The mutual wish to avoid duplication of work and inconsistencies between standards will make it necessary to increase the level of dialogue between Codex and ISO focal points at the country level. Codex and ISO are entering a new era of cooperation and coordination.

About the author

Kazuaki Miyagishima was appointed Secretary of the Codex Alimentarius Commission in 2003 by the Directors-General of FAO and WHO. The central secretariat of the Codex Alimentarius Commission is housed in the FAO Headquarters, Rome, Italy, under the Joint FAO/WHO Food Standards Programme.

2) CAC/RCP 1-1969, downloadable from the CAC Web site.

3) FAO/WHO guidance to governments on the application of HACCP in small and/or less-developed food businesses, downloadable at **www.fao.org/ag/agn/agns/foodcontrol_assurance_en.asp**

4) However, some ISO members are governmental in origin or closely linked to government.

Standards and the WTO/SPS Agreement

by Marinus Huige[1], Chairman of the WTO Committee on Sanitary and Phytosanitary Measures

Standards are not new to the World Trade Organization (WTO) Sanitary and Phytosanitary Measures (SPS) Committee. In fact, the SPS Agreement recognizes the international standards set by governmental bodies, namely the World Organisation for Animal Health (OIE), International Plant Protection Convention (IPPC) and Codex Alimentarius Commission (CAC).

ISO, as a non-governmental developer of voluntary international standards, also has a good reputation in this respect. ISO has both observer status at the CAC, and is an observer member of the WTO SPS. Recently, ISO adopted the CAC's Hazard Analysis and Critical Control Point (HACCP) principles into its flagship food safety management systems standard ISO 22000:2005.

Moreover, ISO has demonstrated a keen interest in continuously strengthening its collaboration with governmental organizations like the WTO and CAC in order to ensure a harmonized approach to food and feed issues.

Forum for discussion

There are also voluntary industry standards – sometimes referred to as private sector standards. When I was elected Chairman of the WTO Committee on Sanitary and Phytosanitary Measures (SPS Committee) in 2007, I did not anticipate having to handle intensive discussions on private sector standards.

"Transparency, openness, stakeholder inclusiveness and harmonization are of major importance."

WTO members use the WTO's SPS Committee as a forum to raise specific trade concerns. And ever since June 2005, when St. Vincent and the Grenadines first raised a concern with regard to the then EUREPGAP requirements on pesticides used on bananas destined for sale in European markets, the question of industry standards has become a recurrent one in the meetings of the SPS Committee. Moreover, discussions have intensified over the last year.

The term private sector or industry standards is used here to refer to everything from individual retailer labels (e.g. Tesco Nature's Choice) to collective national and international standards and certification schemes such as the SQF (Safe Quality Food) Programme and GLOBALGAP – formerly EUREPGAP, a coalition between major European retailers that has now gone global.

These private sector standards may cover any stage from pre-farm gate to post-farm gate. They may also address all sorts of consumer interests including food safety, environment, social or labour conditions, corporate responsibility and – an issue of increasing importance – the carbon footprint of products or their associated "food miles".

Three themes emerge

Although it is recognized that private sector standards can have positive impacts in helping to access high-quality markets, the main concerns raised by WTO members can be grouped into three themes:

- **Effect on market access** – Private sector standards are perceived to be more restrictive than national government requirements and associated international standards, as well as more prescriptive in terms of process. Members express the concern that private sector standards constitute additional market access barriers and, although voluntary, are *de facto* entry requirements for some markets.
- **Development concerns** – These include the proliferation of private sector standards and certification schemes, and associated costs of compliance, all of which can cause particular difficulties for small-scale producers.
- **Legal issues in relation to WTO agreements** – Members' views differ on the question of the application of the SPS Agreement to industry standards – caused by somewhat ambiguous language in the SPS Agreement. Some members maintain that private sector standards are a legitimate private sector activity to which the SPS Agreement does not apply. Others say that the SPS Agreement also covers the activities of non-governmental entities, and that the proliferation of

1) *Author's note:* The views expressed in this paper are those of the author only and do not necessarily represent the views of the World Trade Organization or its members. The author wishes to thank the WTO Secretariat for its assistance and background documents.

industry standards could undermine the progress that has been made in regulating sanitary and phytosanitary measures through implementation of the SPS Agreement.

The SPS Agreement at work

The Agreement on the Application of Sanitary and Phytosanitary Measures (SPS) sets out the basic rules for food safety and animal and plant health protection. It allows countries to set their own requirements, but stipulates that regulations must be based on science, and should be applied only to the extent necessary to protect human, animal or plant life or health.

The preferred way of meeting the scientific justification requirement is through the use of internationally developed food safety, plant and animal health protection standards as adopted by Codex, the IPPC's Commission on Phytosanitary Measures (CPM) and the OIE.

About the author

Marinus P.C. Huige is Counsellor for Agriculture, Nature and Food Quality issues at the Permanent Representation of the Kingdom of The Netherlands in Geneva, a position he has held since 2005. As a representative of a WTO member state, he currently chairs the WTO Committee on Sanitary and Phytosanitary Measures. Prior to joining the Permanent Representation, Mr. Huige was a senior Trade Policy Advisor at the Ministry of Agriculture, Nature and Food Quality in The Netherlands, having worked as a legislation lawyer at the same Ministry. Before joining the Ministry, he served as a lawyer at a law firm in Rotterdam, where his practice focused on commercial litigation, European competition law and intellectual property law.

Harmonization of national requirements on the basis of these international standards facilitates trade by reducing the proliferation of distinct national requirements. The SPS Agreement also encourages the participation of developing countries in the preparation and adoption of international standards, which has been addressed through the creation of trust funds and various assistance programmes. Other provisions of the SPS Agreement require consideration of the special needs of developing countries, through the provision of special and differential treatment.

Despite the existence of international standards, governments can still justify different national requirements if these are based on an appropriate risk assessment. However, the measures they impose must be the least restrictive to trade that are required to achieve the desired level of health protection. And the level of health protection sought by governments, whilst a sovereign decision, cannot be arbitrary and should be consistent in the face of similar health risks.

"The term private sector or industry standards refers to everything from individual retailer labels to collective national and international schemes."

Importantly, the SPS Agreement contains a number of provisions to ensure the transparency of sanitary and phytosanitary requirements. Not only must governments give advance notice of their intention to modify SPS measures, but they must also take into consideration any comments submitted by trading partners, provide associated documents upon request (including risk assessments and the scientific evidence underpinning intended modifications), and ensure that all measures are published promptly.

In addition, the SPS Agreement requires that there be no unjustified costs in testing, certification or approval procedures, to ensure that these do not function as barriers to trade.

Finally, the WTO Agreement ensures that national SPS requirements can be challenged by other trading partners, through the use of the WTO's unified dispute settlement procedures.

Private sector requirements

In contrast to these globally negotiated disciplines on governmental actions, the food safety management programmes operated by the private sector are seen by many developing countries to be going in the opposite direction. Although these schemes do pose problems for producers in developed countries, it seems it is the producers in developing countries that are most frustrated.

Firstly, many of them already find it difficult to produce goods that meet the internationally agreed food safety standards of the SPS Agreement, and then they find that having overcome this challenge, they still cannot gain access to a number of markets unless they meet a further set of private sector standards. On top of that, developing countries point to the proliferation of distinct private sector requirements, with little apparent harmonization.

Certification is costly and recurrent, not least because it is often carried out by private companies that seek to make a profit. Lack of transparency and inclusiveness of stakeholders is often seen as a shortcoming of private sector standards. Fortunately, some private sector schemes have recognized these problems, with the result that efforts are being made to "benchmark" or accept other standards as equivalent.

A variety of objectives

Another consideration is that the industry sector schemes tend to address a mix of SPS and other objectives, including social and environmental concerns that are not related to food safety or plant/animal health protection. Therefore the question arises as to whether the SPS Committee is the most appropriate place to address the issue of these requirements.

The WTO subjects food safety requirements to a different set of legal obligations than those applied to quality and environmental measures or to measures intended to combat consumer fraud. This, added to notification requirements, pushes governments to identify the objectives of their national requirements, and to clearly distinguish between requirements imposed for health protection and those imposed for other purposes.

"Advice from the ISO Central Secretariat will be of great value to the work of the SPS Committee."

The Committee is now trying to identify SPS-related issues within private sector standards schemes to see what challenges they pose. For their part, and on the basis of specific examples, members will try to identify the SPS elements in industry food safety schemes and how they relate to the SPS Agreement.

Where are we now?

The SPS Committee is still in the process of identifying the various challenges of private sector standards schemes in relation to SPS principles. However, it is already clear that transparency, openness, stakeholder inclusiveness – including the engagement of developing countries – and harmonization are of major importance.

This is true for the acceptability of standards in general, and therefore also for industry standards schemes. As a non-governmental developer of voluntary international standards, ISO has a good reputation in that respect, and advice from the ISO Central Secretariat will be of great value to the work of the SPS Committee.

Standing for a non-negotiable right – The Global Food Safety Initiative

by Catherine Francois, Director, Food Safety Programmes, CIES – The Food Business Forum

There is no escaping the fact that globalization is transforming the world in which we live and the way we do business. But while it has been hugely beneficial in terms of bringing more choice to the consumer, opening new markets and identifying competitive new manufacturers and producers, it also poses significant challenges in terms of longer supply chains, global sourcing and traceability.

Nowhere is that more true than in the international food business. The more you transport your food and the more business you do around the world, the more your business is exposed to risk. In order to minimize the risk, all players along the supply chain must work closely together to deliver safe and quality food to the consumer.

Safe food is non-negotiable

"Safe food for consumers, wherever they are in the world, is non-negotiable. The Global Food Safety Initiative (GFSI) was launched back in 2000 and is coordinated by CIES[1] – The Food Business Forum, an international food business association. GFSI is a unique platform which provides the opportunity to work collaboratively across the food business on harmonizing food safety standards. Our mission is to work to improve food safety management standards with all stakeholders, and align them within one common global framework which helps to restore confidence in the supply chain and ultimately to the consumer", said J.P. Suarez, GFSI Chairman and senior vice president and general counsel, International Division, Wal-Mart Stores, Inc.

A recent consumer survey by Deloitte, entitled *Food and product safety and its effect on consumer buying habits*, suggests that questions about product safety can have a significant impact on consumers' shopping habits. The results show that 58 % of those surveyed said that they altered their decision-making in response to allegations about unsafe products.

Although the survey looked at a number of product categories – including toys and consumer electronics – food was the area where safety questions had the biggest implications. In fact, 54 % declared they were more concerned about fresh food safety today than they had been just 12 months ago. Moreover, the study indicates that these changes are not short-lived –they not only tend to last an average of nine months, but also increase the probability that the customer will never return to buying the specific item(s) in question.

1) Comité International d'Entreprises à Succursales (International committee of food retail chains)

About the author

Catherine Francois is Director, Food Safety Programmes at CIES – The Food Business Forum, headquartered in Paris, France.

"All players along the supply chain must work closely together to deliver safe and quality food to the consumer."

Whilst it is true that food has always been a global business, it is also true that the food safety standards to which the industry now holds itself have never been as stringent or consistent as they are today. So how should retailers, food service providers and manufacturers respond in the light of recent food safety scares and plummeting consumer confidence?

Benchmarking good practice

GFSI, which brings together the world's leading food retailing, manufacturing and service companies, continues to grow in importance in the world of food safety internationally. The GFSI Guidance Document Version 5[2] was released in 2007 and the alignment of four major food safety management schemes – British Retail Consortium (BRC), Dutch HACCP code, International Food Standard (IFS) and Safe Quality Food (SQF) – through GFSI benchmarking has led to the common acceptance of these standards by seven major international retailers – Carrefour (France), Delhaize (Belgium), Metro (Canada), Migros (Switzerland), Royal Ahold (Netherlands), Tesco (United Kingdom) and Wal-Mart (USA).

Two pre-farm gate primary production schemes – SQF 1000 and New Zealand GAP (good agricultural practice) – have also been benchmarked by GFSI, and work is currently underway to align other schemes against the GFSI requirements in this part of the supply chain.

2) Downloadable from **www.ciesnet.com**

The GFSI Guidance Document, which references a number of ISO and ISO/IEC International Standards, sets out key elements identified as requirements for food safety management schemes, as well as for associated standards and certification processes. Further, it provides both guidance to food safety management schemes seeking compliance and a framework in which they can be benchmarked. Guidance on the operation of certification processes is also given.

The importance of ISO 22000

There is growing optimism that GFSI is about to reach another milestone: "We have recognized for some time that it was important to find a way to include ISO 22000 in the Global Food Safety Initiative, particularly because it is a multi-stakeholder standard," says Roland Vaxelaire, a board member of the European Food Safety Authority (EFSA) and former GFSI Chairman. "Now we believe that we are very close and that this will be achieved very soon."

"54 % of consumers are more concerned about fresh food safety today than 12 months ago."

Although currently GFSI does not formally recognize ISO 22000:2005, *Food safety management systems – Requirements for any organization in the food chain*, the GFSI Technical Committee has recently completed work identifying where the differences exist between the GFSI Guidance Document and ISO 22000. The resulting Technical Committee Position Paper – What is ISO 22000?[3] was published in September 2007. This has led the way for further work by a number of organizations interested in gaining re-cognition of ISO 22000 by GFSI.

Why has it taken until now to incorporate ISO 22000 into the GFSI recognized standards? The challenge has been to bridge the gap between ISO 22000 and GFSI's Guidance Document.

3) Downloadable from **www.ciesnet.com**



"The difficulty was that whilst ISO 22000 sets out the principles of food safety management and HACCP, developed by the Codex Alimentarius Commission, to identify, prevent and control food safety hazards, and whilst this is very important for the food safety community, it was felt to be too general as an auditing standard for retailers," explains Yves Rey, Corporate Quality General Manager, Danone Group. "So we came to the conclusion that to recognize ISO 22000, we had to recognize ISO 22000-plus-something – and that 'plus something' had to bridge the gap."

The Confederation of European Food and Drink Manufacturers (CIAA) took on the challenge to do just that earlier this year. They have bridged the gap by developing a prerequisite programme which includes the specifics that were felt to be missing from ISO 22000. This new document, published as PAS 220:2008, *Prerequisite programmes on food safety for food manufacturing*, and available from BSI British Standards, the ISO member in the United Kingdom, is designed to be used in conjunction with ISO 22000. It is hoped that these developments will lead to the opportunity to submit ISO 22000:2005 in combination with PAS 220 for recognition by the GFSI, using the benchmark framework outlined in the GFSI Guidance Document for the assessment.

A continuing focus

This development should pave the way for further collaboration with ISO, enabling leading food safety experts from all branches of the food business to work more closely together to maintain a safe food supply chain for consumers around the world. Since that implies each and every person on the planet, it is easy to understand why ensuring food safety is and will continue to be a major and ongoing preoccupation at all levels.

Echoing this thought, the next annual GFSI/CIES conference, to be held in Barcelona in February 2009, will focus on "Food Safety: The Global Challenge" (**www.ciesfoodsafety.com**).

Harvesting new collaboration – The International Olive Council

by Mercedes Fernández Albaladejo, International Olive Council, and Wenceslao Moreda, Fats & Oils Institute, Spanish Research Council

The olive oil market is a distinctive one. Its development is influenced heavily by factors such as the geographical location of olive growing in areas that are subject to cyclical periods of drought. Olive production is also distinctive, being characterized by an alternating pattern of large and small crops resulting, inevitably, in price instability.

No wonder then that the countries with interests in olive growing felt the need to join forces and set up an international forum, not only to find remedies to the problems and boost the market, but also to develop a united framework to defend and safeguard the olive tree and olive oil.

From this common desire came the first International Agreement on Olive Oil and Table Olives (1956) and the subsequent founding of the International Olive Council (see **Box**), both known under the acronym IOC.

For most of the parties to the Agreement, olive farming must necessarily be taken into account in any detailed consideration of agriculture, employment, rural depopulation, trade in agri-food stuffs, soil and environmental conservation, and many other subjects of fundamental socio-economic importance.

Setting standards for legislation

One of the most significant regulatory tasks of the IOC is to develop the definitions and analytical characteristics of all the grades of olive oils and olive-pomace oils included in the trade standards adopted by members for compulsory application in international trade.

The standards drawn up by the IOC are trade standards. They are adopted by consensus of the members, which

pledge to incorporate them into their legislation. Revision of IOC standards takes place in the light of scientific advances that help to make testing methods more accurate, or of technological and commercial developments.

Ever since it first started to be involved in the standardization of olive products, the IOC has cultivated a solid cooperative relationship with a number of international organizations, including the Codex Alimentarius Commission (CAC), the World Customs Organization (WCO) and the European Union. Its aim in doing so is to define the minimum compositional, quality and purity requirements of olive oils and to harmonize the methods of analysis in use.

The Codex Alimentarius Commission is responsible for the joint FAO-WHO programme for the development of food standards with an eye to consumer health protection and fair trading. The World Trade Organization (WTO) takes into account the standards and recommendations of the CAC in the application of the WTO Agreements on Sanitary and Phytosanitary Measures (SPS Agreement) and Technical Barriers to Trade (TBT Agreement). The CAC standards for olive oils and table olives are currently under revision to bring them into line with the IOC trade standards.

Accounting for 98% of the world's olive oil

The International Olive Council (IOC) is the intergovernmental organization mandated to administer the International Agreement on Olive Oil and Table Olives, negotiated under the auspices of the United Nations Conference for Trade and Development.

Since its creation in 1959, the IOC has been headquartered in Madrid, Spain. At present, it has 15 members (Algeria, Croatia, Egypt, European Union (with its 27 Member States), Iran, Iraq, Israel, Jordan, Lebanon, Libya, Montenegro, Morocco, Serbia, Syria and Tunisia). A further five countries are currently negotiating membership.

The olive tree provides a source of income for over 12 million people around the world. Current IOC members account for 98% of the world's olive oil.

Building on the relationship

The IOC has a long-standing collaborative relationship with ISO, albeit, until quite recently, as a liaison body. However, at its meeting in Buenos Aires, Argentina, in April 2007, ISO technical committee ISO/TC 34, *Food products,* subcommittee SC 11, *Animal and vegetable fats and oils,* passed a resolution to take the first steps for the IOC to participate fully in ISO/TC 34/SC 11. Subsequently, in May 2008, this closer cooperation bore fruit with the proposal of an initial set of three IOC testing methods for ISO adoption. These methods, which are specific to olive oil and included in the IOC trade standard, are:

- determination of the aliphatic alcohols content by capillary column chromatography (COI/T.20/Doc. No 26);
- determination of the percentage of 2-glyceryl monopalmitate (COI/T.20/Doc. No 23) – although ISO already has the lipase method, this IOC method is specifically for olive oil;
- determination of wax content by capillary column gas chromatography, (COI/T.20/Doc. No 18/Rev. 2).

The associated ISO standards, currently under development as ISO 12871, ISO 12872 and ISO 12873 respectively, will use the fast-track procedure for comment by ISO members. The three standards are targeted for publication during 2009, after which it is expected that other COI-referenced methods will be proposed.

ISO member from a major olive oil producer

Clearly, since Spain is a major producer of olive oil, this work is keenly followed by *Asociación Española de Normalización y Certificación* (AENOR), the ISO member for Spain. AENOR has a national subcommittee that is responsible for standardizing testing methods for vegetable oils and other fat products. Methods connected with olive oil, especially concerning the requirements for compliance during the extraction process and in the final product, are of particular interest. AENOR has several national standards specific to olive oil, as, e.g. UNE 34606:2003, UNE 34601:2003 and UNE 34605:2003, which, respectively, set out requirements for packing, product specifications and mill production requirements with respect to extra virgin olive oil.

About the authors

Dr. Wenceslao Moreda is a research scientist at the *Instituto de la Grasa* (Fats & Oils Institute, Spanish Research Council – CSIC). He has lengthy experience in the development of methods of analysis for the determination of the quality and purity of olive oils and participates in various committees of chemistry experts, including those of the IOC, ISO/TC 34/SC 11 and the EU.

Dr. Mercedes Fernández Albaladejo is Head of the Olive Oil Chemistry & Standards Unit at the International Olive Council. Her brief includes collaborative work on physico-chemical and sensory testing of the compositional and quality characteristics of olive products to provide input for drawing up international quality control standards, harmonizing national and international legislation to ensure fair international trading, protecting consumer rights and preventing fraud.

Winning factors

Every year the IOC assembles groups of expert chemists and sensory analysts from a range of countries to study and, if necessary, revise the testing methods to determine the quality and control the purity of olive oils and olive-pomace oils. Methods are constantly being improved to adapt them to industry needs and technological developments. This review process generates a large body of knowledge which the IOC can relay to the ISO committees in which it participates.

A key function of the IOC is the forum it provides for its members to draw up rules for olive products, which are then adopted by consensus. The aims of these rules are manifold: firstly, to enhance and control quality, but additionally to ensure transparency on the international market for olive oils, olive-pomace oils and table olives, and to promote their consumption.

Both the IOC and AENOR believe full involvement in ISO to be of crucial importance as an effective way of both introducing specific methods for olive oil and of participating in the conception and development of new standardized methods that include olive oils among the substances evaluated. The IOC and AENOR share the same priorities of harmonizing methods of analysis to ensure the application of a single unified method for laboratory accreditation purposes and to facilitate inter-comparison of multi-country results.

Old wisdom

The fact that the prestige of olive oil is growing stronger by the day – far beyond its Mediterranean borders, and no doubt linked with increasing awareness of its benefit to health – confirms that our ancestors were right in their wish to defend and safeguard this age-old and generous tree. It encourages the entire olive community to continue working for all those who earn their livelihood from olive farming. ■

Making it safe to eat – the ISO 22000 series

by Jacob Færgemand, Convenor of ISO/TC 34/WG 8, Food safety management systems

The safety of feed and food at any point in the chain from producer to consumer is of worldwide concern. Food safety hazards may be introduced at any stage, therefore adequate control throughout the production chain is essential.

Examples of outbreaks of highly contagious diseases in livestock, such as foot and mouth disease, and of micro-organisms like *salmonella* and *listeria* have highlighted the risks of food contamination.

Unsafe food is a risk for all – consumers can become seriously ill, and the industry can face costly corrective actions. The underlying belief that harmonization is possible across today's global industry is not enough, nor are sound food safety directives on their own.

Communication and raising awareness of potential hazards throughout the entire food chain – and therefore not restricted to one's company or department – is crucial. Food safety is a joint responsibility for all of the participating parties.

ISO 22000:2005, *Food safety management systems – Requirements for any organization in the food chain*, aims to ensure that there are no weak links in the food supply chain. Since its publication in September 2005, the standard has been well received by the food industry and is clearly becoming a global standard to be reckoned with.

Tailor-made approach

ISO 22000 has been designed with flexibility to enable a tailor-made approach to food safety for all segments of the food chain. It does not take a "one

size fits all approach since the standards and procedures required for high risk areas in one food sector may not be appropriate in another. For this reason, unlike other schemes, the standard does not provide a checklist methodology.

If a company seeks certification to ISO 22000, it needs to follow local and export market laws, as well as implementing customers' requests. ISO 22000 requires that industry targets each specific type of food product adequately according to its needs.

"Unsafe food is a risk for all."

Effectiveness through communication

Through the development of one system that crosses all food sector branches and national borders, food safety is strengthened by the harmonization of working procedures. This is one of the fundamental rationales behind the ISO 22000 standard.

If everyone uses the same methods and language, the system's effectiveness improves, increasing food safety, reducing the risk of critical errors and misunderstandings, and maximizing the use of resources.

ISO 22000 can be applied to all types of organization within the food chain, ranging from feed producers, primary producers, food manufacturers, transport and storage operators and subcontractors to retail and food service outlets – together with inter-related organizations, such as producers of equipment, packaging material, cleaning agents, additives and ingredients.

Key elements

ISO 22000 combines generally recognized key elements to ensure food safety along the food chain.

- *Interactive communication*

Clear communication along the food chain is essential to ensure that all relevant food safety hazards are identified and adequately controlled at each step. This implies communication of an organization's needs to the other organizations both upstream and downstream in the food chain. Communication with customers and suppliers, based on the information generated through systematic hazard analysis, will also assist in meeting customer and supplier requirements in terms of feasibility, need and impact on the end product.

- *System management*

The most effective food safety systems are designed, operated and updated within the framework of a structured management system and incorporated into the overall management activities of the organization. This provides maximum benefit for the organization and interested parties. ISO 22000 is aligned with the requirements of ISO 9001:2000 in order to enhance the compatibility of the two standards, and to ease their integrated implementation.

- *Hazard control*

ISO 22000 combines the Hazard Analysis and Critical Control Point (HACCP) principles and application steps developed by the Codex Alimentarius, with prerequisite programmes. It uses a hazard analysis to determine the strategy for hazard control.

"ISO 22000 can be applied to all types of organization within the food chain."

About ISO 22000

ISO 22000:2005, *Food safety management systems – Requirements for any organization in the food chain*

ISO 22000 key elements

- *Involvement of the management team*

Food safety is not just something to be handled by the quality department. It is a top-management issue. ISO 22000 focuses on the involvement of the management team, which has to develop overall policy.

- *Communication*

As food safety hazards may be introduced at any stage of the food chain, interactive communication both upstream and downstream is essential. In addition, internal communication is a key element to avoiding misunderstandings and minimizing risks. A common vocabulary is a great help in this connection.

- *The HACCP (Hazard Analysis & Critical Control Point) principles*

ISO 22000 combines the recognized HACCP principles with prerequisite programmes. The hazard analysis determines a strategy and the prerequisite programmes set up an action plan.

- *System management*

ISO 22000 relies on a structured management system based on relevant parts of ISO 9001. It is possible to integrate them into one management system together with ISO 14001.

The development team

ISO 22000 was developed by food safety experts from Australia, Belgium, Canada, Denmark, France, Germany, Greece, Ireland, Japan, the Netherlands, Poland, Sweden, Switzerland, Thailand, United Kingdom, USA, Venezuela, Vietnam, and liaison bodies such as the Confederation of Food and Drink Industries of the European Union (CIAA), amongst others.

Advantages for the industry

Organizations implementing the standard will benefit from:

- organized and targeted communication among trade partners;
- optimization of resources (internally and along the food chain);
- improved documentation;
- better planning, less post-process verification;
- more efficient and dynamic control of food safety hazards;
- all control measures subjected to hazard analysis;
- systematic management of prerequisite programmes;
- wide application because it is focused on end results;
- valid basis for taking decisions;
- increased due diligence;
- control focused on what is necessary;
- saving resources by reducing overlapping system audits.

Food you can trust

Other stakeholders will benefit from:

- confidence that the organizations implementing ISO 22000 have the ability to identify and control food safety hazards.

The standard adds value because it:

- is an auditable standard with clear requirements
- is internationally accepted
- is a publicly available scheme, not a proprietary one, that can be used by all;
- integrates and harmonizes various existing national and industry-based certification schemes;
- addresses a desire for harmonization from the food processing industries concerning food safety;
- is aligned with ISO 9001:2000, *Quality management systems – Requirements*, and ISO 14001:2004, *Environmental management systems – Requirements with guidance for use*, and the Occupation Health and Safety Assessment Series (OHSAS) and can also incorporate retailers' standards;
- contributes to a better understanding and further development of HACCP.

A complete menu of standards

ISO 22000 is supported by a complete set of standards that reinforce its implementation.

- *Audit and certification*

To increase the acceptance of ISO 22000 and ensure that accredited certification programmes are implemented in a professional and trustworthy manner, the technical specification ISO/TS 22003, *Food safety management systems – Requirements for bodies providing audit and certification of food safety management systems,* was published in 2007.

It provides the necessary information and confidence on how the certification of an organization's food safety management system has been conducted. This technical specification offers harmonized guidance for the accreditation of certification bodies, and defines the applicable rules for the audit of a food safety management system compliant with ISO 22000.

- *Applying food safety*

ISO/TS 22004, *Food safety management systems – Guidance on the application of ISO 22000:2005*, was published in 2005. It provides guidelines on implementing ISO 22000, with particular emphasis on good examples.

In 2007, ISO and the International Trade Centre collaborated to produce the book, ISO 22000, *Food Safety Management Systems – An easy-to-use checklist for small business – Are you ready?* It explains how small and medium-sized enterprises can use and implement ISO 22000.

- *Tracing the feed and food chain*

A new standard was published in June 2007 on traceability: ISO 22005:2007, *Traceability in the feed and food chain – General principles and basic requirements for system design and implementation.* It is a useful amplification of the reference in ISO 22000 to traceability as an important component of food safety.

ISO 22005 is intended for organizations operating or cooperating at any point in the feed and food chain. It does not contain any reference to certification, nor is it combined with other standards. Instead, the possibility of certification is left to the user's discretion. However, the standard requires that organizations carry out monitoring, internal audit and reviews to assess the effectiveness of the system.

Other standards in the ISO 22000 family are being developed. They include a project for quality management for farmers, and a standard dealing with irradiation of foods. More information can be obtained by contacting the ISO/TC 34 secretariat : **uari@afnor.org**.

Benefits of building food safety

Food producers in all parts of the food chain around the world have adopted ISO 22000 as a new global food safety standard. Still, many small and medium-sized companies are waiting for the position of the three main market drivers: multinational food companies, authorities and retailers.

Some of the largest multinational food companies have been very positive about implementing the standard for themselves and their suppliers. Authorities in some countries plan to let certified companies benefit from less frequent controls, and perhaps consider an outsourcing of public control. The front runners in the work are authorities in Denmark and France. Retailers in Belgium and Denmark are already certified with ISO 22000, but greater communication on the benefits for retailers is still needed.

Driving forces for the future

It is important to create a common understanding of the benefits of building a food safety management system based on ISO 22000, for both manufacturing companies and retailers. This is being addressed by ISO/TC 34, *Food products*, and food sector organizations for retailers, food producing companies and international certification bodies, among whom a bridging process has been initiated.

"Food safety hazards may be introduced at any stage, therefore adequate control throughout the production chain is essential."

The driving forces for the future development of ISO 22000's implementation are, to a large extent, retailers, important food producers and national authorities. Future dialogue among them is needed. Authorities have to define food safety objectives for hazards like *salmonella, coli bacteria* and *campylobacter*, and companies need to incorporate control measures that ensure these acceptable levels are met.

Another challenge for the food industry is to manoeuver between authorities, clients and internal company demands on how to make safe foods. ISO 22000 provides guidance on this never-ending question and now the ISO 22000 series provides a set of tools for use by all interested parties. These include consultants, certification bodies, accreditation bodies, public authorities and all players in the food supply chain, from farmer to retailer.

New developments

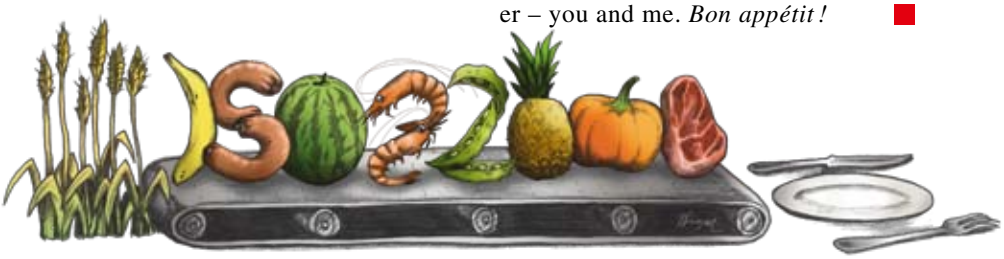
In November 2008, ISO members approved the establishment of an ISO subcommittee on management systems for food safety and quality reporting to ISO/TC 34. The new subcommittee will address standardization in the field of food safety and quality management, covering the food supply chain from primary production to consumption, including both human and animal foodstuffs, as well as animal and vegetable propagation materials.

To maintain the global prevalence of the ISO 22000 series, it will be necessary to continually update the standards already published, as well as to develop new standards and technical specifications as needed – for instance, to focus on a specific trade or to elaborate and clarify specific subjects in the standards.

As organizations begin to adopt ISO 22000 in continuously increasing numbers, it becomes necessary to clarify and respond to issues raised by the users of the standards and the technical specifications. By establishing a new subcommittee responsible for the entire ISO 22000 family, it will be possible to gather all the experts' knowledge in one place, making it easier to respond to issues and requests whenever necessary.

The secretariat of the new subcommittee will be held by Danish Standards, the ISO member for Denmark, and by Mr. Jacob Færgemand (see *About the author*) as Chair. The first meeting of the new subcommittee will take place during the first semester of 2009.

The ultimate objective is to put safe food on the tables of the consumer – you and me. *Bon appétit !*



About the author

Dr. Jacob Færgemand is Convenor of ISO/TC 34, *Food products*, WG 8, *Food safety management systems* and WG 11 on food safety management systems and related conformity assessment issues. Since 1994 he has worked with the certification body, Bureau Veritas Certification Denmark, as lead auditor for ISO 9000 and HACCP, and as hygiene inspector for the British Retail Consortium and ISO 22000 certification. In 1996, he became Food Sector Manager, and in 2002 Sales Director. He now has a position as Business Development Director Food for the Benelux and Nordic Region. He holds a seat on the food committee of Global Food Safety Initiative (GFSI).

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Quality crops

by Richard Cantrill, Convenor ISO/TC 34/WG 12,
Application of ISO 9001 in agriculture

Organizations from around the world are well acquainted with the ISO standard for quality management systems: ISO 9001, *Quality management systems – Requirements.* Widely applied in areas as diverse as airlines and sports clubs, some ISO committees have found it useful to prepare complementary documents with specific guidance for particular industry sectors to further improve the standard's application.

ISO 22006, *Quality management systems – Guidelines for the application of ISO 9001 in crop production,* provides guidance to individuals, cooperatives and companies wishing to apply ISO 9001 principles to agricultural practices.

"The ISO process of consultation and consensus-building aims to produce a final standard equally applicable to all forms of agriculture."

The application of ISO 9001 and of the ISO 22006 industry specific guidance for agricultural systems will promote food safety, process verification, bio-security, identity preservation, the consumer's right to information, biotechnology, and country-of-origin legislation.

Although the idea originated in the American Midwest, a region characterized by large, mechanized farming operations, the ISO process of consultation and consensus-building will ensure that the final standard is equally applicable to all forms of agriculture, be they large or small scale.

Behind the farm gate

The scope of ISO 22006 is crop production. Activities beyond the farm gate such as transportation and storage by the first purchaser of the crop are addressed in other standards. Food safety is similarly covered by ISO 22000 and related standards.

ISO 22006 can be applied to the production of a wide range of foodstuffs, including:

- commodities – wheat, corn (maize), soybeans;
- fruits – apples, pears, etc.;
- fresh produce – lettuce, tomatoes, spinach;
- root crops – carrots, potatoes, beets;
- mixed crops – cotton.

The broad application of this standard is exemplified by reviews carried out on its applicability to crops as diverse as high-intensity olive production and marigold cultivation for nutritional supplements.

Process approach

The focus of the standard is what is termed the process approach. It refers to the application of a system of processes within an organization, together with the identification and interactions of these processes and their management.

Thirteen core agricultural processes were identified and used to create the first draft document. These include:

- farm planning;
- land allocation;
- allocation, purchase and procurement of inputs;
- field preparation;
- field planting;
- field activities;
- pre-harvest and storage activities;
- harvest;
- transportation and handling on the farm;
- crop storage on the farm;
- distribution and delivery;

These processes are outlined in the standard, and an example of their application is given in an informative annex.

"Thirteen core agricultural processes were identified and used to create the first draft document."

And ahead to the finishing line

The ISO working group developing the standard, ISO/TC 34, *Food products,* working group WG 12, *Application of ISO 9001 in the agriculture,* will meet in December 2008 to discuss and resolve comments received during the DIS (draft International Standard) vote. Some of the issues to be addressed include:

- optimizing references to ISO 14001 and ISO 22000;
- definition of "design" (Clause 7.3) in crop production;
- length of the document;
- use of country-specific terms throughout the document, for example, USA terminology such as "scouting" (field observation) and "employees" (people involved);
- removal of selected terms from the guidance text.

The development of this standard has been a rewarding process incorporating a wide range of viewpoints and experiences from both local and global perspectives.

From the time the idea emerged in the year 2000 until its approval as a new work item in 2005, there were many discussions on how broad the scope should be and which crops should be considered. The authors are aware that the standard can be applied to other activities such as the production of food for animals, biomass/substrates for biofuels, fibre products (cotton/hemp), non-food seed (grass seed) and forestry.

Activities that are not addressed in this standard but which might be included later on include transportation of agricultural products, processing of agricultural products, dairy, livestock and poultry. It is anticipated that ISO 22006 will have a wide audience, including crop producers, processors, customers and suppliers in the food distribution chain, as well as agricultural training centres and universities.

Question	Answer
Can ISO 22006 requirements be met by organizations of all sizes?	ISO 22006 does not provide requirements, but guidance. It is based on ISO 9001, a standard already implemented by organizations of all sizes.
Isn't "crop production" a much too broad (or too narrow) concept?	The standard will have wide application.
What about other national and regional documents on food safety already in place?	ISO's globally relevant and applicable standards are the result of consensus amongst representative stakeholders from around the world. Unlike national, regional or private company standards, they can ensure that everyone in the world is on the same page.
Should ISO 22006 wait until the new ISO 9001 is published in 2008?	The new edition has only small changes, and these have been incorporated into the draft standard.
Isn't this material covered by ISO 22000?	ISO 22006 addresses specifically quality management for crop production. It is thus complementary to ISO 9001 (which can be implemented without ISO 22000).
Does it conflict or overlap with existing environmental standards?	The Working Group has made references to other standards where appropriate.
Is there a risk that the examples provided in the standard may be interpreted as requirements?	The standard provides guidance only, and examples should only be interpreted as such.

Table 1 – *Above are examples of some of the questions raised during the submission of the standard for comments, and the responses given.*

About the author

Richard C. Cantrill is Technical Director of the American Oil Chemists' Society. He is also Administrator for US technical advisory group activities in ISO/TC 34 working groups and SC 2 (oleaginous seeds and fruits) and SC 11 (fats and oils), as well as Secretary of ISO/TC 34/SC 16 (biomarkers) and Convenor of ISO/TC 34/WG 12.
Dr. Cantrill is Secretary of the InterAgency Meeting and NGO representative at Codex Alimentarius meetings. He is a member of FAO/WHO Expert Committee on Food Additives (JECFA).

Irradiation – the new choice for food processing

by Romina Garay, Convenor of ISO/TC 34/WG 10, Food irradiation

Reduced spoilage, inhibited sprouting and delayed ripening are some of the advantages procured by food irradiation, the most important being the destruction of harmful microorganisms, bacteria, viruses, and insects that might be present in food.

During irradiation, food is exposed to ionizing radiation in order to improve its safety and quality. The technique may be used for controlling pathogenic microorganisms and parasites, reducing the number of spoilage microorganisms, inhibiting the sprouting of bulbs, tubers and root crops, extending product shelf life, and as a phytosanitary treatment.

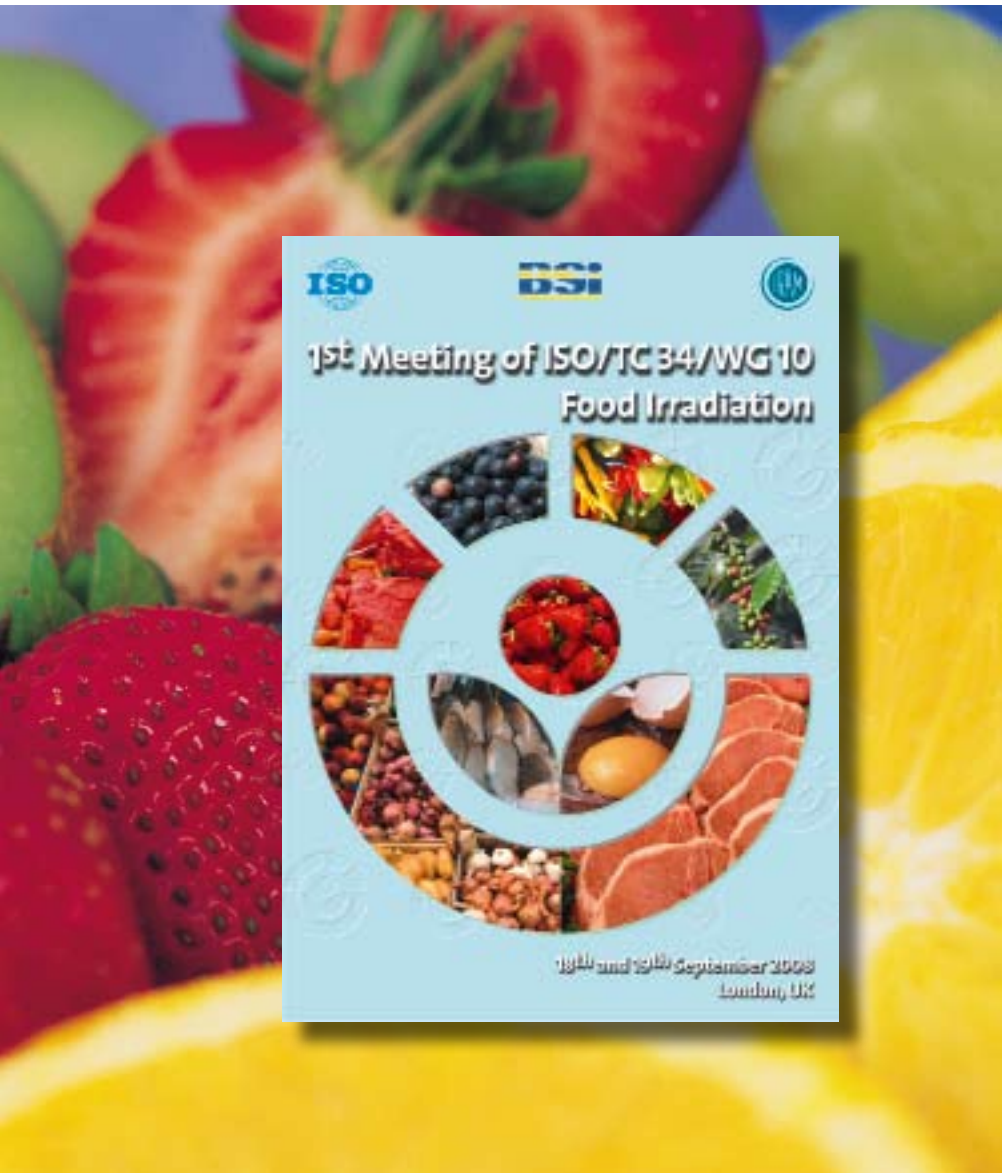
The results can be impressive. For example, berries that normally start spoiling after three or five days can, if irradiated, last up to three weeks. Irradiation is thus becoming an increasingly widespread technological choice in food processing.

Always good practices

Food irradiation is intended for use only on products made under principles of good manufacturing practices, as the technique should not replace other food safety measures.

Incorporating food irradiation into a food safety management system, such as ISO 22000:2005, *Food safety management systems,* is highly advisable. Indeed, the irradiation of food is a Critical Control Point (CCP) of a Hazard Analysis and Critical Control Points (HACCP) programme, helping to minimize the risk of transmission of pathogenic microorganisms to consumers.

In this context, International Standards can assist wholesale customers, irradiator operators and consumers around the world to ensure the quality and safety of the procedure. ISO is therefore currently preparing a quality standard (ISO 22008) to meet this emerging need.



"During irradiation, food is exposed to ionizing radiation in order to improve its safety and quality."

Origins

Given the advantages and increasing propagation of food irradiation, Argentina, through its ISO member, IRAM, introduced a new work item (NWI) proposal to the ISO technical committee ISO/TC 34, *Food products,* on "good processing practices for the irradiation of foods for human consumption."

The NWI was based on two well-known Codex standards:

- Codex Alimentarius, CAC/RCP 19-1979, Rev. 2-2003, *Recommended international code of practice for radiation processing of food*;
- Codex Alimentarius, CX/STAN 106-1983, Rev. 1-2003, *Codex general standard for irradiated foods*.

The proposal was soon accepted and work started under a new working group specifically created to develop standards on food irradiation practices with Argentina as the secretariat. Its members included Argentina, Australia, Canada, China, Cuba, Denmark, France, Germany, Greece, Hungary, Indonesia, Kazakhstan, Morocco, Philippines, Poland, Sri Lanka, Thailand, United Kingdom and the USA.

From medical cabinets to supermarket shelves

At the time a document was prepared, circulated and voted, but eventually unrealistic target deadlines resulted in the cancellation of the programme. However, in January 2007, the project was re-established and incorporated into the ISO 22000 family.

Following a suggestion from the United Kingdom, the structure of the current document was changed to follow the model of ISO 11137-1:2006 – *Sterilization of health care products – Radiation* – Part 1: *Requirements for development, validation and routine control of a sterilization process for medical devices*.

First meeting of the ISO working group on food irradiation, London, United Kingdom.

Many irradiation facilities serve multiple purposes – i.e. the same facility can be used to irradiate foods as well as medical devices – so this harmonization was considered necessary to facilitate parallel implementation of the two standards.

About the author

Romina Garay is Convenor of ISO/TC 34/WG 10, *Food irradiation* and Project Leader of ISO/AWI 22008. She is a standardization professional in food and health management at the standardization direction of IRAM, Argentina. She is Convenor of several technical national committees and IRAM's representative in several ISO technical committees, subcommittees and working groups. Ms. Garay has a BSc in food technology.

Now even better

In September 2008, following a meeting of the working group in London, it was agreed to submit the current working document for voting under the title *Food irradiation – Requirements for the development, validation and routine control of the ionizing radiation process used for the treatment of food for human consumption*.

The proposed standard specifies requirements for the development, validation and routine control of the ionizing radiation process used for the treatment of food for human consumption. It also covers irradiation processes using the radionuclides 60Co or 137Cs, electron beams and X-ray generators. The standard specifies the basic elements to be considered to control the food irradiation process.

At the meeting, it was agreed to move general information from the various chapters of the standards into annexes to make the text easier to read. In the current version of the standard, three informative annexes cover:

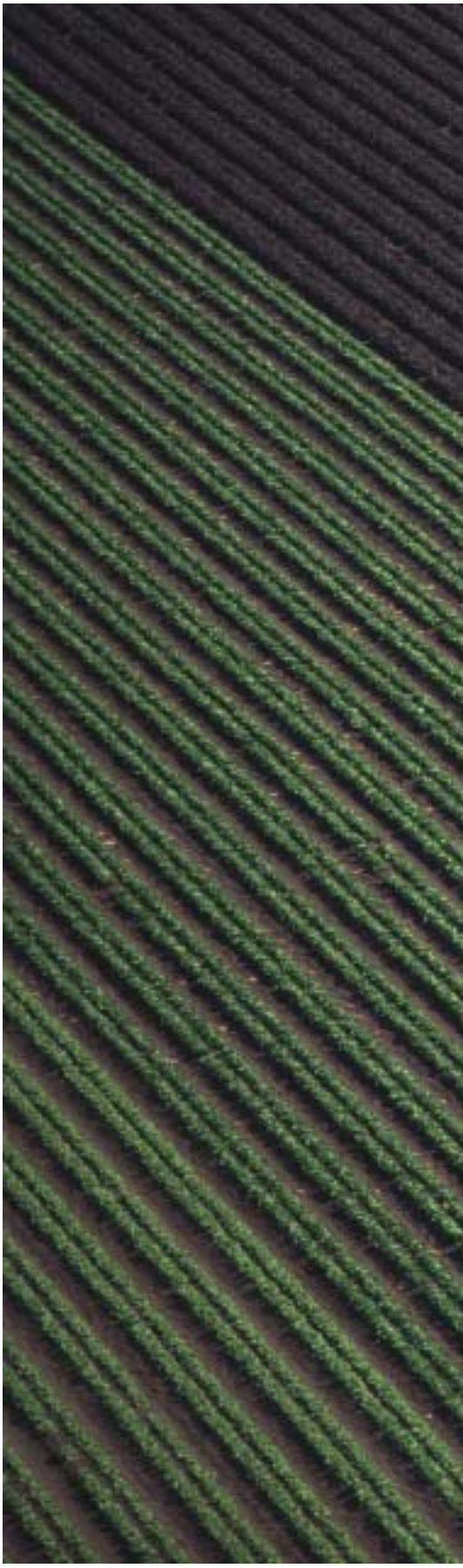
- design of food irradiation facilities;
- product definition;
- dosage calculation issues.

What it will accomplish

The main objectives of the ISO 22008 quality standard are to:

- provide requirements and guidance for the irradiation of food, consistent with current hygienic standards and practice codes, including a technical agreement between the customer and the irradiator operator;
- establish a documentation system for irradiated food within a quality assurance framework.

This technical agreement represents a new concept in food irradiation treatment, establishing responsibilities as well as product and process specifications useful to irradiator operators and customers alike.



A greener approach to crop protection

by Jean-Christophe Rousseau, Chair, ISO/TC 23/SC 6, Equipment for crop protection

Growing awareness of environmental and health issues has brought into question the use of pesticides in agriculture – an increasingly controversial issue. Yet, there is also a pressing need to find viable solutions to feed the world's populations. The use of pesticides is essential here to ensure efficient food production on a quantitative, as well as qualitative and economic level.

In recent years, emphasis has been placed on a reasonable use of pesticides that is compatible with sustainable development. Some countries have tended towards a reduction in the quantities used. More generally, policies have given priority to the development of good practices in the use of phytosanitary products.

The middle link

To date, the focus of regulations has been at the two ends of the chain. At one end, to authorize the marketing of phytosanitary products through very strict approval procedures and, at the other end, to set maximum residue limits for plant foodstuffs.

In the future, and particularly in Europe when the European Commission's *Thematic Strategy on the sustainable use of pesticides* comes into force, emphasis will be increasingly placed on the intermediate link of the chain. This will become notable with the introduction of measures related to:

- practices – recycling of empty packaging, management of phytosanitary effluents;
- users – compulsory training and certification of users;
- application equipment – mandatory inspection of sprayers in use, environmental certification of new equipment.

Technical committee ISO/TC 23/SC 6, *Equipment for crop protection*, has long anticipated such regulatory developments. During the course of the 1970s and1980s, its work mainly addressed the functional parts of sprayers, but since the 1990s the committee's attention has inclined towards aspects related to user safety and environmental protection. This approach can be seen in several examples of recent or ongoing work.

Hoppers to reduce risk

In the application process, one of the most risky steps for both the operator and the environment is the preparation phase of the spray mixture, and in particular the introduction of phytosanitary products into the sprayer tank. This is because it involves the handling of pure, and therefore concentrated, products.

On earlier equipment, the product had to be poured directly into the tank. Today, all equipment with a filling aperture located at a height of more than 1500 mm from the ground or from a platform

must be fitted with an induction hopper. This type of hopper is able to transfer the chemical product into the sprayer, partially mix the chemical product, and even carry out self-cleaning. Free-standing hoppers which can be connected to the sprayer are also available.

In this context, a new subject of study was initiated in 2005. With a membership comprising experts from various sectors and countries – test laboratories, manufacturers, development consultants, from France, Germany, Italy, Sweden and the United Kingdom – working group WG 11, Induction hoppers, developed a two-part standard.

Just published, Part 1 of ISO 21278:2008, *Equipment for crop protection – Induction hoppers,* specifies test methods, whilst Part 2 addresses general requirements and performance limits. This standard incorporates criteria relating not only to performance but also to safety and respect for the environment, namely:

- speed of induction of various forms of products (liquid, powder, or granules);
- efficiency of the bowl-rinsing device;
- efficiency of the can-rinsing device incorporated in the hopper.

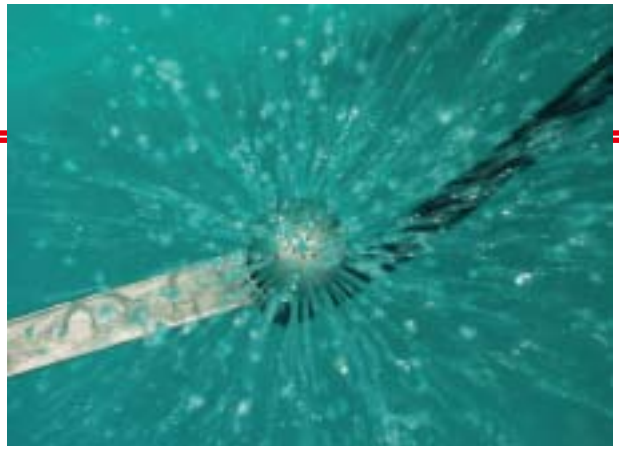
Comparative tests carried out between various hoppers available on the market have revealed significant performance discrepancies, showing that there is scope for considerable improvements to be realized in a number of cases. This new standard will provide invaluable help to manufacturers who, from now on, will have a method to assess their equipment and advance the quality of their products, with benefit for both user safety and the environment.

"One of the most risky steps for both the operator and the environment is the preparation phase of the spray mixture."

Rinsing for good practice

Another example is the rinsing of sprayers. Until now, the main aim of this operation has been to prevent problems during subsequent treatments: unwanted clogging for one, and for another, phytotoxicity risks in the event of the application of a herbicide product.

Rinsing, which is now part of good practices of application, is mainly recommended because of its potential impact on the environment. Indeed, rinsing in the field, which allows dilution or even emptying of the bottom of the tank onsite after dilution, is one of the most efficient methods of managing any residual volume at the end of the application. It also helps to limit to a minimum the risk of pollution from point sources. The European project TOPPS "Training the operators to prevent pollution from point sources" has clearly highlighted the efficiency of this practice.



"Reducing the volume of residual in sprayers is one of the best ways to limit the volumes of phytosanitary residues."

Subcommittee SC 6 has worked on this issue for many years and developed several standards related to the rinsing process:

ISO 13440:1996, *Equipment for crop protection – Agricultural sprayers – Determination of the volume of total residual*, specifies a method for measuring the volume of residual of sprayers. The volume of residual is the part of the spray mixture which, at the end of the application, cannot be sprayed by the

About the author

Jean-Christophe Rousseau is an agricultural engineer. He joined Berthoud, France, in 2002, where he is the Marketing Manager of the vineyard and tree equipment range, and is also responsible for the monitoring of regulations and standards developments relating to sprayers within the Exel Industries group. He has been Chair of ISO/TC 23/SC 6 since 2007.

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device for technical reasons related to the device itself.

In practical terms, it is the volume of the spray mixture that remains in the sprayer when the pump loses pressure. The lower the volume of residual in the device, the less residues it generates at the end of the application and the easier it is to rinse. The residual volume of the sprayer depends on its design but also on the rinsing method used. Reducing the volume of residual in sprayers is one of the best ways to limit the volumes of phytosanitary residues.

More recently WG 6, *Sprayer cleaning*, developed a standard allowing the efficiency of sprayer rinsing systems to be measured. Published in 2004, ISO 22368, *Crop protection equipment – Test methods for the evaluation of cleaning systems*, is in three parts:

- **Part 1:** *Internal cleaning of complete sprayers* (tank and sprayer);
- **Part 2:** *External cleaning of sprayers*;
- **Part 3:** *Internal cleaning of tank.*

Tests on different types of sprayers are underway in order to determine performance thresholds.

Accent on respect

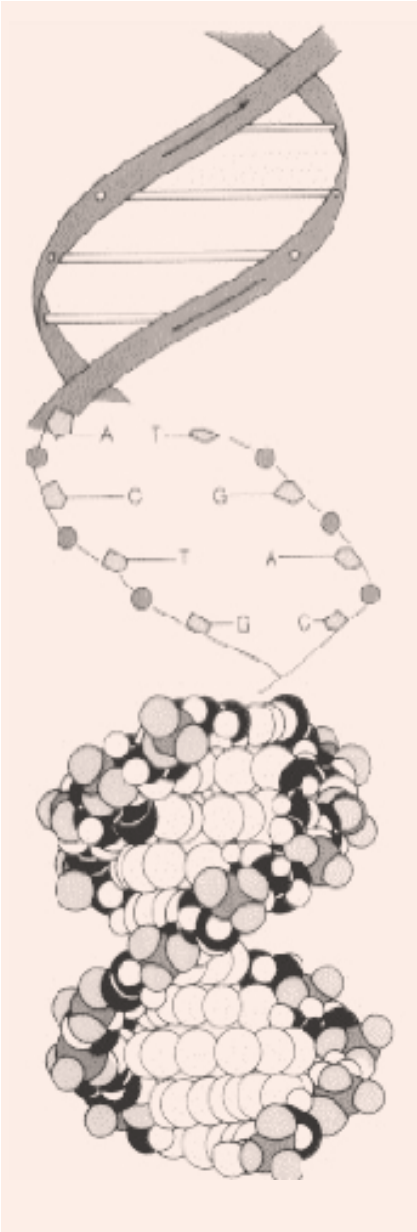
It would be possible to discuss many other examples of past, ongoing and planned work within SC 6, connected with issues of user safety or the environment. Subjects such as measurement of the drift on the field and in the laboratory, safety requirements of knapsack sprayers, safety requirements and performance limits of knapsack atomizers, traceability, among others.

Much of this work has inspired legislators. All of it clearly illustrates ISO/TC 23/SC 6's contribution to promoting application techniques in crop protection with an accent on respect – of user safety, of the environment, of the consumer, and ultimately of us all. ■

ISO enters a new field

Molecular biomarker analysis

by Dr. Michael Sussman, Chair of ISO/TC 34/SC 16, Horizontal methods for the detection of molecular biomarkers in: foods; seeds and propagules of food crops; commodity food crops; fruits; vegetables and derived foods



ISO has entered a new field with the establishment of a subcommittee for standardizing innovative technology in molecular biomarker analysis. Created by technical committee ISO/TC 34, *Food products*, the secretariat of the new subcommittee ISO/TC 34/SC 16, *Horizontal methods for the detection of molecular biomarkers in: foods; seeds and propagules of food crops; commodity food crops; fruits; vegetables and derived foods*, is held by the American National Standards Institute (ANSI), ISO member for the USA.

"ISO members will seek to achieve formal agreement on methods and standards to improve the portability of test results and increase predictability in world trade."

Through the new subcommittee, ISO members will seek to achieve formal agreement on methods and standards to improve the portability of test results and increase predictability in world trade. As national economies grow more and more dependent on world trade, collaboratively developed and internationally agreed standards that encompass the entire food chain are increasingly necessary for improving efficiency and reducing costs.

In the past, ISO has addressed biomarker analysis in food testing. The detection and determination of specific gene sequences in oleaginous seeds led to the development of standards for the detection and determination of these same genes in food products. In 1998, and again in 1999, experts from ISO/TC 34/SC 2, *Oleaginous seeds and fruits and oilseed meals*, expressed interest in biomarker standardization, but could not reach the required consensus vote to add this to their own work programme.

Tentative first steps

In 2000, in the framework of the Vienna Agreement, ISO/TC 34 experts established working group WG 7, *Genetically modified organisms and derived products*, to work in parallel with CEN[1]/TC 275/WG 11, *Genetically modified foodstuffs*, on the development of five standards for detection and quantification of products of modern biotechnology using biomolecular methods[2]. Under the convenorship of the *Association Française de Normalisation* (AFNOR), the ISO member for France, the WG's purpose was to mirror the CEN-led activities on detection of biotechnology-derived markers in food.

However, in 2005, a proposal was made to create a new subcommittee – more permanent than a working group – within ISO/TC 34. The proposal, which addressed the need for biomolecular testing of seeds, was put forward by the US ISO technical advisory group (US TAG) for ISO/TC 34/WG 7, under the auspices of ANSI.

Although there were sufficient positive votes from participating countries to achieve a two-thirds majority and to add this project to the work programme of ISO/TC 34, comments submitted during the voting processes suggested that the topic required further consideration by the ISO Technical Management Board.

The comments centred on two main themes:

- existing ISO/TC 34 commodity subcommittees could cover seeds and biomolecular methods and develop standards for this methodology,
- ISO/TC 34/WG 7 already existed to develop standards related to the detection of biotech-derived foods.

However, neither ISO/TC 34/SC 2 on oleaginous seeds and fruits nor ISO/TC 34/SC 4 on cereals and pulses – the two existing commodity committees – had expressed any interest in working on seed or biomolecular methods. Moreover, the development of methods of analysis for the detection of biotechnology-derived markers undertaken by CEN/TC 275/WG 11 was restricted to food and did not include seed or propagation materials.

"The new subcommittee will work to comply with the needs of ISO members in order to meet their stakeholders' requirements."

Under the Vienna Agreement, an exception was made to allow the development of the food standards to be CEN-led, with subsequent consensual acceptance and adoption by ISO. The five standards arising from this work have been the topic of many discussions by ISO/TC 34/WG 7. They will be considered with regard to content, intent, and global relevance following the recent systematic review (see **Box**).

Early standards

ISO 21569:2005, *Foodstuffs – Methods of analysis for the detection of genetically modified organisms and derived products – Qualitative nucleic acid based methods*

ISO 21570:2005, *Foodstuffs – Methods of analysis for the detection of genetically modified organisms and derived products – Quantitative nucleic acid based methods*

ISO 21571:2005, *Foodstuffs – Methods of analysis for the detection of genetically modified organisms and derived products – Nucleic acid extraction*

ISO 21572:2004, *Foodstuffs – Methods for the detection of genetically modified organisms and derived products – Protein based methods*

ISO 24276:2006, *Foodstuffs – Methods of analysis for the detection of genetically modified organisms and derived products – General requirements and definitions*

About the author

Dr. Michael Sussman is Director, US Department of Agriculture (USDA), Agricultural Marketing Service (AMS), Field Laboratory Services Division. Previously manager of the AMS National Science Laboratory, he has worked for the USDA AMS since 2003. During this time, he has also served as the AMS molecular biologist, responsible for coordinating AMS' biotechnology laboratory program and developing and performing biomolecular testing methods. From 1996 to 2003, Dr. Sussman worked as a research scientist at the Fort Dodge Animal Health Division of Wyeth, Inc. and Origen, Inc, a biotechnology startup company. Prior to 1996, he held post-doctoral positions with the USDA Agricultural Research Service and Michigan State University, publishing over twenty scientific journal articles in the field of biomolecular science. Dr. Sussman has served as a member of the US delegation to the Codex Alimentarius Committee for Methods Analysis and Sampling and the US TAG for ISO/TC 34/WG 7.

1) CEN is the European Committee for Standardization

2) *ISO Focus,* April 2006, "Detection of genetically modified crops and derived foods" Dr. Marianna Schauzu

An expressed global need

Experts in Denmark, Italy, the Netherlands, Switzerland, the USA and others expressed a global need for the standardization and harmonization of methods for the detection of products of modern biotechnology. This was also a stated aim of the European Network of GMO Laboratories and the International Seed Testing Association. After revision and resubmission of the original proposal, the ISO Technical Management Board this year ratified the decision of ISO/TC 34, *Food products,* to establish a new subcommittee. The new ISO/TC 34/SC 16, *Horizontal methods for the detection of molecular biomarkers in: foods; seeds and propagules of food crops; commodity food crops; fruits; vegetables and derived foods*, was created in April 2008. ISO/TC 34/WG 7 has since been disbanded.

"Scientists can now develop ways to feed large, fast-growing populations through moving genes to produce more and better agricultural products."

Tuna and not sardines

Today, with growing interest in applying standards to other areas of commerce, the new subcommittee will work to assure that the resulting standardized testing methods and laboratory criteria comply with the needs of ISO members in order to meet their stakeholders' requirements. Methods of analysis that are harmonized and practicable, with well-defined structure and known nomenclature, will bring more customers to the market.

Biomolecular testing includes nucleic acids-based (DNA and RNA) and protein-based methods. For example, microsatellite analysis shows the difference between salad and frying potatoes; PCR analysis (polymerase chain reaction) distinguishes premium Atlantic salmon from cheaper rainbow trout; and RFLP analysis (restriction fragment length polymorphism) removes any doubt that consumers are buying blue fin tuna and not sardines.

Biomolecular detection methods can also detect and identify plant pathogens early in crop production and, as new methods are developed, it will be necessary to have minimum criteria for accuracy, sensitivity, selectivity, and reproducibility.

New approach to ancient goals

In centuries past, when societies discovered characteristics in agricultural plants that could improve nutrition, they eagerly tried to develop new varieties to enhance these traits. That goal continues today. Aided by modern technology, scientists can now develop ways to feed large, fast-growing populations through moving genes to produce more and better agricultural products. Producers benefit with greater and more reliable production, and the consumer enjoys an ever-wider range of choice, whether for improved nutrition, compatibility with dietary requirements, or to put better-tasting food on the dinner table.

Because technology is now at hand that can assure purity and the highest possible quality for agricultural products, achieving universal acceptance of consistent standards for agricultural products will provide long-lasting benefits to consumers and producers throughout the world.

Got good milk? – Team effort for the dairy sector

by Rinus van Schaik, Secretary of ISO/TC 34/SC 5, Milk and milk products – Methods of analysis and sampling.

Milk and milk products are key in the food chain, providing ingredients for a wide range of food products. Recently, it was revealed that milk powder in certain parts of Asia was adulterated with melamine additives before being added to infant formula and other products. This crisis exemplified how food issues can quickly explode from one area into another throughout the supply chain, making compliance with International Standards increasingly relevant.

ISO/TC 34/SC 5, *Milk and milk products – Methods of analysis and sampling,* makes an important contribution to the effective functioning of the dairy industry, and by extension the entire food chain – by developing, publishing and reviewing methods of analysis and sampling, and by disseminating relevant information to key stakeholders.

Effective collaboration – ISO and the International Dairy Federation

The subcommittee has cooperated closely with the International Dairy Federation (IDF) since 1963 (and until 2001 with AOAC International, the Association of Analytical Communities). This collaboration has resulted in the publication of most of the subcommittee's projects as joint ISO-IDF International Standards or Technical Specifications (IDF Reviewed Methods). These joint ISO-IDF International Standards are published under the auspices of ISO.

The procedure for developing ISO-IDF standards is based on the ISO directives. IDF and ISO/TC 34/SC 5 maintain separate voting procedures.

The ISO-IDF working area is subdivided as shown in **Figure 1**. Development of ISO-IDF International Standards for analysis methods and sampling for milk and milk products is conducted by Joint ISO-IDF Action Teams (JATs), each of which includes project groups for the ISO-IDF work items within its specific scope.

About the author

Ing. Rinus van Schaik holds an "external secretariat" of the NEN, the Dutch Standardization Institute and member of ISO, located at Qlip NV, an independent service organization for the dairy sector.

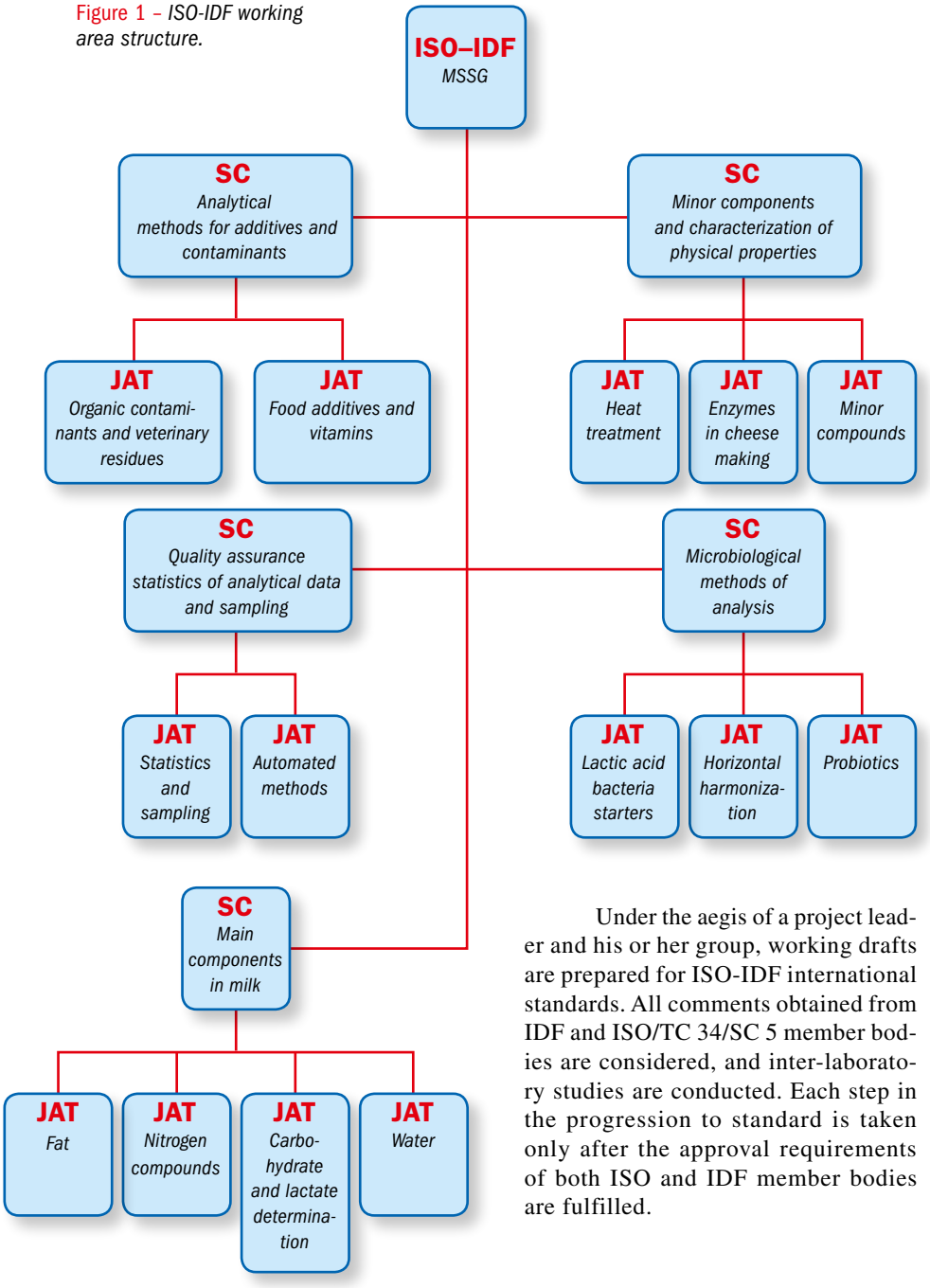
He has served as Secretary of ISO/TC 34/SC 5 and NEN/NC 370 005, *Milk and milk products,* since 1990 and of CEN/TC 302, *Milk and milk products – Methods of analysis and sampling,* since 1992. He is also an associate member of the Dutch National Committee of the International Dairy Federation.

The common ISO/TC 34/SC 5 and IDF working area is supervised by the Method Standard Steering Group (MSSG). The MSSG consists of the chairpersons of the five Standing Committees, a member of the IDF Science Permanent Controlling Committee (SPCC), and the secretary of ISO/TC 34/SC 5. The MSSG is supported by one or more representatives from the IDF Head Office.

Experts nominated to new projects by either IDF or ISO/TC 34/SC 5 become members of the JAT, supervising the project in one of the five specific working areas. There is considerable overlap, however, in the representatives appointed by the two organizations, as they generally draw from the same pool of dairy industry professionals.

"ISO/TC 34/SC 5 contributes to the effective functioning of the dairy industry – and by extension the entire food chain."

Figure 1 – *ISO-IDF working area structure.*



Under the aegis of a project leader and his or her group, working drafts are prepared for ISO-IDF international standards. All comments obtained from IDF and ISO/TC 34/SC 5 member bodies are considered, and inter-laboratory studies are conducted. Each step in the progression to standard is taken only after the approval requirements of both ISO and IDF member bodies are fulfilled.

Since ISO and IDF agreed in 2001 to publish standards jointly, their efforts have led to the publication of about 130 ISO-IDF International Standards. Additionally, some 30 ISO and IDF standards will be brought up to joint ISO-IDF status through a fast-track procedure for publication under the ISO umbrella.

Counting cells and keeping babies safe

Recently published standards include ISO 707|IDF 50:2008, *Milk and milk products – Guidance on sampling*, which provides guidance on methods for sampling milk and milk products for microbiological, chemical, physical and sensory analysis (excluding automated sampling). This standard is used as is by many countries, or as guidance for describing sampling procedures in writing local legislation.

ISO 13366|IDF 148, *Milk – Enumeration of somatic cells,* was also published recently :

- **Part 1**, *Microscopic method* (Reference method) specifies the reference method for counting somatic cells in both raw and chemically preserved milk. This method, applicable to cow milk, can be used to prepare standard test samples and determine the proper reference method.
- **Part 2**, *Guidance on the operation of fluoro-opto-electronic counters,* gives guidance on the operating conditions for counting somatic cells in both raw and chemically preserved milk, using fluoro-opto-electronic methods in which either a rotating disc technique or flow cytometry is applied in the counting section. This guidance is applicable to the counting of somatic cells in raw cow milk and milk from other species, such as goat, sheep and buffalo.

An important microbiological publication is ISO/TS 22964|IDF/RM 210, *Milk and milk products – Detection of Enterobacter sakazakii*. This technical specification provides a method for the detection of E. sakazakii in milk powder

Adulteration of milk – The melamine problem

In response to recent concerns related to the adulteration of milk products with melamine, the MSSG made the following statement:

"Many experts have been actively working towards making appropriate test methods readily available to the international dairy community… not only for supplier milk, but also for intermediate ingredients as well as finished products.

"The task is daunting given the broad scope of consumer foods that contain dairy ingredients as important contributors to their functional and nutritive value. Furthermore, the recent discovery of melamine in some sources of animal feed broadens the scope."

*In their statement the MSSG mentioned that the recent melamine contamination had been clearly intentional to artificially inflate the measured protein content of ingredients and end-products and added "In a publication from September 2008, the World Health Organization (WHO) addresses the issue of the combined toxicity of melamine and cyanuric acid (***www.who.int/foodsafety/fs_management/Melamine.pdf***). According to this report, each substance, on its own, is of relatively low acute toxicity but when co-ingested renal toxicity results.*

"Therefore, in order to provide a measure of food safety, it is important that both analytes be assessed via a robust quantitative protocol. At present investigations are ongoing as to how publication of some of the available procedures could be fast-tracked in light of the immediate worldwide need."

and powdered infant formula, and is also applicable to environmental samples collected from milk powder or infant formula factories. Investigations have shown that a fatal infection was associated with E. sakazakii in hospitalized neonates, and that the infection was associated with the presence of the organism in commercial powdered formula fed to the infant.

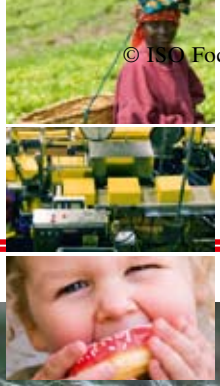
Demands from dairy associations led to an internationally accepted testing method for E. sakazakii (which was recently re-classified as six species within the genus Cronobacter spp). Based on the dairy technical specification cited above, a horizontal standard for food products is currently under development.

Extraordinary successes and future challenges

One measure of the success of ISO/TC 34/SC 5 is its extraordinary co-operation with the IDF. This is reflected not only in the sheer number of publications, but also by the fact that many of the joint ISO-IDF International Standards have been adopted by the Codex Committee for Milk and Milk Products (CCMMP), and through that committee by the Codex Committee for Analysis and Sampling (CCMAS).

But ISO/TC 34/SC 5 also faces significant challenges. One of these is the decrease in the number of available experts and the amount of funding allocated to their work, a problem that can partly be attributed to mergers in the dairy industry. Another issue is the cost of organizing inter-laboratory trials and the number of laboratories participating.

Looking ahead, there is still a great deal to be done, not only in the standardization of methods, but also in bringing the issues to the attention of stakeholders, the dairy industry and laboratories. ISO/TC 34/SC 5 and IDF Methods of Analysis and Sampling are constantly seeking ways to increase participation and encourage member countries and their experts to join our work.



Keeping track – Radiofrequency identification of animals

by Kees van 't Klooster, Convenor, and Pieter Hogewerf, Project Leader, ISO/TC 23/SC 19/WG 3, Identification,

Pet owners can generally be counted on to recognize their own companion animals. But owners are not the only ones who may need to identify animals. Veterinarians require positive identification to provide proper treatment. Customs officials need to know the history of animals crossing national boundaries. The work of humane societies is made much easier when they can quickly find the owner of a lost pet.

Still more factors come into play when it comes to identifying livestock. On the farm, computerized milking and feeding equipment can provide individualized treatment. Off the farm, new owners, cattle sale yards, slaughterhouses and officials responsible for taxes or subsidies need to track animals belonging to numerous owners.

Alpaga, Morgins, Valais, Switzerland

photo : P. Krieger

"Dozens of companies have entered the animal identification market with transponders and transceivers, making it a mature, competitive market."

Figure 1 – *RFID ear tag transponder.*

It all adds up to making the field of identification applications one where the need for standards is very large – and rapidly growing.

Tags that work

The code structure and communication protocols for RFID (radiofrequency identification) of animals have been standardized for over a decade in the International Standards ISO 11784:1996, *Radio frequency identification of animals – Code structure*, and ISO11785:1996, *Radio frequency identification of animals – Technical concept*. Because the standard is based on low-frequency communication in the 134,2 kHz frequency band, it has worked very well for animals: in some applications the animal identification signal has to travel through tissue (e.g. with injectable tags), which is far more difficult to realise with higher frequency devices.

Furthermore, animal RFID tags cannot be swiped through a scanner, making necessary a certain reading distance. This is especially true for large animals

that may impose safety risks for their owners or handlers. Reading distances of up to 1 m are feasible with this technology. The standard enables the use of full-duplex transponder communication (FDX-B) as well as half-duplex transponder communication (HDX). Transceivers compliant with ISO 11784 and ISO 11785 can read both HDX and FDX-B transponders. Further, in ISO 11785 additional requirements are defined for making possible the use of portable transceivers close to a stationary transceiver, without disturbing the reading performance of any of them.

ISO 11785 also provides information on linking stationary transceivers without loss of reading performance.

Evaluation of performance and conformance

ISO 24631, *Radiofrequency identification of animals,* is divided into four parts:

Part 1: *Evaluation of conformance of RFID transponders with ISO 11784 and ISO 11785 (including granting and use of a manufacturer code)*

Defines procedures for evaluating the transponder air interface and code structure. Also includes procedures and forms that help maintain unique identification codes, as specified in ISO 11784:1996.

Part 2: *Evaluation of conformance of RFID transceivers with ISO 11784 and ISO 11785*

Defines procedures for evaluating the transceiver air interface and the transceivers' interpretation of the transponder code structure.

Part 3: *Evaluation of performance of RFID transponders conforming with ISO 11784 and ISO 11785*

Defines procedures for measuring the basic transponder characteristics (activation field, dipole moment and signal stability).

Part 4: *Evaluation of performance of RFID transceivers conforming with ISO 11784 and ISO 11785*

With Part 4, the performance of transceivers can be evaluated as measuring the reading distance diagram and the transceiver response time. The ability to read over a certain distance depends on orientation and direction (see **Figure 2**). The faster a transceiver can read a transponder, the better it will be able to read moving animals.

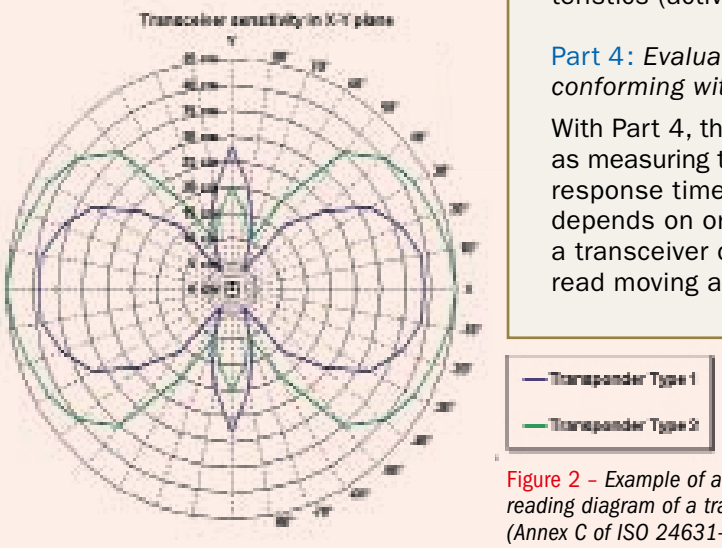


Figure 2 – *Example of a distance reading diagram of a transceiver. (Annex C of ISO 24631-4).*

"These new standards are expected to help users select the right products for their applications."

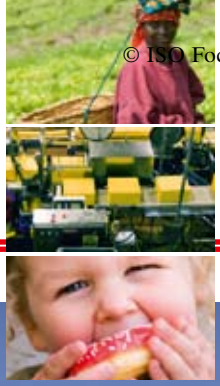
About the authors

Dr. Kees van 't Klooster is a director of Innovative Modern Agriculture – Wageningen bv. His research in Wageningen covers international agricultural, land and water engineering in a broad sense, including animal identification. Dr. van 't Klooster is the convenor of ISO/TC 23/SC 19/WG 3 on animal identification.

Pieter Hogewerf is a director of Innovative Modern Agriculture – Wageningen b.v. (IMA-Wageningen), a company active in the field of animal identification. He is responsible for the ICAR-approved animal identification test laboratory and is project leader of several ISO animal identification standardization projects within ISO/TC 23/SC 19/WG 3. He is involved as project leader in several international and national animal identification projects.

Precise and comparable data

Dozens of companies have entered the animal identification market with transponders (ear tag, injectable or bolus, see **Figure 1**, preceeding page) and transceivers, making it a mature, competitive market and driving product costs down. The technology has been introduced on a massive scale with various applications in different parts of the world, and not only for companion animals and livestock. Use is widespread both in situations where owners may freely choose to tag their animals, as well as in many mandatory schemes around the world that are aimed at tracking animals.



The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) prescribes the use of identification in accordance with ISO 11784 and ISO 11785, and many zoo animals have these transponders. To help them judge the quality of these products prior to purchase, users have been calling for guidance on product selection.

A set of standards currently being developed within technical committee ISO/TC 23/SC 19, *Agricultural electronics,* working group WG 3, *Identification*, will respond to this demand. The draft standards address testing of transponders and transceivers for performance and conformance with ISO 11784 and ISO 11785 (see **Box**). These tests will result in precise and comparable data on transponders and transceivers.

Making life easier

ISO develops International Standards, but does not itself conduct any conformance testing. Where required for ensuring the effective use of specific standards, ISO designates a competent body to serve as a maintenance agency or registration authority. In the case of the series of standards on radio frequency identification for animals, ISO has designated the Rome-based International Committee on Animal Recording (ICAR) as the registration authority (RA). The responsibilities of the RA will include the publishing of test reports on its Web site (**www.icar.org**).

These new standards are expected to help users select the right products for their applications by making well-defined test results available to all interested parties. This will speed up further introduction, encourage producers to improve on performance, and reduce the costs for separate tests in multiple countries.

Fishing boats in northern Norway
(photo © Erik Sterud/Standards Norway).

Sustainable aquaculture – Fundamentally international

by Svein Ludvigsen, Chair, and Hilde Aarefjord, Secretary, ISO/TC 234, Fisheries and aquaculture,

The industries, businesses and trades connected to fisheries and aquaculture are all fundamentally international in nature. This is true both of trade in fish and fish products, and of the production of equipment used in aquaculture and fisheries. Many of the processes involved have potentially far-reaching environmental impacts, and major consumer interests need to be taken into account.

Given its broadly international character, sustainability in the seafood sector depends quite heavily on transnational agreements and practices. Yet to date, there are no recognized international standards specifically for the sector. This is where ISO can play an important role.

Setting priorities

To develop International Standards for the sector, ISO established a new technical committee, ISO/TC 234, *Fisheries and aquaculture*. In assessing the requirements for standardization in the field of fisheries and aquaculture, ISO/TC 234 has proposed that initial priorities should include:

- terminology;
- technical specifications for equipment and its operation;
- characterization of aquaculture sites and maintenance of appropriate physical, chemical and biological conditions;

- environmental monitoring;
- data reporting;
- traceability;
- waste disposal.

Clearly, the work of ISO/TC 234 will not address any related issues already covered by other ISO technical committees. Therefore, the following are excluded from the new committee's scope:

- methods of analysis of food products and traceability;
- personal protective clothing;
- environmental management.

Fish farm outside Bergen, Norway
(photo © Britt Stokke Lønaas/Standards Norway).

Off to a dynamic start

Members presented a number of issues for information, discussion or consideration by the committee at its meeting in Spain in November 2008. Among these was the question of responsible fishing and specifications of good practice for fishing vessels. Development of specific standards will be carried out by working groups consisting of fishery and aquaculture experts nominated by the participating ISO members. To date, two working groups have been established to address:

- traceability of fish products;
- environmental monitoring of the seabed impacts from marine finfish farms.

An ad hoc group has been established to identify objectives, principles, needs and benefits for cage technology that would be used in developing standards.

Another ad hoc group has been created to identify business needs for standardization in the area of food safety for aquaculture farms. This will later be used to determine if this is within the area of ISO/TC 34 or ISO/TC 234.

Other groups and work items are under consideration and two advisory groups have been established on "aquaculture environmental management" and "aquaculture technology". In addition, an ad hoc group is further developing the ISO/TC 234 business plan.

Favourable environment for optimum health

The ISO system allows member countries to propose their national standards as drafts for international standards. In this connection, Standards Norway has two standards that can be considered as a starting point together with information, documents and experiences from other areas – one describing requirements for marine fish farms and another for environmental monitoring of fish farms. Working group WG 2 is addressing this latter question.

Favourable environmental conditions for farmed fish promote optimum health and growth. It is also important to avoid unnecessary environmental impact from marine finfish farms and aquaculture. As an example, the Norwegian Ministry of Fisheries and Coastal Affairs requires all fish farmers to monitor marine fish farms in accordance with the Norwegian standard NS 9410 – *Environmental monitoring of marine fish farms* or equivalent standards. This standard describes methods for determining and monitoring bottom conditions based on the assumption that environmental conditions in the surrounding areas of fish farms are directly related to fish farm waste.

Avoiding slippery escapes

When they escape, farmed fish can inflict economic losses on aquaculture business. In addition, they represent a potential environmental problem. The Norwegian standard NS 9415 – *Marine fish farms – Requirements for design, dimensioning, production, installation and operation* is an example of one way to reduce such problems. This standard is designed to reduce the risk of escape due to technical failure and incorrect operation of fish farming installations.

It describes requirements for the physical design of cage nets, moorings, floaters, barges and auxiliary equipment, as well as for functionality after assembling the main components into a complete fish farming installation. Further, it describes how a complete installation should be placed in relation to the natural conditions in a given locality and how it

Fishing for new focus

ISO/TC 234, *Fisheries and aquaculture,* held its first meeting in October 2007 in Bergen, Norway. A second meeting was hosted by the *Asociación Española de Normalización y Certificación* (AENOR) in Madrid in November 2008. The secretariat is held by Standards Norway (SN), the ISO member which submitted the original proposal to set up this committee.

Although all ISO member bodies have the right to participate in technical committee work, it is particularly important to ISO/TC 234's success that the leading fishing and aquaculture nations are among its members. The committee currently has 16 fully participating national members and a further 16 observers. In addition, three international organizations are in liaison: *the Food and Agriculture Organization of the United Nations* (FAO), *Codex Alimentarius Commission* (CAC) and the *International Union for the Conservation of Nature and Natural Resources* (IUCN).

Fish farm in Øksfjord, Norway (photo © Per Eide/The Norwegian seafood export council).

should be operated in order to achieve acceptable escape protection.

"The fishery and aquaculture industry must take into account important consumer interests."

Valuable contribution

Figures show that seafood is the number one traded food in the world. So it is hardly surprising to learn that one in five people depend on fish as their primary source of protein. With growing populations and to some extent dwindling wild fish stocks, sustainable solutions are necessary to meet world demand. Aquaculture is becoming an increasingly important part of the food supply chain. However, this can only be sustained with good practices, for the health of both the industry and the consumer.

"Favourable environmental conditions for farmed fish promote optimum health and growth."

The development of well-chosen International Standards in the area of fisheries and aquaculture will be a valuable contribution to ensure safe and sustainable fisheries and aquaculture. ■

About the authors

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