

# Food Safety Management in Developing Countries

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## Abstract

Prominent food scares and changes in the international trading environment have brought food safety to the forefront of international agri-food policy concerns. Recent trends include an increased emphasis on food safety regulations in international trade, a tightening of standards in the North, a reorientation of private sector quality assurance techniques towards preventive management, and a corresponding shift by regulatory agencies toward process-based standards including "mandatory HACCP." There is also a new focus on consumers' role in the food safety equation, both as actors in the supply chain and as advocates, and an increased spotlight on scientific methods for assessing food-borne risk. Drawing on the 24 papers presented at an international workshop held in December 2000 and on workshop discussions, this article looks at the consequences of these trends for developing countries, and raises questions for future directions by the range of actors: governments, industry, consumers, scientists, and developing country partners.

## Introduction

In recent years, food safety has become a subject of increasing policy importance internationally. This stems in part from a rash of prominent "food scares" in the United States (outbreaks of salmonella and E. Coli O157:H7) and Europe (notably the spread of Bovine Spongiform Encephalopathy or BSE). There is a growing public perception, shared by some members of the scientific community, that incidences of food-borne disease are on the rise. In a parallel development, the Uruguay Round of international trade talks, concluded in 1994, brought food safety to the forefront of debates concerning trade in food and agricultural products: in a context of diminishing tariffs and quotas, the new arena of contention is the enactment of sanitary and phytosanitary measures, where countries maintain some leeway to determine their own standards.

This changing climate, largely driven by the concerns of the economically more advanced countries, raises several important questions for countries in the developing world. The most obvious concern is the impact on their trade-oriented sectors. Many developing countries rely heavily on agricultural commodity exports, and have been pursuing value-added

strategies to expand their foreign markets for processed foodstuffs. How are export sectors coping with new international environment?

Less frequently voiced, but no less important, are the concerns relating to the food safety situation domestically. For a range of reasons, people living in developing countries face a higher level of exposure to contaminated foodstuffs than those living in wealthier countries – the tropical climate favors proliferation of pests and naturally occurring toxins, the water supplies used to clean and process food are frequently unsafe, and regulatory standards are either lower or less well enforced. Rapid urbanization may have complicated the situation, by changing people's traditional ways of handling their food: more and more people depend on markets, and many rely at least in part on food prepared outside of the home. How are governments, producers, and consumers meeting the evolving food safety challenge?

Both the external and domestic challenges facing developing countries raise questions for the international community. What kinds of development cooperation can best support these countries in the management of food safety? What kinds of collaborative research are needed to resolve outstanding issues?

With these questions in mind, the Food and Agriculture Organization of the United Nations (FAO) and the Center for Cooperation in International Research for Agricultural Development (CIRAD) teamed up to organize an international workshop focusing on the issues facing developing countries in the management of food safety. The workshop brought together food safety experts from Asia (India, the Philippines, Thailand), Africa (Morocco, Burkina Faso, Ghana, Mauritania, Senegal) and Latin America (Brazil, Costa Rica, Guatemala), representatives of donor agencies (European Union (EU), France, Germany, the United Kingdom (UK), and the World Bank), international technical assistance organizations (FAO and the World Health Organization (WHO)) and members of the European research community.<sup>1</sup>

The workshop ran for 3 days in December 2000, and combined paper presentations, panel discussions and working groups. A first set of papers provided overviews of current issues in food safety management; a second set, case studies of management experiences in different types of supply chains. Panel discussions were held on two topics: donor approaches to improving food safety, and consequences of supply chain organization and the regulatory environment on management strategies. The working groups looked at future needs in five areas: risk assessment, regulatory environments, quality assurance, development assistance, and research.

The full set of workshop papers is available in this proceedings volume. This article provides an overview of some of the key issues raised in the papers and in the workshop discussions.

## **Current Issues in Food Safety Management**

### **Recent Trends**

Food safety's rise as an international policy concern has occurred during a time of profound change in thinking about the role of the different players: government regulators, industry, scientists, and consumers. Many of the new ideas have already made their way into practice. Let us begin by reviewing some of the recent trends:

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<sup>1</sup> For a complete listing, refer to the participant list within this proceedings volume.

- **Food safety standards and international trade.** As mentioned, there has been a new focus on food safety issues in international trade since the conclusion of the Uruguay Round, which brought agriculture into the fold of world trading rules. Two agreements annexed to the general trade accords – the Sanitary and Phytosanitary (SPS) Agreement and an updated Agreement on Technical Barriers to Trade (TBT) – were designed to lay out conditions for transparency and equivalent treatment when countries put into place regulatory measures to ensure food safety, consumer protection, and plant and animal health. Under the harmonization principle, countries are encouraged to adopt international standards, such as those agreed to by the Commission of the Codex Alimentarius, an international expert body dealing with food safety issues. When they do adopt stricter measures, these need to be founded on clear scientific evidence (the principle of fundamental rights and obligations). Countries must accept control measures of their trading partners, when these are different from their own measures, if the exporting country can demonstrate that their measures permit an equivalent level of protection (the equivalence principle). Research has shown a rise in standards-based trade obstacles over the 1990s: the number of technical notifications to the World Trade Organization (WTO) and its predecessor, the General Agreement on Tariffs and Trade (GATT) doubled between 1990 and 1998 (HENSON et al., 2000).
- **A tightening of standards in the North.** In response to increasing consumer concerns about food safety, regulators in Europe, the United States (US) and Japan have been raising the bar that food suppliers need to meet to sell on their markets. This includes stricter norms on pesticide and veterinary drug residues and mycotoxins – some of which are powerful carcinogens – as well as on microbial contaminants.
- **A reorientation of quality assurance methods.** In the private sector, food safety management comes under the broader rubric of “quality assurance.” The past decade has witnessed nothing short of a revolution in this area. Industries have shifted away from the traditional focus on end-product testing (where sub grade products are rejected) toward quality management of the production process (where the aim is prevention of quality mishaps before they happen). With regards to food safety, two catch phrases have become omnipresent: “Hazard Analysis and Critical Control Points” (or HACCP) and “farm to fork” strategies. HACCP, a 7-step method developed in the 1960s for controlling microbiological contamination of processed foods for the US space program, has been expanded to cover a range of different types of contamination, in a variety of production circumstances. The “farm to fork” notion is that quality needs to be managed not only in the processing factory, but also along the entire supply chain, from the initial stages of raw material production to the final stages of food preparation for consumption.
- **A shift from end-product to process-based regulatory standards.** Regulators have not been immune to the change in thinking within industry on quality assurance, and are, in fact, partly responsible for the waves of firms adopting HACCP programs. Increasingly, regulatory bodies are shifting their emphasis from measures targeting outcomes (e.g. maximum tolerance levels for contaminants) to process-based measures (i.e., imposition of specific quality assurance methods). The result has been a rise in “mandatory HACCP,” whereby firms in certain sectors (notably meat and fishery products) are required to implement such programs if they want to maintain a license to sell their products. The change in regulatory orientation is justified both on grounds of better

performance (the same reason that industry has been moving to this approach on its own) and on more ethical grounds. Process-based regulations shift the primary responsibility for safety from the government to the private sector (since government becomes the auditor of the industry's own programs). This is sometimes referred to as a move from a "command and control" approach to one stressing responsibility of private industry actors.

- **An increased role for civil society.** These latter arguments are part of a more general shift in thinking about the way society should go about managing food safety, as a shared responsibility of different parties – government regulators, private industry, and consumers. Consumers' roles are two-fold: as the last link of the supply chain (they hold the "fork" in the "farm to fork" imagery), and as advocates and watchdogs for the regulatory process. While the first role has always been acknowledged, it is gaining a renewed emphasis in countries like the US, where regulators are concerned that consumer laxity on food hygiene is a major source of food-borne illnesses. The second, advocacy role is a newer one, and is part of a more general trend toward civic activism on public health and environmental issues. In Europe, the consumer movement is particularly vocal, and clearly has influenced the direction of the regulatory process towards increased stringency (HOBBS and PLUNKETT, 1999).
- **Greater scrutiny of scientific methods of risk assessment.** The decision to introduce regulatory measures hinges on the results of risk assessment exercises. These involve the identification and the characterization of hazards (the contaminants present in foodstuffs), the assessment of the population's exposure to these hazards, and the characterization of the health risk to the population, given likely exposure rates. All four tasks are the job of scientists. Science has come under increased pressure for several reasons. First, the spotlight put on food safety by prominent food scares has led the public to desire answers, quickly, on the nature of risks and the ways to minimize them. Second, under the terms of the SPS agreement, importing countries with stricter-than-international standards need to justify their measures on scientific grounds. This makes risk assessment methods the focus of some trade disputes, with expert scientific testimony mobilized to argue for and against the regulation. Third, there has been a growing debate, spurred by consumer advocates and from within the scientific community, on the nature of scientific evidence for certain types of risk, and on the appropriate ways to deal with probable risk when evidence is inconclusive. The upshot of this debate is the question of when it might be justified to apply the "precautionary principle" to regulate food safety, i.e. to impose restrictions in the absence of firm evidence that they will reduce a health risk. Since countries have taken different positions on the use of the precautionary principle in food safety, this debate has played a role in some prominent SPS-based trade disputes, notably concerning the use of genetically modified organisms (GMOs).
- **Tougher requirements for laboratory analysis:** The new climate has also put increased pressure on laboratories used for analyzing food safety. In particular, there has been a trend toward accreditation – a process by which laboratories demonstrate adherence to a set of quality management norms. Regulatory bodies in the North generally require laboratories used to demonstrate compliance to be accredited, and this is increasingly true for private sector firms as well. Accreditation is seen as a way of guaranteeing analytical quality; it comes at the cost of meeting the requirements of the specific accreditation program, such as the International Standards Organization (ISO). In the United

States and Europe, there is also a growing focus on multi-residue procedures, requiring the use of more sophisticated (and costlier) techniques and equipment.

## **The Workshop Papers**

The first set of workshop papers addresses each of these trends, both in general terms and with the specific implications for developing countries.

Ezzedine BOUTRIF's and Maya PINEIRO's paper on the new international trade context for developing countries provides an overview of the SPS and TBT agreements, and addresses the debate on whether or not the new trading environment has been favorable to developing countries. Citing research findings by Spencer HENSON and his colleagues at the University of Reading, they conclude that even if SPS measures are not protectionist in intent, they pose clear, specific difficulties for poorer countries. In particular, developing countries are handicapped by more limited access to scientific and technical expertise and information needed to meet new requirements. Moreover, the prevailing production and marketing conditions in developing countries are often incompatible with SPS requirements, such as traceability – the ability to trace a product from the raw material to its final form. Preliminary estimates show significant negative economic consequences of more stringent trade barriers, with millions of dollars in lost commodity trade.

Linda NICOLAIDES' paper on quality assurance systems provides an account of the transformation of private sector approaches to quality management that has taken place in recent years. She defines and outlines the linkages between what are typically viewed as successive stages of the preventive approach to quality assurance: "Good Practices", HACCP, and the "Total Quality Management" approach which underlies accreditation programs like those of the International Standards Organization. The paper provides useful background to the case studies of food safety management in individual supply chains. Those papers, discussed below, highlight the specific issues raised for developing countries in responding to this new trend.

The new regulatory approach, emphasizing shared responsibility between government, industry, and consumers, is the subject of Mohamed MAJDI's paper on the Moroccan experience. Morocco has embarked on a reform of its regulatory system, with the assistance of the FAO and bilateral donors, including Canada, and is now implementing several pilot activities designed to streamline regulatory actions and shift some responsibility to industry quality controllers. The author points out some of the difficulties inherent in moving from a system based on repressive control (with spot-checking of end-products and less-than-dissuasive legal sanctions for violations) to a modern control system based on preventive maintenance and a permanent dialogue between government and industry representatives. Difficulties notwithstanding, he suggests that this new approach may provide a particular opportunity for developing countries, whose regulatory bodies under the "old system" lacked the resources to be effective, in terms of either product or geographical coverage.

Two papers deal with the question of scientific methods for risk assessment. Jørgen SCHLUNDT provides an overview of the FAO/WHO risk analysis framework, and outlines current efforts to promote risk analysis for microbial contaminants, a new discipline. He emphasizes the needs for data and for exchange of scientific information to inform the debate on risk management options. Bernard CHEVASSUS-AU-LOUIS provides an informative discussion of the debate surrounding the use of the "standard" model of risk analysis, and the reasoning behind the adoption of a new analytical model using the precautionary principle. He argues that a rigorous application of the precautionary principle can guide risk management policy in instances where the data do not yet permit hard scientific conclusions, but where there is a consensus of probable or possible risk. The new model also implies active participation by representatives of the public in the evaluation and

management of risk, as ways of improving both the quality and the acceptability of risk analysis. Several different models for public participation that have been tried or proposed in European countries are discussed and evaluated.

Bringing the public into the process in a developing country context is the subject of Ben MALAYANG's paper. He highlights the paradox facing poor countries in an area of public health and welfare like food safety: on the one hand, the participation of civil society is essential to complement the role of state institutions, whose resources are limited. Yet poverty severely hampers the public's mobilization in this area, even in a country with vocal democratic institutions like the Philippines. Among many consumers, food safety is often compromised in the desperate struggle to have something to eat. In this context, consumer advocacy groups have been unable to mobilize a wide enough citizen base to influence policy, and government institutions continue to take the lead in promoting food safety. Interestingly, there has been more vocal and influential advocacy work both for and against GMOs than in the area of traditional food safety concerns.

A final set of papers addresses the dilemma of laboratory facilities in the developing country context. Laboratories are essential tools in the food safety system, as an input into quality assurance programs and the regulatory process. They are also expensive to set up and operate, particularly in poor countries, where spare parts are harder to come by and where the basic infrastructure services (water, electricity and gas) are often in irregular supply. Regulatory trends in the North are adding to these costs, with the trend toward more sophisticated techniques and the accreditation requirement. As the paper by John COX points out, these trends are making a difficult situation next to impossible for laboratories in many developing countries. He argues for international support to promote a network of well-managed laboratories for analysis of pesticide residues, in order to foster their viability and eventual accreditation. He also suggests donors should consider supporting private laboratories (particularly those set up by growers' associations), as these are frequently better managed than public sector laboratories.

The idea of networks as a mechanism for strengthening developing country laboratories is also the theme of the paper by Jean-Jacques TULASNE, who describes a project linking food laboratories in several West African countries. The project, funded by the French government and supported by a range of French research and technical institutions, has among its objectives information exchange, training in some of the new laboratory techniques and systems for quality management, and accreditation of at least one laboratory in each of the participating countries.

Finally, the paper by Brehima DIAWARRA and Hagretou SAWADOGO describes an innovative program of collaboration between a public research laboratory and the private sector in Burkina Faso, in a context where most of the clients are small and medium-scale enterprises, with too little business to support a private laboratory system. The partnership involves training in Good Practices and HACCP, the analysis of foodstuffs and in-company tests, and the use of some data for research purposes.

## **Management of Food Safety in Agricultural Supply Chains**

With the "farm to fork" approach to food safety, supply chain management has come into the spotlight in the South much as it has in the North, and both firms and regulators have been scrambling to adopt fully-fledged HACCP programs, or at least HACCP-inspired methods of quality assurance. At the workshop, seven supply chains were chosen to capture key issues of safety management relating to market orientation (local versus export) and type of hazards (microbial, mycotoxins, chemical additives). Table I provides an overview of the 15 papers

by product, country and market. For two product groups – dairy and poultry – the cases focus on domestic market development. For one – coffee – there is an export focus. For the remaining four commodity groups (fish/seafood, groundnuts, fresh produce and animal feed), the papers illustrate approaches for both types of markets.

**Table I. The Supply Chain Papers**

Commodity (key contaminants)	Local Market Focus	Export Market Focus
<b>Dairy</b> (microbial hazards, veterinary drugs)	<ul style="list-style-type: none"> <li>Uganda, Brazil (<i>FAYE &amp; LOISEAU</i>)</li> <li>Mauritania (→) (<i>ABDEIRRAHMANE</i>)</li> </ul>	
<b>Poultry</b> (microbial hazards)	<ul style="list-style-type: none"> <li>Senegal (<i>CARDINALE et al.</i>)</li> <li>Colombia (<i>CABAL</i>)</li> </ul>	
<b>Fish/Seafood</b> (microbial hazards, chemical pollutants)	<ul style="list-style-type: none"> <li>Mali (<i>ZAKHIA</i>)</li> </ul>	<ul style="list-style-type: none"> <li>Thailand (←) (<i>SUWANRANGSI</i>)</li> </ul>
Groundnuts/Aflatoxin-susceptible products (mycotoxins)	<ul style="list-style-type: none"> <li>India (<i>REDDY et al.</i>)</li> </ul>	<ul style="list-style-type: none"> <li>Senegal (←) (<i>DIMANCHE &amp; KANE</i>)</li> </ul>
<b>Coffee</b> (mycotoxins)		<ul style="list-style-type: none"> <li>General (<i>DURIS</i>)</li> <li>Guatemala (<i>ANZUETO</i>)</li> </ul>
<b>Fresh Produce</b> (pesticides, soil pollutants, microbial hazards)	<ul style="list-style-type: none"> <li>Vietnam (<i>MOUSTIER et al.</i>)</li> <li>India (<i>KARANTH</i>)</li> </ul>	<ul style="list-style-type: none"> <li>Costa Rica (←) (<i>KOPPER</i>)</li> </ul>
<b>Animal Feed</b> (mycotoxins, microbial hazards)	<ul style="list-style-type: none"> <li>General (<i>BASTIANELLI, LE BAS</i>)</li> </ul>	<ul style="list-style-type: none"> <li>General (<i>BOUTRIF</i>)</li> </ul>

“→” and “←” indicate that the article also addresses some safety management issues for the other type of market

Some of the papers discuss experiences with the implementation of quality assurance programs; others look at pre-implementation issues of hazard diagnosis and identification of quality management options. We look at each group in turn.

## Implementing Quality Assurance Programs

As several of the case studies show, putting in place quality assurance programs has become a market defense strategy in the new international climate. Exporting industries in developing countries have little choice but to meet the more stringent quality management requirements if they want to retain their markets and see them grow. Some domestic industries have taken a similar approach in the face of new international competition, as tariff barriers are reduced on food and agricultural products.

Sirilak SUWANRANGSI's paper on Thailand's seafood industry illustrates how that country has succeeded in making a full-fledged conversion to HACCP-based methods for its export market. From the time the program was initiated in 1991 to the end of the decade, exports doubled in value terms, reaching over US\$4 billion per annum, making Thailand one of the world's major players in the market for fishery products. The program began as a voluntary

one, and then became mandatory for all processors seeking regulatory approval for exports from the Thai Department of Fisheries (DOF). As of 2000, 201 fish processors were approved, and the DOF had gained international recognition for its regulatory oversight by a number of major fish importing countries, including Japan and the EU.

Gisela KOPPER recounts a similar success story concerning Costa Rica's export market for fresh produce. Once again, regulatory HACCP has been used to keep markets (and particularly the crucial US market) open to Costa Rican products, and the Costa Rican authority has earned the distinction of regulatory equivalence with the US authorities. Here, as in Thailand, the new collaborative model of food safety has been applied, with government assuming the role of auditor of industry's own quality control programs.

Such is also the objective of two more recent market-defending quality programs presented at the workshop. Maria Piedad CABAL discusses the experience of the Colombian poultry industry with a pilot HACCP program, introduced as a way of preparing for the consequences of Colombia's accession to the WTO. The industry is making the bet that meeting stricter quality norms will help it to fend off competition from US poultry imports, which will become significantly cheaper than their domestic equivalents once tariffs are removed. Experiences with the voluntary HACCP program in the first year were sufficiently favorable that the producers' organization chose to continue the program and extend it to a larger number of firms. Whether the quality label alone will be a sufficient draw for Colombian consumers, once import barriers are removed, remains a serious question for the industry's future, however.

The confectionary groundnut sector in Senegal, recounted by Philippe DIMANCHE and Amadou KANE, is another challenging case. In response to new, stricter maximum tolerance limits for aflatoxin in the EU, the industry and regulators have been attempting to put into place a quality assurance system to save their export market. The program involves setting up the requisite laboratory system (by strengthening industry's self-monitoring labs and preparing the national food technology lab for accreditation) and getting actors along the supply chain to adopt quality management techniques. There are significant technical challenges, however, since even a single contaminated grain can raise an entire lot to impermissible levels of aflatoxin. Appropriate sampling techniques to demonstrate regulatory compliance are difficult to establish under such conditions. Since some producing countries – such as the US – have a lower incidence of aflatoxin in their groundnut crops than tropical countries like Senegal, the new regulations may lead to a permanent displacement of the market unless effective management solutions are found and adopted.

Other case studies describe situations where quality management has been a local response to local opportunities, rather than something motivated directly by the international scene. One is Hanoi's "safe vegetables" program, an initiative of the Vietnamese government to deal with the problem of chemical contamination of leafy vegetables, a major component of diets. The program was launched on a pilot basis in 1995 with the collaboration of some cooperative producers and the establishment of a handful of "safe vegetable" shops. A survey done by Paule MOUSTIER and her colleagues finds that consumers are interested in the higher quality product, and willing to pay more for quality. At this pilot stage, with only 1.5% of Hanoi's vegetable supply met through the program, supply rather than demand is the constraint for expanding the market.

Finally, Nancy ABDEIRRAHMANE presents the experience of a fully private sector initiative in Mauritania to establish a modern dairy drawing on local production of dromedary, cow and goat's milk. In the context of a virtually nonexistent regulatory environment, the dairy managers developed "made to measure" food safety practices, tailored to take into account the nature of the supply chain (many small producers selling at numerous collection points; impracticality of conducting laboratory tests on samples at point of purchase) and climatic



conditions (which made standard protective clothing used in temperate zone dairies inappropriate). The wager has paid off, although the dairy still faces tough competition on local markets from lower quality products, given the population's limited understanding of dairy hygiene as a source of illness. Moreover, the absence of regulators, while allowing a greater flexibility to the firm in developing its quality assurance system, has proven to be a constraint for the development of potential export markets in Europe for dromedary cheese. There simply are no regulations on the book within the EU authorizing the import of dromedary milk products. It would require high-level advocacy work by officials to change the regulations blocking the development of this potential niche market

## **Diagnosing and Devising Solutions to Food Hazards**

The papers focusing on the upstream issues of hazard diagnosis and identification of management solutions look at products for local markets, mainly in loosely structured, informal sectors. The one exception is coffee, where new European norms under consideration for ochratoxin pose a threat to exporters. Upstream work is needed, since there are no established mechanisms for controlling the problem, associated with the occurrence of molds. As in the case of groundnuts, sampling techniques are problematic at the low levels of tolerance that would apply. Daniel DURIS' paper describes a new multi-country project aiming to devise appropriate management practices along coffee supply chains, which typically involve large numbers of small-scale producers. Francisco ANZUETO recounts the steps being taken by Guatemala to monitor the ochratoxin situation in its coffee industry. Although Guatemala may be more fortunate than some other producers, because both the type of coffee grown (arabica) and the processing method used for dehulling (wet method) appear to limit contamination, the industry remains vigilant, given the crucial role of coffee to the economy's export earnings and income generation.

Improving food safety in informal supply chains raises questions at both the technical and organizational levels. These are areas where there are no ready-made solutions, either because knowledge is lacking on the incidence and characteristics of hazards, or because the nature of the supply chain is such that imported solutions are not entirely suitable without modification – for instance, the need to allow for scattered actors, for the lack of integration of the chain, for rudimentary processing technologies, etc. In such situations, it has become popular to look for “HACCP-type” approaches to quality management. The aim is not to introduce programs involving the full HACCP system (complete with documentation, record-keeping, and internal audits), but rather to use the HACCP approach as a guide to determining problems and solutions.

Bernard FAYE and Gerard LOISEAU discuss the issues facing rapidly expanding dairy supply chains in developing countries, and provide illustrations of hazard identification in a supply chain perspective from Uganda (milk) and Brazil (cheese). They argue that working with supply chain actors to limit these hazards is a more promising route, in these contexts, than imposing strict regulatory sanctions, given the multiple sources of contamination and the limited reach of regulators.

Eric CARDINALE and his colleagues examine the situation of the emerging poultry industry in Dakar, the capital city of Senegal. This is a relatively new industry, which has been expanding in tandem with changing food habits – notably the rise of fast-food and other away-from-home meals. The team's research shows an alarming rate of contamination by salmonella and other microbial organisms, involving many small- to medium-scale producers and processors. The human health risk is compounded by the new food habits, most notably the fact that operators at the restaurant end of the chain (again, small and largely informal sector) frequently do not cook the meat sufficiently to kill the pathogens. The safety steps to overcome these problems are readily available; the challenge comes in finding effective

ways to communicate with the supply chain actors and consumers about the hazards and the need for vigilance.

Nadine ZAKHIA describes a project involving researchers and actors of the dried fish supply chain in Mali, which is based on artisanal techniques of fishing and processing. The project comprised the identification of hazards, the exploration of techniques for limiting contamination that the actors considered feasible, and the development of standards for regional trade in dried fish together with regulatory authorities.

Two papers look at the problems encountered with contaminated animal feed. Although the primary concern with feed has long been the effects it has on the health and vitality of the animals themselves, there have been increasing concerns about induced effects on the safety of the animal products for human consumption. The most prominent, if not most widespread, example in recent years has been that of BSE, linked to contaminated animal-based feeds, and suspected of causing a form of the incurable and deadly Jacobs-Kreutzfeld's disease in humans. Ezzedine BOUTRIF's paper provides an overview of the different types of contamination problems encountered in the feed-to-food link and summarizes the major standards, codes and guidelines that have been established by the Codex Alimentarius Commission to facilitate safe trade in feedstuffs and animal products. Denis BASTIANELLI and Cedric LE BAS look at possible solutions to some common feedstuff contamination problems in developing countries. These problems are frequently more serious than in the North, given climatic factors (higher rates of fungal and microbial contamination) and limited regulatory control (higher rates of inappropriate additives). They argue for an approach adapted to the less structured supply chains of these regions. For instance, contamination by feed additives in the North is largely avoided thanks to the high level of vertical integration in the sector: the feed provider is also the poultry seller, and thus responsible for quality at both stages. Such an in-built incentive system is missing in the disaggregated supply chains more common in developing countries. In addition to training supply chain actors in preventive measures, the authors argue for the use of low-cost, non-toxic additives to reduce risks. Such an approach requires additional research to validate some of the suggested methods.

Low-cost techniques appropriate in the developing country context are also the subject of two papers looking at contamination problems in India. D.V.R. REDDY and his colleagues present the results of immunochemical tests they have developed for diagnosing the presence of aflatoxin in selected foods and feeds sold on various markets in the country. These tests, inexpensive and easy to use, revealed significant levels of contamination in some cases, and have been adopted by the feed industry for routine testing of ingredients. The authors argue for a wider use of such tests to ensure a safer food supply. N.G.K. KARANTH's paper presents comparable results for several low-cost tests for pesticide residues in fresh vegetables. Given evidence that the most serious problems are linked to contaminated soil, he also proposes some innovative redeeming technologies for "bioremediation" and "biocleaning."

## **Future Directions for Food Safety Management**

What are the principal challenges facing developing countries in the food safety arena, and where are the needs greatest for support to research and development activities? The workshop discussions provided useful insights on these questions, all the while highlighting that there are no easy answers. We identify six key areas of debate: (1) the ethical and practical issues of "marketing" safety in developing countries; (2) the extent to which improving food safety for export markets has a positive spillover onto local markets; (3) the degree to which HACCP "pays off", both financially and in terms of increased safety; (4) the

appropriate role for government in promoting food safety; (5) the extent to which food safety should be a priority in relation to other areas requiring government support; and (6) the role donors can and should play.

## **“Marketing” Food Safety in Developing Countries: Ethical and Practical Considerations**

Should there be a market for safe food? In other words, should consumers have a choice to buy foods that are more or less safe, much in the way that they have a choice to buy goods with different levels of other quality characteristics? People’s intuitive response to this question is generally negative, on the ethical grounds that safe food should be a right of all members of society. Is food safety a public good, to be guaranteed by government, and whose cost should be borne by society as a whole? Or should food safety be ensured through market mechanisms, with individuals directly assuming responsibility for their choices? The subject opens to debate for at least two reasons.

First, the distinction between “safe” and “unsafe” is rarely an either-or proposition; for most contaminants, different levels of tolerance could be admissible, depending on the frequency of consumption and the way meals are prepared. At the same time, increasing safety raises costs, requiring more expensive production methods and involving higher rates of loss. This line of reasoning has led some economists to argue for allowing consumers a choice in the level of safety they want (and are willing to pay for), beyond some minimal level guaranteed by government (ANTLE, 1995). A concern in developing countries, eloquently addressed by Ben MALAYANG, is that many people can barely afford to purchase food of any kind. A market that distinguishes food according to levels of safety may find the poor consuming mainly the unsafe foods, which would logically be cheapest. This is no longer a matter of individual choice, but solely one of individual constraints, and provides an argument for public guarantees of safety standards.

Second, even strong advocates for public safety guarantees (and against a “market” for safety) run into practical constraints in the developing country context. When the regulatory reach of government is limited, both by resource scarcity and by the nature of the supply chains themselves, it can be difficult, if not impossible, to impose minimum standards effectively. In such cases, pilot activities to promote safer foods are seen as a way forward. The Vietnamese vegetable program described by MOUSTIER and her colleagues is one such example. Another is the introduction of some voluntary programs in Costa Rica to introduce safer methods for fresh produce destined for the local market, described by KOPPER. Both programs in effect create a market for safer foods – in the Vietnamese case through the project’s special retail outlets, in the Costa Rican case through the granting of quality labels for project produce. If the programs are successful in attracting enough consumers, they could lead the way to a generalized imposition of higher quality norms, and thereby minimum guarantees of safety. But it is also possible, given high poverty rates, that they will enjoy more moderate success, and result in a segmented market for produce with and without safety guarantees.

### **Is Better Safety for Export Markets a Lead-in for Local Markets?**

Economic necessity makes it quite natural for countries to devote attention to meeting food safety standards in their export sectors. Failing to do so can result in a significant loss in export earnings, incomes and employment. The domestic market is less demanding, and hence of lower priority in this respect. Does improving safety for export have positive effects on the domestic public health situation – above and beyond the indirect benefits accrued

through income and job creation? Such a situation would be ideal, allowing a pragmatic focus on economic imperatives to generate wider socio-economic benefits. Observers give three different answers to the question. Some argue that there is a positive spillover: techniques learnt for exports will foster the creation of a “quality culture” in the food industry more generally. Skeptics argue against this view in one of two ways: either that there is no link between the two markets (and hence no direct benefit), or that there are actually adverse effects for local markets from improvements in safety for export markets. The absence of linkages could occur when an export industry functions as an enclave, wholly separate from the local market. Negative spillovers could occur if the industry conducts sorting for export, leaving the non-export grade product (with a higher concentration of contaminants than before sorting) available for local consumption.

In practice, it is likely that all three types of situations occur, depending on local circumstances and on the nature of the product. The policy question is how to foster beneficial linkages between the export sector and producers serving the domestic market (particularly when they work in different companies), through training and other support mechanisms. This is the idea behind the Costa Rican initiative for fresh produce, which works with farmers and local distributors. It is also an objective of the Thai Department of Fisheries, which, as SUWANRANGSI describes, has begun encouraging fish processors serving the domestic market to adopt various quality assurance methods.

### **Does HACCP Pay Off?**

In the new philosophy of quality assurance, the dictum of management specialists is that “quality pays for itself.” This may well be true in situations where individual firms make the decision to innovate by providing greater quality assurance to their clients. It is less obvious in a context where quality assurance systems like HACCP and beyond (including accreditation) are becoming the norm rather than the distinguishing factor. In such situations, implementation becomes a market necessity, and firms may be lucky to recover their costs.

Another dictum one might formulate, in light of current regulatory trends, is that “HACCP guarantees safety.” There are, however, debates on this question as well. At the point when US regulators were planning to introduce mandatory HACCP in the meat and fisheries industries, consumer groups raised concerns that the opposite might be true – they worried that a shift of regulators to a position of “auditor of industry audits” would distance them from the real problem of monitoring safety (ANTLE, 1995).

Both questions – is HACCP cost-effective, and does it really increase food safety – merit closer examination, given the speed with which the system has become the industry and regulatory standard.<sup>2</sup> For developing countries, the HACCP wave also raises particular concerns. As both SUWANRANGSI and KOPPER argue, HACCP systems entail substantial up-front costs, effectively limiting them to large-scale firms. While this scale-sensitivity of HACCP has also been raised in the North, it is likely to pose a greater problem in the South, where many more supply chains are composed of small and medium-scale enterprises. The fear is that the new regulatory environment for exports may effectively preclude many of these firms from moving up the ladder. If developing country governments push for the introduction of process-based requirements for the domestic market, this may reinforce the advantages of large firms (including multinationals from the North). Case study research by FARINA and REARDON (2000) suggests that this trend is well on its way in Latin America, with large companies, able to demonstrate adherence to various quality certification

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<sup>2</sup> For a discussion of the debate on whether or not HACCP is cost-effective in a developed country context, see UNNEVEHR and JENSEN (1999).

programs, making inroads on large urban markets. In such a context, less ambitious measures to sensitize small-scale, informal sector operators to better safety practices may not be enough to help them compete.

## **What Role for Government in Promoting Food Safety?**

The new thinking about roles for the private sector (industry) and civil society (consumers) in co-managing food safety also raises questions about what governments should be doing. Does the collaborative management model really imply that governments have less to do? Or is it more a question of changes in orientation? The workshop discussions suggest the latter may be closer to the truth. Let us consider the different arenas in which public support is considered crucial.

First, it is noteworthy that in the developing country context, governments appear to play a critical role in helping industries – even well developed ones – to make the transition to meeting new international standards. Government was the catalyst for the successful programs in Thai seafood and in Costa Rican fresh produce, just as it has been in the pilot activities for safe vegetables in Vietnam and for confectionary groundnuts in Senegal. In Colombia, the initiative came from the producers' organization, but government support to the program (notably the funding to support bringing in the teams of quality consultants) was critical. The only example of a purely private initiative for quality assurance was that of the dairy in Mauritania, which involved an individual firm and not a whole industry. The message to be drawn here seems clear – to the extent that a quality label is important on a larger scale than a single enterprise, public support, and perhaps also leadership, may be critical to the initiative's success. As SUWANRANGSI stresses, regulatory officials need to gain new skills to play this role effectively.

A second theme concerns the interface between the public sector and the public at large. If consumers are to be able to play a more effective role in protecting themselves from food-borne diseases, health education is essential. The study by CARDINALE and his colleagues on poultry in Senegal highlights the new needs in this area arising from changing food habits and urbanization. As MALAYANG points out, the fledgling nature of consumer movements in developing countries also tends to place governments in the position of taking on the advocacy role that these groups would ideally play on their own. Many governments provide some support (logistical and financial) to consumer groups in their infancies, in order to encourage their development.

A third area for public sector action is research. The research needs of developing countries in the food safety area are multiple, and cover the entire range of risk assessment and quality assurance activities. In many supply chains there is a need for better understanding hazards – their characterization and their incidence – and how to control them. Low-cost methods are needed both for hazard detection and remediation. These are areas where only some borrowing can be done from findings and methods available in the North, and where the private sector is unlikely to have the resources to do or fund the work on its own. Public-private collaboration is needed for research on hazard management; so is collaboration with teams from countries with greater experience in these areas, including other developing countries. Many workshop participants stressed the key role that could be played by regional networks to address the particular challenge of laboratory quality in this work.

The other part of the risk assessment equation relates to the epidemiological aspects: exposure rates of the population and sensitivity to food-borne contaminants. This is an area where there is little direct knowledge pertaining to developing countries, as most research is done in the North, on local populations. Nor is it an area where private sector involvement could be anticipated to be significant. Yet it could be important, both because certain

foodstuffs are not consumed in the North, and because populations may not have the same levels of tolerance, to conduct original research in this area rather than relying on extrapolations from research done elsewhere. Here again, collaboration among countries could be a key way to proceed.

The fourth and final area where an important public sector role was stressed is in the international arena. Governments that are not actively present in the WTO and the international standard setting bodies like the Codex Alimentarius Commission are unable to support their domestic food industries. As BOUTRIF and PINEIRO argue, this is a critical area for developing countries, both to help determine the agenda of work done on standards, and to defend their industries in the WTO dispute resolution process, once specific trade problems crop up.

### **How Much Priority Should Governments Devote to Food Safety?**

The obvious problem, in relation to this range of activities that in principle merit public support, is where to find the resources. Governments in the developing world face multiple demands, and have only a limited capacity to respond. Where does food safety fit in among the range of concerns? This question can be asked from two standpoints: food safety as an instrument of public health, and as a tool for economic development.

In the public health arena, the criterion for resource allocation is generally one of cost effectiveness – for a given level of resources, how many lives can be saved, or days of illness reduced, by devoting attention to a range of important public health problems. Here, the value of spending on food safety resources would need to be weighed against that of programs to combat diseases such as AIDS and malaria, and other public health problems like water and sewage systems.

For economic development programs, the convention is to consider the returns to spending among alternative activities – i.e. to weigh both costs and benefits of different uses of public resources. Here, food safety expenditures would be judged in terms of the benefits they generate (in terms of keeping markets open or generating new markets) per unit of cost, in relation to other economic projects receiving public support (export promotion, industrial development, certain types of infrastructure, etc.).

It is easy to see, in this context, why much of the focus in the food safety area has been on the export-oriented sector. On the one hand, the lack of risk assessment work means that there is little knowledge about the stakes of food safety from a public health perspective in developing countries (lives lost, morbidity rates). Meanwhile, it is fairly straightforward to make some positive assumptions about how improved food safety will generate benefits for specific export sectors. If there are positive spillovers to the domestic food supply, this also generates public health benefits.

### **What Role for Development Cooperation?**

In light of governments' own resource constraints, donor agencies can play a key role in improving developing country food safety management. Traditional project support – for instance, to develop appropriate management techniques for a supply chain facing marketing constraints – is clearly a useful mechanism. But there are a number of other ways in which developed country partners can also provide helpful input. This includes facilitating exchanges to build regional networks; support to improve the advocacy capacities of developing countries in international forums; assistance in getting the science-based information on the table for certain tropical pesticides and bacteria; building up networks of

laboratories on the road to accreditation. To date, donors have put an emphasis on the export-oriented sectors, in part on the grounds that this will generate direct economic benefits. But this is also a response to the new trading environment. The SPS Agreement includes several clauses requiring assistance and special treatment of developing countries, and a number of donors are providing support as a means of helping trading partners cope with new regulations. (For instance, the EU is funding the groundnut and coffee projects to combat mycotoxin contamination, and the US has been a key supporter of Costa Rican food safety efforts). In the view of many developing countries, much remains to be done to level the playing field.

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